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Editorial and Business Offices:

Vatican City
Telephone: 6-6896.845,
6896.793, 6896.798
Telefax 6-6896.841

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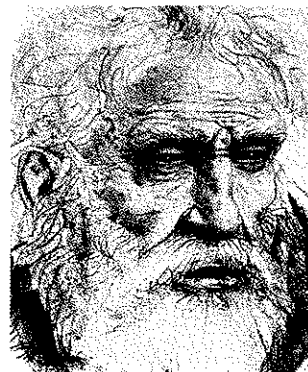
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Proceedings of the Third International Conference

*organized by the
Pontifical Council
for Pastoral Assistance
to Health Care Workers*

*on
Longevity and the
Quality of Life*

**November 8-10, 1988
Vatican City Synod Hall**



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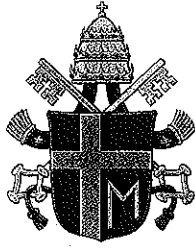
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The illustrations in this issue represent scenes from the Apocalypse by medieval painters (from Frédéric van der Meer, THE APOCALYPSE Ambers. Fond Mercator).



Dilecto ac Venerabili Fratri
FLORENTIO ANGELINI
Archiepiscopo titulo Messeniensi

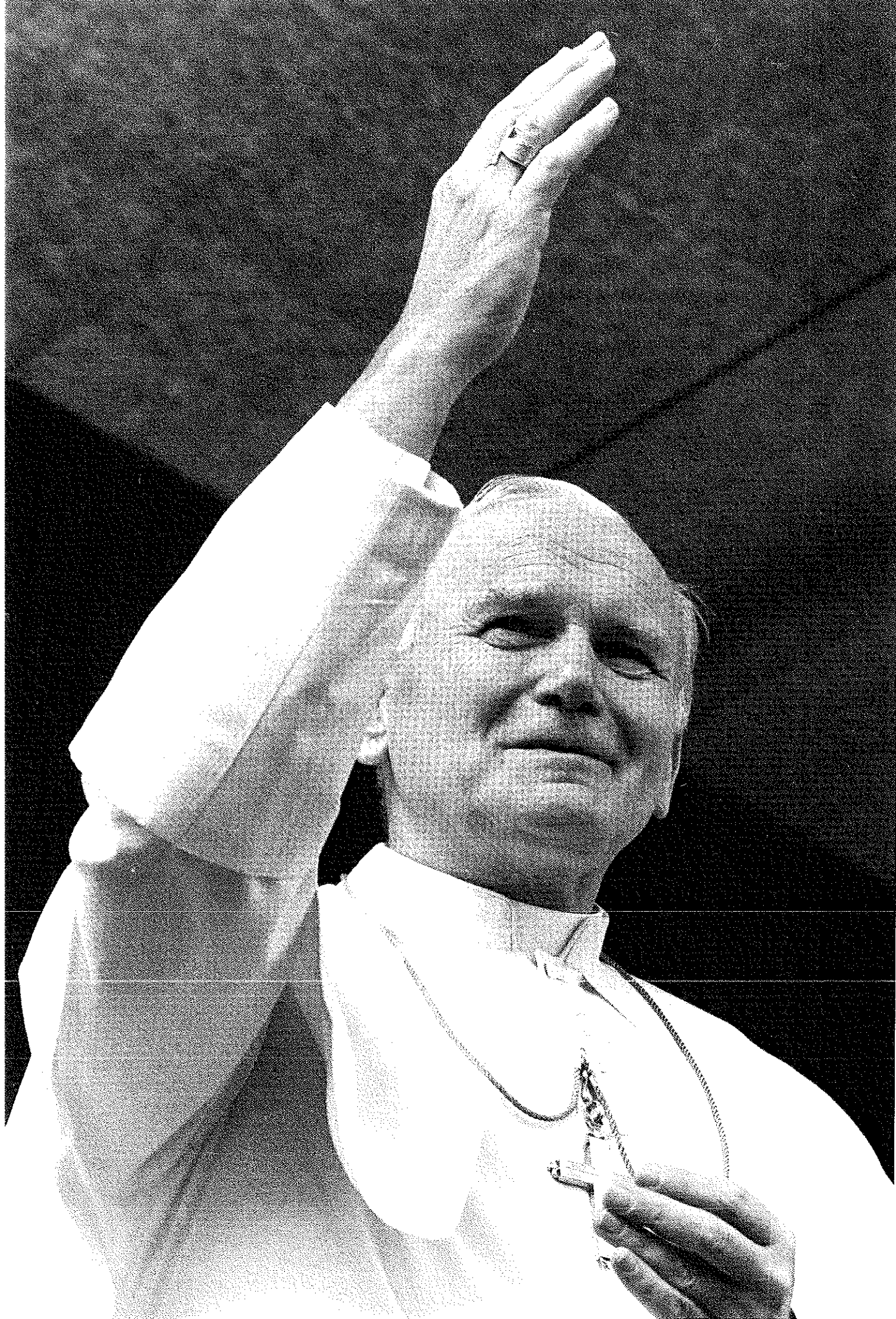
Ad gravissima munera Romanae Curiae intentus, quibus Beati Petri Successores in universa gubernanda Ecclesia proxime adjuvantur, cum Constitutio Apostolica a verbis incipiens "Pastor Bonus" suos plenos et integros effectus hodie sortiatur, Te Praesidem Pontificii Consilii de Apostolatu pro Valetudinis Administris constituo et nomino. Proinde Tibi omnia et singula huic officio adiuncta iura et honores concedo et onera tribuo.

Vota faciens ut Deus Tibi in huiusmodi officio ad gloriam suam et Ecclesiae bonum implendo propitius adesse pergat, Benedictionem Apostolicam, fraterni amoris testem, Tibi libenter impertio.

Ex Aedibus Vaticanis, die I mensis Martii, anno
MCMLXXXIX.

Joannes Paulus PP. II

With the coming into force of the Apostolic Constitution Pastor Bonus on March 1, 1989, the Holy Father appointed Archbishop Fiorenzo Angelini President of the Pontifical Council for Pastoral Assistance to Health Care Workers, as the above document, signed by the Pope, testifies.



Safeguard and Defend the Personality of the Elderly

Ladies and Gentlemen,

1. My respectful and cordial greeting goes out to you. I am happy about this meeting; it enables me once again to have contact with numerous qualified masters of Medicine present here to take part in this International Conference, which the Pontifical Council for Pastoral Assistance to Health Care Workers has opportunely sponsored on the subject of "Longevity and the Quality of Life."

The topic is seen to be of great current interest in the light of the modified percentages of the different age groups in the world population. Today, throughout the world, *a constant increase in the number of elderly persons* is in fact being reported: this entails a greater ethical, moral, political, social, and organizational commitment by all so that adequate security and effective care will be guaranteed for them.

Not only *the world of medicine* is involved, whose task is to make possible the well-being of this particular age group by preventing illnesses and promoting all that is feasible to ensure the elderly's self-sufficiency; also under discussion are *the family and community structures*, whose duty it is to take steps so that the elderly may continue to express themselves as active elements incorporated into their family and social context. Only the solidary commitment of all can enable the elderly to obtain proper recognition of their active presence in society. If, on account of its scope, the problem of making the most of the third age is in fact modern, ancient is the insight into the legitimacy of the elderly's desire to continue to be *constructively integrated into life*, not just that of the family, but as individuals and in association with others.

This desire corresponds to the serious moral obligation, perceived by the conscience of every man and sanctioned by Sacred Scripture as well, to offer adequate care to the elderly. Among the commandments of the Decalogue, there is one which states, "Honor your father and your mother as the Lord God has commanded you" (Dt 5:16). The Bible does not call our attention only to the respect

and obedience due parents, but also to the obligation in justice of assisting and caring for them when they are no longer capable of providing for themselves: "Remember that they have begotten you; what will you give them in exchange for all they have given you?" (Si 7:28).

2. The great social and cultural changes of the last fifty years, connected with technological progress, itself a result of an extraordinary development in the field of science, *have profoundly modified the relations among generations*. In developing countries, local cultures have conserved stronger links with tradition and a more stable role for the elderly, regarded as an expression of family unity. But in the industrialized nations evolution has been so rapid and far-reaching that it has deeply transformed the social context based on the patriarchal family: the situation of the elderly has suffered the consequences in a marked way.

At the same time, more widely applied hygiene, preventive medicine, modern pharmaceuticals, and better and more appropriate nourishment have raised man's average lifespan in these countries by *about thirty years* in less than a century. Hence the notable percentage increase of the elderly. This increase poses a series of problems of a structural and economic order to which society labors to respond.

3. Sociologists and physicians distinguish *two categories of elderly people*, the self-sufficient and those who are not, avoiding, however, the consideration of motor sufficiency alone as a discriminating factor, since a good many of the elderly affected by motor non-self-sufficiency enjoy full psychic balance and marked mental lucidity. As is obvious, if the problems of the first category are lesser, more serious and pressing are those posed by the non-self-sufficient, for whom safe, dignified, and specific care must be procured.

The present International Conference seeks to take up these problems, stressing *the close link* which must be maintained between longevity and quality of life. In-

THE POPE'S ADDRESS TO THE INTERNATIONAL CONFERENCE

deed, it is not enough to ensure the satisfaction of the primary needs connected with longevity: the *exigencies posed by the personal dignity of the elderly* must also be taken into account, making available to them the set of benefits which will enable them to lead a life accompanied by activity suitable for their age. Only adequate employment of physical and psychical energies can, in fact, safeguard in them solid awareness of themselves and a constructive will to live. A less clear-cut distinction among different age groups and even the possible prospect of life in a certain sense without age depend, therefore, on the quality of life we manage to ensure for the elderly.

4. Today the rejection of the patriarchal family model, especially in rich countries, has in fact favored the growing phenomenon of *entrusting the elderly to public or private facilities* which, in spite of good intentions, are generally not in a position to help them completely to overcome the barrier of psychological isolation and, above all, family marginalization, depriving them of the warmth of the family, of interest in society, of love for life. Sheltering facilities must thus be created which will pay greater attention to these psychological and spiritual needs of the human being, on which the "quality of life" of those reaching such a stage decisively depends. This can offer a "humane" solution to the elderly who do not have a family of their own to rely on or who are not able to manage their own affairs, or who, in any event, freely wish to avail themselves of such facilities, regarding them as suitable for their situation.

It must be forcefully asserted, however, that *this is not the ideal solution*. The objective we must be oriented towards is that the elderly be able to remain at home, relying, if need be, on adequate forms of home care. In this regard, public involvement can march side by side with *volunteer action*, through the contribution of initiatives inspired by the teachings of the Catholic Church, along with those of other religious and humanitarian movements deserving of respect and gratitude.

5. For the implementation of such an orientation, not only of a technical nature, but social and moral as well, it is necessary to refer to *certain fundamental values* — like the sacredness of human life, the dignity of the person, the intangibility of his freedom — which are inscribed upon the conscience of each individual and constitute the basis for every authentic civilization. In the case of the elderly, moreover, our thought must move to the debt of gratitude society owes them for all they have done for the common good during their active years.

These values acquire a special wealth of content in the light of biblical revelation, which presents the human being as made in the image and likeness of God (cf Gn 1:26) and recommends, "Son, assist your father in his old age; do not sadden him while he lives. Even if he loses his judgment, show him compassion...for kindness to a father will not be forgotten" (Si 3:12-14).

6. In recent years science has made substantial progress in the field of treatment for pathologies of advanced age. On the basis of current expertise, it is today possible to prevent or at least to delay the appearance of some of these phenomena by providing for *appropriate, well-oriented aging*, wherein external factors as well, such as nutrition, environment, health education, and hygiene, play a part.

There are, however, other pathological phenomena in regard to which current available knowledge is still insufficient to program preventive and curative action. This poses for those working in this branch of medicine the duty of making a renewed commitment to acquire more precise knowledge concerning the etiology of such pathologies and adequate forms of care.

But I cannot fail to call everyone's attention to the need for common action not to stop at the search for increasingly sophisticated, costly drugs to the nearly exclusive benefit of *the elderly in rich countries*. The effort of developed nations must also turn to those vast areas of the world in which, in spite of the perma-

THE POPE'S ADDRESS TO THE INTERNATIONAL CONFERENCE

8 nence of admirable family solidarity, endemic poverty, illness, insufficient means, lack of structures, and psychological conditioning dramatically shorten the lives of so many brothers and sisters, rendering longevity an unlikely target. If, in fact, to work for a qualitatively appreciable longevity is a proper task of science and technology, an equally important one is to strive so that every man will be ensured a life parabola leading from birth to natural decline which is neither accelerated nor compromised by subhuman living conditions. The rich countries, then, must not forget the less fortunate ones, where, in view of the large populations, adequate care is guaranteed for only a few. The big pharmaceutical producers, by way of the humanitarian policies of the respective States, should not allow these countries to lack those medicines — painfully called “or-

phan drugs” — which, no longer needed where well-being is greatest, can prove decisive in vast areas of the world. We should be grateful to those in this field who are setting in motion concrete and unselfish initiatives.

7. Ladies and gentlemen, the close relationship which in the very subject of your Conference you have rightly established between *longevity* and *quality of life* allows one to grasp that a percentage increase in life expectancy should be regarded as an inadequate achievement if the quality of existence does not advance at the same rate. Nevertheless, to pursue this objective effectively *it is necessary to involve the whole social body* so that it will bring to maturity a new sensitivity to this problem. Preventive and curative medicine must be accompanied by broad action providing for institutions and fa-

Tribute to His Holiness John Paul II

Prof. G.B. MARINI BETTOLO

President of the Pontifical Academy of Sciences

Your Holiness,

On behalf of all those who have come from every part of the world to attend this Third International Conference and all present, I have the honor to convey to you our deferential and devout greeting and heartfelt thanks for having wished to be in our midst today.

This is the third International Conference organized by the Pontifical Council for Pastoral Assistance to Health Care Workers, the Office of the Holy See for Medicine and Health Care, directed so capably, enthusiastically, and successfully by Archbishop Fiorenzo Angelini, who with his collaborators in recent years has managed to revivify around the world the spirit of dedication to humanity which over the centuries has characterized the hospital orders and the work of missionaries.

The topic for these sessions concerns a delicate problem in our contemporary society, *Longevity and the Quality of Life*, which calls for the attention and commitment of moralists, philosophers, theologians, psychologists, economists, demographers, and sociologists, in addition to doctors, health professionals, scholars, researchers, and scientists, all represented here today.

The subject is, indeed, extremely complex — I would term it many-sided — and touches upon numerous aspects which are not only scientific, social, and economic, but, above all, concern the human personality, entitled to full dignity and respect at every stage of life and everywhere on earth.

The elderly have for centuries constituted a precious part of society everywhere, particularly for their wisdom, the fruit of experience and age; they have always been sur-



cilities capable of opening to the elderly the fields of culture, education, and the most varied activities. The chance to go on pursuing stimulating interests and conducting useful activities makes the elderly not only feel alive, but also happy to be so. Each new day of life will then appear to them in its true light: as *a gift* of the always loving providence of God.

In any event, the contribution which you — scientists, physicians, researchers, scholars — can make to the pursuit of this objective remains preeminent. I thus turn to you to exhort you to orient your work, with renewed impetus, towards the safeguarding, defense, and promotion of man's entire personality in advanced age, so that the natural decline in physical energies will not be accompanied by the decay of psychic and intellectual capacities, which, precisely in the elderly, may reach the prerogatives of full maturity and wis-

dom. The Scripture indeed states, "White hairs are a crown of honor; they are found in the ways of uprightness" (Pr 16:31).

To place oneself at the service of the elderly means to become meritorious as regards the lives of all, for it means making possible *the full expression of man's potentialities*, which, in being peculiar to each age of life, thoroughly enrich each for the good of all. Here lies the greatness of your work, Ladies and Gentlemen, its nobility and irreplaceableness. May it contribute further to fulfilling the words of the Psalm: "In old age they will still bear fruit, will remain fresh and green, to proclaim Yahweh's integrity" (Ps 92:14-15).

With this wish, I invoke divine assistance for you and your work; as a pledge of it I wholeheartedly impart my Blessing.

rounded by respect and attention in the family and social domains.

In this century, as a result of scientific progress achieved by medicine, a highly significant increase in average life expectancy has been attained, leading to a sensible increase in the percentage of elderly persons and occasioning a series of social, economic, and even ethical problems which remain to be satisfactorily resolved.

At this Conference the medical, scientific, organizational, and ethical aspects of the action to be carried out to give the elderly not just assistance, but well-being, too, the quality of life, have been set forth.

This commitment must not be severed from the moral obligation to ensure for the elderly solidarity in respect for the person, who is not only a body, but a spirit, not just for survival, but for a dignified conscious life.

The different topics discussed and developed in constructive consideration which we shall all take back with us to our points of origin have brought out the commitment we must all make to protecting the human personality in the elderly as well, providing not only all the means offered by medical science, but, above all, giving them comfort, solidarity, and love.

With profound devotion, Holy Father, we await your word and your teaching.

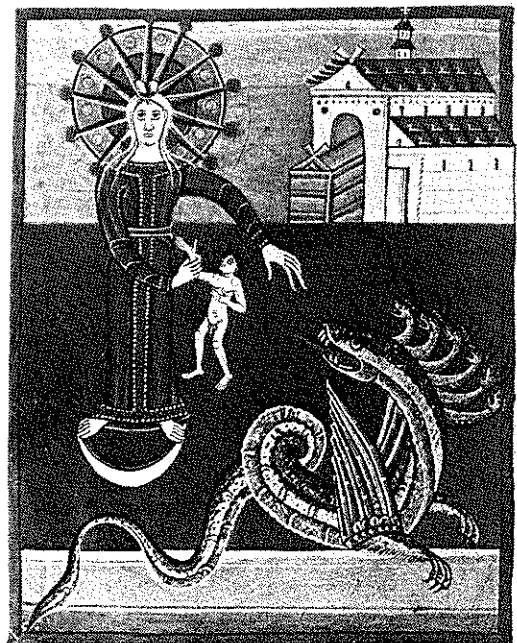
Closing Statement

1. The Third International Conference sponsored by the Pontifical Council for Pastoral Assistance to Health Care Workers, in order to discuss the subject of "Longevity and the Quality of Life," takes note that at the conclusion of three exacting days, with the contribution of men of science, not only has it deeply examined the problem, shedding light on different angles, but also offered valid suggestions to set in motion concrete and effective initiatives.

2. It is often affirmed that we are once again passing through a period of confusion in language, loss of identity, the inability to give a general meaning to things. In truth, technological progress is so accelerated and agitated that it has become the dominion of specialists, who, in turn, control increasingly specific, limited aspects of it. In industrialized countries, man has acquired extraordinary power, but he often does not know how to employ it and, with anguish and dismay, witnesses its destructive effects. There are still wars which set against one another

peoples that, though possessing the same roots, cannot manage to come to an understanding. Well then, these International Conferences show that it is still possible to understand one another and set out upon a common road even when such highly specialized topics as those of medicine are being dealt with.

3. Everyone recalls that the *First International Conference*, in 1986, was devoted to "Pharmaceuticals at the Service of Life." On this subject — so difficult and the source of so much polemic — we heard the solemn voice of His Holiness John Paul II raised to warn about the need for a rigorous moral code. We then heard the voices of the scientists who lay the basis for pharmacological discoveries or achieve them. There was discussion of the problem of experimentation on man, of modern and traditional medicines, of the needs of developing countries and programs to meet them, of industry's responsibility for the safety and ethical use of pharmaceuticals. The result was a clear, unequivocal message addressed to



all working in the field of pharmaceuticals.

4. The *Second International Conference*, in 1987, was devoted to "*The Humanization of Medicine*," an equally difficult subject. It was necessary to define the aims of medicine and thus implicitly the meaning of illness and suffering in life. Once again the voice of John Paul II was heard by representatives of other religious confessions. There was renewed discussion by health professionals and scientists, together with religious, philosophers, and sociologists. To humanize medicine means to give glory to it.

5. This is the profound sense, the guiding principle of these International Conferences: when men of good will meet, there are no difficulties in understanding or ideological, cultural, religious barriers. The universality of the Catholic and Christian message has been rediscovered, its capacity to provide a point of understanding and at the same time a response to man's fundamental problems. What joins us is respect for life in all its forms; wonder in the face of creation, where everything has a sense and a meaning: without evil there would be no good, just as without illness and suffering there would be no health; the need to comprehend, to provide a foundation for our existence even beyond reason: this does not mean repudiating it, but, while grasping its limits, at the same time seeing its incapacity to furnish an explanation for things; and, at the bottom of all of this, the rediscovery of religion, which is the profound conscience of mankind. For us, as Catholics, there is also a rediscovery of our cultural identity, which is a guide for earthly life in addition to the afterlife. An identity of which dialogue and mutual understanding are integral parts.

6. These considerations *apply as well to this Third International Conference*, in the course of which senescence has been discussed from diverse standpoints. The dimensions of the problem, which is already immense today, but will be even vaster in the future, in developing coun-

tries as well, have been specified. Not only the medical, but also the ethical, sociological, political, and philosophical implications of this problem have been examined. Senescence is not the decline of life, but another phase, just as important as procreation, growth, and maturity. It is thus sacred on both a religious and biological level. Society must regard the elderly not with pity, but with respect. Their dignity should be safeguarded in medicine, as occurs in all other stages of life, and through measures and laws which reappraise and foster their role.

7. *In summary, this Third International Conference has reaffirmed respect for life and its value at all stages and in all its forms. A reaffirmation with which men from diverse backgrounds, and with varying religious and cultural orientations, have once again found themselves in agreement. Our profound thanks to all who have contributed to this achievement.*



Old Age Is the Fulfillment of Life

The subject for your sessions, "Longevity and the Quality of Life," requires reflection on the meaning of human life. In reality, for the first time in the history of humanity, scientific progress seems to be in a position to obtain what, according to the account in Genesis, appeared to be a mythical privilege of the patriarchs. They died, as the Bible says of Abraham, Isaac, and others (Gn 35:29), "full of days." The current situation of mankind, afflicted as it is by premature aging and assaulted by illness, does not yet allow what we know to be the life experience biologically possible for the human species — the longevity written into man's genetic patrimony — to reach its goal.

Human beings could thus live to the age of 130 years, then, barring an accidental cause of death. Is this progress? Without a doubt, if — thanks to the quality of life — they are spared decay and suffering. But what is the use of this additional time snatched from death when man is not spared death? In truth, the most difficult experience in human life continues to be having to die.

1. Prolongation of life and the social dimension

The developed countries make significant efforts and invest enormous sums to prolong human existence and render it less vulnerable to aging. At the same time, the better part of mankind is still deprived of the most elementary care. These people do not enjoy the "right to health" recognized and proclaimed by the United Nations.

How could the countries rich in technical, economic, and human resources close their eyes to the "medical death" of numerous lands where hundreds of thousands of children die at a tender age?

For these rich countries, what is the cost of medicine (and what kind of medicine)? At the expense of what respect for life? It is fitting to establish a *global* balance of the cost of health — global in the sense of embracing *all* mankind. *Global* amounts to saying that it takes into account the real "costs," what some will call profits (for example, earnings from the sale of instru-

ments of death, pesticides and fertilizers, medicines, and so on) and what must be called losses (such as millions of deaths by extermination, famine, abortion, etc.). The economists should thus recognize how much a human life "costs" according to their unit of reckoning: for each survivor, how many corpses? And at what price? This global balance would lay bare the immorality of many choices by society...

How could a society wishing to call itself humane and Christian stand as a bastion of longevity and physical health in the face of whole populations in mortal peril each day — without mentioning the epidemics, like AIDS, which strike rich and poor?

A policy for old age, though felicitous, cannot be built over the devastated bodies of a largely unfortunate mankind! What sense would such "survival" make? What is its meaning for *life in its wholeness*.

At this point in our reflection, two biblical figures may enlighten us: two aged men confronted at death in regard to the lives of others.

The first figure, presented to us by Matthew (2:1-18), is that of the old king Herod, bound to the wild phantoms of power; the second figure, presented to us by St. Luke (2:25-30), is that of the old Simeon. Both face the coming to birth of the future in the person of the Christ-Messiah.

At the news that "the king of the Jews has been born," Herod, to survive, decides to kill. To survive with kingly power — rendered ridiculous in the face of his imminent death — which he has conquered and, indeed, usurped. He has the innocent children of Bethlehem massacred. Jesus is a survivor of this massacre. Herod kills, thus hoping against hope to flee from his own death and survive with his power.

Simeon is also an old man. His attitude is the opposite of Herod's. He takes the Child presented at the temple by Mary and Joseph into his arms. With words of blessing he thanks God for the gift of having lived long enough to see with his own eyes "the salvation prepared for all peoples," a salvation he is holding in his

OPENING ADDRESS BY CARDINAL JEAN-MARIE LUSTIGER, ARCHBISHOP OF PARIS

arms. At this moment he places his life in the hands of God, in thanksgiving for the Messianic peace finally granted to Israel and all nations.

Old age inhabited by the will to power imagines it can survive at the expense of others' deaths.

Or old age as a fruit of hope nourishing it in faith, brimful of love for God and men.

2. The time of life: A time of grace offered to man's freedom

Second reflection: What is the use of prolonging life? What does the length of life mean?

Aging life is not a time devoid of concerns. Let us recall the poem of Ecclesiastes:

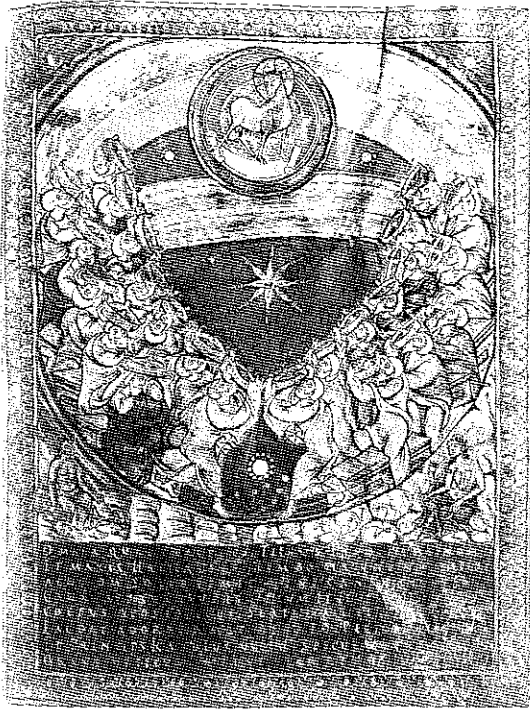
Remember your Creator while you are still young,
before the bad days come,
before the years come which, you will say,
give you no pleasure; before the sun and the light grow dim
and the moon and the stars,
before the clouds return after the rain;
the time when your watchmen become shaky,
when strong men are bent double,
when the women, one by one, quit grinding,
and, as they look out of the window, find their sight growing dim. When the street-door is kept shut,
when the sound of grinding fades away,
when the first cry of a bird wakes you up,
when all the singing has stopped;
when going uphill is an ordeal
and you are frightened at every step you take
— yet the almond tree is in flower
and the grasshopper is weighed down
and the caper-bush loses its tang;
while you are on your way to your everlasting home
and the mourners are assembling in the street;
before the silver thread snaps,
or the golden bowl is cracked,
or the pitcher shattered at the fountain,
or the pulley broken at the well-head:
the dust returns to the earth from which it came,
and the spirit returns to God, who gave it (Qo 12:1-7).

When Jesus asks his disciples, "Can any of you, however much you worry, add a single cubit to your span of life?" (Lk 12:25), he is inviting them to live *day after day* in the hands of God, entrusting themselves entirely, "like the lilies in the field and the birds in the sky," to the goodness of our Creator and Redeemer. Existence, welcomed each day in thanksgiving as a gift of God, receives its meaning in God's present, a preview of face-to-face contact in eternity. This can fill an entire lifetime and enable us to face death.

The length of life, human time, finds its meaning and fullness in God's present, in continuous communion with God's eternity.

The prophet Isaiah, in chapter 38, with touching poetry lays bare the anguish of King Hezekiah, condemned by an illness, and his thanksgiving for the prolongation of life granted him. When ill, he obtains from God an extension: "fifteen years added to the number of his days"; "I thought: In the noon of my life I am to depart. At the gates of Sheol I shall be held... Like a weaver I have rolled up my life; he has cut me from the loom... At once, my bitterness turns to well-being. For you have preserved my soul from the pit of nothingness... The living, the living are the ones who praise you, as I do today... Yahweh, come to my help and we will make our harps resound all the days of our life in the Temple of Yahweh" (cf. Is 38:10-20).

The time of life is a grace, a possibility offered by God to our freedom. Jesus tells us so in the parable of the barren fig tree (Lk 13:6-9): "'For three years now I have been coming to look for fruit on this fig tree and finding none...' 'Sir,' the vinedresser replied, 'leave it one more year... It may bear fruit next year; if not, then you can cut it down'" (you will carry out judgment). As with the fig tree, an increase in life is always a grace given to man to allow him to give meaning and realization to his life so that he will finally yield the fruit God expects from him. The time of our life is always precarious. Its close remains unforeseeable. Time is granted to our freedom, an irreplaceable



time to direct ourselves, even when everything else is taken away from us.

This is what Christ teaches us in the parable on watchfulness (Lk 12:35-47). Human existence is a vigil during the night; its end is not death, but rather the coming of the Master, the Lord of all things, the rising Sun bringing light. Human life worthy of this name demands watchfulness to be attentive and available for Him whom we are waiting to encounter. On the other hand, he who allows himself to turn away from this attention is the victim of illusion and the hardening of his "heart." Such is the foolish rich man (Lk 12:16-21): seeing that his affairs were prospering, he said, "I will pull down my barns and build bigger ones and store all my grain and my goods in them, and I will say to my soul: My soul, you have plenty of good things laid by for many years to come: take things easy, eat, drink, have a good time." But God said to him, "Fool! *This very night* the demand will be made for your soul." Accumulated wealth is of no use. Freedom alone counts: the time remaining for it is short...

Christ thus resorts to this paradoxical formula: "He who saves his life will lose it; he who loses it for my sake will save it" (Lk 9:24). Yes, the time of life is the time of freedom which gives meaning to life. Whoever agrees to lose his life for Christ finds it; whoever does not hold on to it possessively, but opens it to Him who is its Savior.

To increase the length of life offers the freedom of man, created in the image of

God, the chance to bring his vocation to fulfillment. Every extra added onto the time of our lives is a new field for the unfolding of our freedom. An increase in grace accorded not only as the fruit of men's potency, but as the possibility of a *spiritual* miracle, made feasible by human technique and work. In a certain sense, every man healed is a "miracle case" in the measure in which not only is his body put back in motion, but he is offered the spiritual chance to inscribe upon time the meaning of his life. The postponement of death, the chance to bring life to completion.

3. The fruitfulness of old age: Birth from on high

Old age is often a fearful and feared trial in which one sees one's strength diminished and one's life reduced by a half or degraded. Why, then, prolong an existence deprived of the prerogatives of youth which give life its pleasure and beauty? Indeed, our society overvalues youth and its creativity and relegates therein its vital forces, putting aside the old, cast adrift by life, and marginalizing them in the limbo of memories fading away. The illnesses linked to age can make this distancing and marginalization from so-called "active life" even crueler.

This was not the vision of old age among ancient civilizations. The Bible witnesses to this fact: "How fine a thing: sound judgment with gray hair, and for the elderly to know how to advise! How fine a thing: wisdom in the aged, and considered advice coming from people of distinction! The crown of the aged is ripe experience; their glory, the fear of the Lord" (Si 25:4-6).

We are not faced with a cultural difference alone, but, in our time, confront a spiritual lack. At the beginning of St Luke's Gospel, the angel announces to Zechariah, "Your wife Elizabeth will bear a son, and you shall name him John." The Baptist. Zechariah replies, "I am an old man, and my wife is getting on in years." Why is it granted precisely to this elderly, barren couple to bring into the world the Precursor of Jesus the Messiah? "A prophet of the Most High, he will lead many children of Israel back to the Lord their God; he will go before the Lord to prepare the way for him, to give his people the knowledge of salvation. Zechariah will respond by giving thanks and prophesying: "Blessed be the Lord, for he has visited and redeemed his peo-

ple... Thanks to the merciful goodness of our God, a rising Sun will come to visit us."

Isaac, the son granted to Abraham and Sarah in their old age (Gn 18:9 seq.), had already been a sign provided by God of a hope for fruitfulness depending exclusively on his power.

A fruitfulness, then, not just of biological life, but spiritual, from on high, an announcement of the resurrection. It prefigures the transformation of human existence which takes up corporal life in its spiritual destiny. Metaphorically, it demonstrates the true fulfillment of life, which with old age is not exhausted. The Psalmist had already sung, "Blessed be the Lord... He contents you with good things all your life, renews your youth like an eagle's" (Ps 103:5). God restores youth. Is it perhaps only the illusory image of the adolescence of body and spirit, that is, of childhood?

To answer this question, let us take the third chapter of John's Gospel. Jesus says to Nicodemus: "If one is not reborn from on high, he cannot see the kingdom of God." And Nicodemus objects, "How can a man be born when he is old? Can he possibly re-enter his mother's womb and be reborn?" Not without irony, Jesus replies, "You are a master in Israel and don't know these things?" You fail to grasp that human life is not exhausted in the body, like the life of an animal. The body of man is a temple, a kind of sacramental, historical place for the eternal existence of every person. Even in the body's senility, the "new birth" is granted to whoever receives the Spirit of God.

Jesus' reply to Nicodemus must be applied by us precisely to the disabled elderly who still have a breath of life. We do not know the extent to which the secret of their freedom is buried. Those who have assisted elderly or dying persons well know the spiritual secret hidden in apparent unconsciousness. I can testify that the proof of our love ever near at hand, of intense faith, of tirelessly repeated prayer, can unleash in elderly people now deprived of words and movement scarcely perceptible signs demonstrating how their spiritual vocation is fulfilled in this supreme trial.

That is why respect for life up to the final breath obliges those caring for it, who seem to possess demiurgic power over the lives of others, to perform an act of faith in the spiritual destiny of the sick and agonizing. The doctor who prolongs corporal existence may feel like God: isn't he capable of "disconnecting" to interrupt



the bodily course of life? At what point is it legitimate, if at all, to do so? Can man become the supreme arbiter of another's life and death? In reality, he is only the arbiter of death. He is in fact the arbiter of death if we recall that it is up to him to interrupt life. And when he contributes to prolonging it, he is not at all the arbiter of life, for, in this case, it is given by God as an extra, a possibility, though minimal, even already buried in the secret of God. Let us, then, beware of this demiurgic temptation. *Man can kill, only God gives life.* When man helps another to live, however, he offers him a new, supplementary chance to live for God. In the field of medicine, the difficult criterion in distinguishing between ends and means, prudent judgment concerning what it is appropriate to do, must be subordinated to the judgment of moral conscience adequately illuminated according to the teaching of Revelation. This choice placed in our hands must never be forgotten, that of each man who finds himself one day, the last one, facing his death.

Old age is not at all the time of spiritual sterility; on the contrary, it can become the time of new birth in God. One comes to ask God to be freed from life. Not, indeed, because of unhappiness or suffering, but to reach God. "I wish to see God." It is necessary, however, to remain to serve one's brothers and sisters. St. Paul was familiar with this chance to fulfill his mission to those he had generated to life, the Corinthians (cf. 2 Co 5:6-9), the dear Philippians: "For me to live is Christ, and to die a gain... And yet for

your sakes it is necessary for me to remain in the flesh" (Ph 1:21).

This wish to see God is not a surrender, disdain for life, but realization in the fullness of life. As if, through the fragility of human life now rendered transparent, transfigured life could already be discerned, for which passing to God is the required threshold.

4. Old age: Fulfillment of life

In his final exchange with the apostle, Jesus says to Peter, "When you were young, you put on your own belt and walked where you liked; but when you grow old, you will stretch out your hands, and somebody else will put a belt round you and take you where you would rather not go." The Gospel adds, "In these words he indicated the kind of death by which Peter would give glory to God" (Jn 21:18-19).

The martyrdom reserved for his adult age restores freedom to Peter in the hands of Another. Who is this Other? Is it just the executioner? Isn't this Other who will gird Peter really Christ himself, who will clothe him with his own martyrdom? Isn't it Christ himself who will grant Peter the grace of identifying himself through the Passion with his Master, whom Peter had abandoned in his Passion? In Peter's old age, isn't there a fulfillment of the grace initially received in the high priest's courtyard, with the tears issuing from his heart over the Crucified, and later, on the lakeshore, with the loving words of the Risen One: "Peter, do you love me? Feed my sheep"? Grace of forgiveness which is completed in the grace of identification with the Crucified himself. Peter in his old age received the measureless grace of living the Passion of Christ which he had repudiated since his youth.

"It is I." These final words Christ addresses to him are the first with which he had previously called him along the shore of the lake. Until old age, Peter will cherish as the guide and meaning of his life the first words heard in his youth: "It is I."

It is thus true that old age is the fulfillment of all of life. That is why we cannot, without evading grace, place a prior limit on our old age. The norms envisioned in some western countries to authorize the doctor in advance to interrupt life in the case of incurable illness are an affront to human dignity. It is to commit suicide in advance. In other words, renounce the unforeseeable possibilities of life. No one

can know in advance what he will want at that moment. Human life is always open to the grace of God. To assign a limit beforehand means wanting to anticipate the grace of the present moment, repel and deny it. It is to refuse the unforeseeable and its grace; it means to despair of God and of oneself as well. You know the reply of the Curé d'Ars to a woman in despair over the suicide of her husband, who had cast himself into the water: "Oh! Madame, between the bridge and the bank...."

Only God knows the repentance which may fill the final second of a human being's life and save him from eternal perdition. A lesson of great wisdom demonstrating that no man knows what grace may be reserved for him in the final breath of his earthly existence — including even the most obstinate. As a result, no one has the right to renounce it.

For you are my hope, Lord,
my trust, Yahweh, since boyhood...
Do not reject me in my old age
or desert me when my strength is failing...!
(Ps 71)

By way of conclusion

God grants us life as a grace and a challenge. At the same time, life is subject to God's judgment. A judgment concerning which the parable of the foolish rich man, struck down suddenly by death, offers us a provocative image. A judgment in regard to which Jesus' admiring gaze at the poor widow slipping all she had to live on into the Temple alms box represents an anticipation.

Fulfillment of a life in the wisdom of God or folly of a life lost and squandered. This is the ultimate truth which the face-to-face encounter with our Judge, full of mercy, will enable us to grasp. This last judgment shows us the extraordinary dignity of man's corporal life. Jesus' parable (Lk 11:33-36) on the lantern and the body discloses its secret: "The lantern of your body is the eye." What light illuminates your eye and radiates from the lantern of your body? Is it a sinister light or a dazzling one? The body is like the material of the sacrament of human existence, qua "body fact," with the person transfiguring it. Poor human bodies are clothed with the luminous dignity inhabiting them.

The Christian receives the promise and certainty of this light in Christ, the Light of the world. "Whoever follows me will not walk in darkness, but will see the light of life" (Jn 8:12).

Niels Stensen: Science and Sanctity

*ARCHBISHOP FIORENZO ANGELINI
PRESIDENT OF THE PONTIFICAL COUNCIL
FOR PASTORAL ASSISTANCE TO HEALTH CARE WORKERS*

The very recent beatification — celebrated by John Paul II on October 23, 1988 — of the scientist, physician, and bishop Niels Stensen was the occasion for numerous, profound studies on the great researcher.

It is not hard to collect from his rich written production and from testimony on his work affirmations and proof which bring out the singular synthesis between science and sanctity, scientific knowledge and faith, which Niels Stensen managed to effect and live out.

I shall limit myself to some annotations which I deem to be of special current interest, for with unaltered value they propose anew a truth often disputed or overlooked: science and sanctity are not antithetical or two parallel lines destined never to meet, but rather a fruitful pair, of which the life and work of Niels Stensen constitute an enlightening confirmation.

Stensen lived for only forty-eight years. From a very early age until he was thirty-nine he was, so to speak, exclusively taken up by his scientific research. At thirty-nine he was ordained a priest and at forty-one, a bishop. In the final decade of his life, then, he devoted himself entirely to the apostolate. Now, nothing would be less objective than forcedly to separate these dates, attributing to Stensen's science his years as a researcher and discoverer and to his sanctity his years as a priest and bishop.

The religious problem which ever accompanied Stensen, leading him, with the help of grace, to bring his conversion to the Catholic faith to maturity, was always interwoven with his passion for scientific research. Indeed, I would like to state, on the basis of the testimony at our disposal, that the *conversion* of Niels Stensen is situated on the same path, forms part of the same itinerary as his activity as a scientist, to such a degree that, after his conversion, which definitely aroused attention in the cultural world of his time, Niels Stensen continued to recall that it had been precisely his solicitude in examining nature as the work of God which had led him to



the happy meeting between science and the truths of faith.

The circumstance, certainly a mysterious one, which enabled Stensen to arrive at religious faith in starting from and with science — faith which had, in any event, always accompanied him — did not bring with it either the renunciation of the laws governing scientific research or a reduction of the truths of faith solely to the domain of rationality.

In the celebrated opening address he delivered to his anatomy classes at the University of Copenhagen in 1673, he asserted, "The finality of the true anatomy researcher is this: through the marvelous whole of the organism to succeed in elevating us to the noble dignity of the soul and, as a result, by way of the prodigy of both, to soar to the knowledge and love of their Author."¹

For Stensen holiness was the goal of his scientific activity, since it was a translation into life terms of some of the conclusions on the human condition at which he had arrived through scientific search.

This arrival in fact became exaltation of science itself, whose inner dynamism is always accompanied by an ethical motivation, a moral reason. This does not mean that every researcher or scientist can or should follow the same itinerary as Stensen. The exemplariness of this scientist and saint must be sought in the sincerity of his investigation, in the uprightness of his mode of action, in the consistency between thought and life.

In proposing the figure of Niels Stensen, therefore, stressing the meeting in his life between science and sanctity, both are ex-



alted, according to the open vision recalled in the message of the Second Vatican Council to men of thought and science in these words: "Remember the statement by one of your great friends, St. Augustine: 'Let us seek with the urge to find, and we shall find with the desire to seek still more'. Happy those who, while possessing the truth, seek it even more in order to renew it, go deeper into it, and offer it to others. Happy those who, though not having found it, walk towards it with sincere hearts."²

In Stensen, priest and bishop, there is a rigorous operative coherence with the root conclusions at which he had arrived as a scientist. The extremely rich correspondence covering the last ten years of his life shows us that Stensen was most sensitive to the needs of the weak: he not only deprived himself of everything to give to others, but availed himself of his vast social relations to transform them into a means to aid the needy. He took up, then, that integral notion of "health" which is at the very root of scientific research and at whose service moral rectitude must place itself.

As the Holy Father, John Paul II, recalled in the homily delivered on the occasion of Niels Stensen's beatification, in him there was no "fracture" between science and faith, but, rather, his holiness was "an inner step forward" in his exemplary itinerary.

Niels Stensen's own shield is well known: an anatomically designed heart crowned by a cross. In referring to this symbolic design, the Holy Father spoke of the "science of the heart." Science concerning the heart and science which is and must be "heart," a science which, as knowledge of the Autor of Creation and of life, is at once love for creation and life.

Characteristic of Stensen was a great in-

tellectual humility — a humility which was not a surrender of reason, a renunciation of research, but awareness of the real dimension and truest finality of knowledge.

Stensen's whole production also enables us to have access to a notion of sanctity not bound to stereotyped schemes, but rooted in his very conception of science, understood to be hard work, sacrifice, the capacity not to seek conclusions in advance which require a long road, availability and openness, sincerity in recognizing limits, joy in sharing the knowledge acquired.

There is a prayer which Niels Stensen wrote, perhaps the day after his conversion — a prayer we might describe as the prayer of the scientist and researcher. It reads, "Lord, without whose will not a hair falls from the head, nor a leaf from the tree, nor a bird from the air; nor does a thought come to the mind, a word to the tongue, an act to the hands. You have led me thus far by ways unknown to me. Guide me still, whether I see or fail to see, along the paths of grace. It is easier for You to lead me where You will than for me to recede from where my desires lead me."⁴

It is not without meaning that, in the span of just two years, the Church, through the initiative of her Supreme Pastor, has raised to the altars the physician and scientist Giuseppe Moscati and the researcher and scientist Niels Stensen. This is an indication which should lead all, believers and others, to a reflection on the possibility and fruitfulness of the encounter between science and faith. To seek the vestiges of the Creator in creation is a gratifying task, for as Bernard of Clairvaux reminds us, only God, even if not found, is never sought in vain.⁵

¹ NICHOLAI STENONIS, *Proemio Demonstrationum Anatomicarum . Opera Philosophica*, vol. II, p. 253.

² Second Vatican Council, Documents *Message to Men of Thought and Science*.

³ Cf. *L'Osservatore Romano*, November 24, 1988.

⁴ NICHOLAI STENONIS, *Opera Theologica*, vol. I, second edition (Copenhagen: Larsen and Scherz, 1944), p. 220

⁵ Quoted by E. VACANDARD, *Vie de Saint Bernard* (Paris, 1895), vol. II, p. 236.

A Philosophy Focused on Man

A GREETING BY THE CUBAN HEALTH MINISTER, DR. JULIO TEJA

Members of the Presidency and Delegates,

First of all, we wish to congratulate the Pontifical Council for Pastoral Assistance to Health Care Workers on its initiative in devoting this Third International Conference to the interesting subject of "Longevity and Quality of Life." In thanking its President, Monsignor Angelini, for his invitation, I am honored to convey to all the distinguished participants in this event a cordial greeting from the Government of the Republic of Cuba and its hope that the meeting will produce satisfactory results to raise the quality of life with all its implications.

The gradual socioeconomic development of our country, with the consequent improvement of the National Health System, has enabled us to increase life expectancy to over 74 years of age, and more than 11% of the population is now in the so-called "third age," constituting new challenges to meet its needs.

In different studies conducted in recent years we have encountered situations similar to those reported in other countries, which point to such fundamental problems as feelings of slight social and family usefulness, isolation, lack of communication, obesity, sedentariness, the need for rehabilitation, boredom, and depression.

In the early years of the Cuban Revolution special attention was paid to the first stage of life to solve the problems of schools, children, adolescents; Children's Circles multiplied and many efforts were made to diminish infant mortality.

Beginning in the nineteen-seventies stress was laid on

care of the elderly. To this end an entire program was traced out, including the creation of the specialty of Geriatrics, the progressive incorporation of hospital beds for specialized attention, and also, more recently, a national program directly connected with the development of the "family doctor" model.

We initiated this model in 1984 with insistence on spe-



cialized doctors living in the community they were to serve. We now have over 6,000 of these doctors caring for more than 3,800,000 people amounting to 36% of the population, and we must reach everyone with this model of primary care by the year 2000.

As part of the family doctor model for care one of the

most promising experiences had its start: the Grandparents' Circles.

This movement allows us to organize the elderly in the areas in which they live for the purpose of introducing physical exercise, organizing recreational activities, and helping to solve community social problems.

Recent information on the basis of complete experiences shows that exercise not only halts the process of aging but can even reverse it; this brings out the importance of the fundamental approach in creating these Circles, whose members now represent 20% of the elderly population. We now have 423 general hospitals covering the entire country in which physiotherapeutic gymnasiums and rehabilitation-physiotherapy services are being introduced to meet the demand.

To complement this special program for the elderly a national campaign is being conducted against smoking, sedentariness, and obesity which will undoubtedly benefit this group as well.

In parallel construction of homes for the elderly proceeds where those lacking relatives to care for them are completely or partially housed and the practice of exercise is being introduced, along with some of the experiences we have mentioned. In Cuba many of these homes are looked after by religious congregations which are examples of abnegation, dedication, and love for one's neighbor.

This summarizes our policy and our philosophy towards man, who, thanks to science, is approaching the genetic possibility of greater longevity. We have the moral obligation to guarantee it with dignity and love.

Scientific Research at the Service of Longevity

FREDERICK K. GOODWIN, M.D.

Administrator, Alcohol, Drug Abuse, and Mental Health Administration, U.S. Department of Health and Human Services

First, I would like to thank Archbishop Angelini and the Pontifical Council for Pastoral Assistance to Health Care Workers for inviting me to participate with this very distinguished group. It is especially gratifying to come to the Vatican to be present at this International Conference on Longevity and Quality of Life because prior to my medical training, my education included scholastic philosophy at two distinguished Catholic universities.

My focus today is on the mind and the organ which serves it, the brain. As I will illustrate, the increasing ability of medical science to enhance longevity through advances in the treatment and prevention of the major killers of mankind has brought increased attention to brain function. Indeed, it is especially appropriate at this conference to note that it is the brain that represents the intersection of the physical life and the spiritual life—that is, the life of the soul. What I will attempt to demonstrate today is that, in our modern world, pathological brain function comprises one of the principal limits to the quality and prolongation of life.

We are witnessing an exponential growth in the proportion of our population that is over 65 years old. In the not too distant future, 1 out of 5 in the U.S. population will be in this age group, a demographic reality reflected throughout the developed countries. In Figure 1 are findings of the recent Epidemiological Catchment Area study in the United States, conducted by the National Institute of Mental Health (Regier et al. 1988). When one examines the one month prevalence of mental disorders by age group, it is clear that the over-65 age

group actually has the lowest incidence of these disorders. Note that these data are drawn from direct population surveys and do not reflect patients self-selecting for admission to treatment centers. The only mental disorder which clearly shows an age-related increase is severe cognitive impairment; here, we see a stepwise increase to the point that those over the age of 85 have nearly a 20 percent incidence of severe cognitive impairment. I will return to this issue.

Among the mental disorders, depression warrants our special attention today. Depression is best viewed as a spectrum. At one end of the spectrum is normal depression — feelings of sadness and depressed, pessimistic thoughts in reaction to everyday disappointments in life, losses, or threats to one's self-esteem. The important point about normal depression is that it does not interfere with functioning nor does it involve physiological or physical symptoms. At the opposite end of the spectrum is major depressive illness, a complex syndrome that not only involves cognitive and mood changes, but also involves considerable physiologic disruption and significant interference with normal functioning.

A diagnosis of clinical depression requires a definite duration of symptoms; that is, the cluster of symptoms are experienced relentlessly, week after week. Near the normal end of the spectrum are the grief reactions which are inherently a part of life. These reactions initially can mimic many of the symptoms of serious clinical depressions, but do not have the prolonged course. Intermediate in the spectrum are "reactive" or "neurotic" depression, both terms which no longer are in use. Under earlier

diagnostic systems, these terms designated a less serious form of depression, particularly with regard to physical symptoms and functional incapacity. Recent research indicates that the presence or absence of precipitating stresses in one's life does not differentiate whether or not a depression is going to be more functionally disabling and more physiological. Apparently, the nature of the depression depends more on individual vulnerabilities, which are largely genetic, than it does on the contribution of environmental factors.

When elderly individuals become depressed, they are more likely than are younger persons to have physical symptoms. These will include the so-called endogenous symptoms of early morning awakening, diurnal variation, weight loss, and the like.

Of special importance to our discussion here is the prominence of cognitive symptoms. To quote a patient of mine: "My mind has slowed down and burned out; it is virtually useless." This statement indicates the dementia that can be associated with serious depression. Unlike other forms of dementia which I will speak of today — and this is an important distinction — the dementia portrayed in this statement is reversible because major depressive illness is one of the most treatable disorders among all the mental disorders.

Major affective disorder is fundamentally longitudinal, that is, with recurrent episodes. Recurrence is expressed in two fundamental patterns: unipolar and bipolar. Unipolar depressive disorder, in which depressive episodes alternate with periods of normality or nearly normal functioning, represents about two-

thirds of the cases. In bipolar, or manic depressive disorder, depressions alternate either with normal periods or with hypomanic or manic episodes, states which in many ways represent the opposite of depression. The manic patient is hyperactive, hyperaroused with intense feelings of euphoria. The mind races. The patient is grandiose, and feels he or she can do anything; he needs very little sleep and is infused with boundless energy. As the syndrome progresses to its most severe stages, the manic patient becomes increasingly disorganized with a mind racing so fast that one can no longer keep track of reality. Manic episodes are very destructive and result frequently in behaviors that can wreck marriages, careers, and family savings.

An interesting aspect of major affective disorder is that, left untreated, the patient will eventually recover spontaneously. The average duration of an untreated depressive episode is approximately one year; that of the untreated manic episode is approximately four months. The effective treatments that are available today can dramatically shorten the duration of both depressive and manic episodes, bringing them into remission, generally, within a few weeks of the initiation of treatment. A tragic consequence of untreated depression, however, is suicide: 15 percent of patients with major depressive illness will die by suicide. Of particular import to this conference is the fact that this rate is disproportionately higher among older depressive patients.

Table 1 lists similarities between normal aging and "endogenous" features of depression which I described earlier. You will recall that I noted that when older people become clinically depressed, they

are more likely to have a depression with these endogenous features. This likelihood presumably reflects the convergence of the depression with natural biological changes associated with older age.

It is well known that among the important psychological factors capable of precipitating depressive episodes is loss. Table 2 outlines some aspects of the aging process and its association with loss. In addition, of course, biological changes associated with normal aging, such as those listed in Table 3, also may be relevant to depression.

Yet another factor contributing to the heightened risk of depression in the elderly is the frequent use of drugs that can cause or precipitate depression. Given the fact that the elderly have increased incidence of various physical disorders, they are more likely to be on a variety of medications. Many of these agents can affect mood and, particularly among those who are predisposed genetically, can even precipitate depression. Drugs commonly associated with depression in the elderly are listed in Table 4.

In what has preceded, we have reviewed a number of age-related changes that would seem to increase the risk of depression in the elderly. What, then, is the evidence regarding the incidence of depression in different age groups? First, let us consider serious depression as reflected in data on hospital admissions for depression and mania as a function of age. Available data suggest an age-related increase in hospitalizations for depression among males (but not among females) over the age of 50. Indeed, for females the admission rates level off after age 50 and decline noticeably in the 70-and-older group.

We know that males are twice as likely to commit suicide as are females and that the one aspect of depression which does appear to increase with age is the risk for suicide. Given that suicide is probably the most important indication for hospitalization among severely depressed individuals, this may explain why males continue to show a direct relationship between age and admission for depression.

Today, the great majority of patients with major depressive illness are treated successfully as outpatients. Therefore, when we look at the data from the recent population survey of the U.S. (Regier et al 1988), we see a picture very different for the hospitalization data. Recall that these data are based on direct sampling of the community using structured interview techniques. As was the case with mental disorders generally, the incidence of affective disorders actually goes substantially down in the older age groups. Thus, for the broad spectrum of affective disorders, we see that the relationship to age actually is inverse.

What might account for the reduced incidence of depression in those 65 or older? Two explanations come immediately to mind. First, some of those individuals who are more vulnerable to depression would already have died by the age of 65. Mortalities would include those who have suicided and also would reflect the increased incidence of physical problems associated with depression, principally cardiovascular disease. Thus, the over 65 age group represents "survivors" who are perhaps more robust and resilient with respect to depression.

A second explanation may be found in the general tendency of older persons to have

matured psychologically in a way that equips them to handle disappointments and losses with more strength and resolve than typically is seen in younger, less mature individuals. In a sense, elderly people have adjusted their expectations and are more realistic about them.

In brief, in spite of the objective losses associated with aging that we discussed previously, older persons are not necessarily more prone to depression; this is particularly true when we consider the broad spectrum of depressions rather than just those which are sufficiently serious to result in hospitalization.

Let me return now to a topic to which I alluded earlier, that is, the amenability of depression to treatment. Advances in the treatment of depression represent one of the major success stories in modern psychiatry and, indeed, in all of modern biomedicine. In sharp contrast to years past, the vast majority of depressed patients today can be treated successfully and returned to normal, happy, and productive lives through the clinical use of an array of effective drugs and focused psychotherapy techniques, which frequently are used in combination.

Before discussing the different treatments of depression as they apply to the elderly, however, I should point out one unfortunate reality; that is, two-thirds of individuals who meet criteria for major depressive disorder do not seek or receive treatment for the illness. In general, individuals with mental disorders are less than half as likely to receive treatment as are individuals with physical disorders.

This disparity in rates of help-seeking and treatment received reflects the stigmatization and shame often associated with mental illness. Stigma is seen in an assumption held by much of the population, and shared as well by persons who suffer from these illnesses, that mental illnesses are somehow personal failings or weaknesses. That is, because mental disorders involve behaviors which are analogous to normal behaviors which in-

volve personal responsibility and free will, there is a tendency for society not to see them as legitimate illnesses.

The problem of stigma is compounded by the fact that, for many decades, mental health professionals — in the U.S. particularly — so strongly emphasized psychosocial factors in the etiology of these disorders that the general population still is not aware of the importance of biological factors in the serious mental disorders. Indeed, surveys taken in the United States reveal that less than 10% of the general public is aware that biological factors are involved in these disorders.

This emphasis on psychosocial factors was perhaps inspired by the pragmatism of American mental health professionals in past decades. Until the very recent past — no more than 25 years ago, or the mid-1960s — we tended to construct psychosocial theories of causality because the primary tools that we had at our command for dealing with mental illness were psychosocial strategies. That is, we developed etiological theories which served to underpin and justify our limited treatment capacities. In other words, before sophisticated and effective medications were developed, to have paid attention to biological factors would have seemed to be defeatist in the sense that the identification of a biological factor would not point to any treatment and might even seem to be a way of “giving up.” Yet when we look at the data in a straightforward way, evidence for biological and genetic factors interacting with psychosocial ones is similar across the broad spectrum of physical and mental disorders. We could make a direct comparison between the genetic and psychosocial factors involved in diabetes or hypertension, for example, and those involved in depression. Or consider epilepsy. A century ago, epilepsy was not understood to involve abnormal electrical activity in the brain; rather, it too was considered a behavioral disorder for which the individual was responsible. As a

result, epileptics historically were treated cruelly, to say the least. With the accumulation of scientific evidence demonstrating that epilepsy involves abnormal electrical activity in those parts of the brain which control motor function, the moral taint was lifted from epilepsy.

Today, we possess evidence that forms of manic depressive or “bipolar” illness also involve abnormal electrical activity, not in the motor cortex, but in the limbic structures, regions of the brain which are involved in and regulate our emotions. This information notwithstanding, the tendency remains to view behavioral dyscontrol associated with this form of abnormal electrical activity in the brain as a “mental” disorder that, unlike physical illness, reflects a characterological flaw or frailty that can be explained, exclusively, as succumbing to the pressures of one’s psychosocial environment.

I believe that at a conference such as this which is focusing on ethical issues this aspect of stigmatization of the mentally ill warrants our attention.

In spite of the fact that the majority of depressed patients do not seek treatment, those who do generally do quite well. A wide range of treatments now is available for the depressive disorders. Recent research suggests that those who do not respond to the first choice treatment may well respond to other pharmacologic strategies. For example, for many individuals who do not respond to a tricyclic antidepressant (the class of drugs which represents the treatment of first choice for most cases, and for which there is generally about a 70- to 75-percent success rate) the addition of lithium can produce an antidepressant response. For those who still remain nonresponders, the tricyclics can be changed over to another class of antidepressants called the monoamine oxidase inhibitors, and thus the proportion of nonresponders is reduced to perhaps 5 or 10 percent.

With regard to the treatment of depression among the elder-

ly, we have every reason to believe that elderly patients can respond as effectively to antidepressant treatments as will younger persons. There are, however, special considerations that need to be taken into account when using antidepressant drugs in the elderly. Of particular importance is an increased sensitivity to side effects. In administering any antidepressant drugs to elderly patients, dosages should start at a low level and be increased very gradually, with careful monitoring for side effects. A number of new antidepressants have been developed recently that have a substantially reduced incidence of anticholinergic side effects; these, particularly, should be useful in elderly depressed patients. The new agents include bupropion and fluoxetine as well as trazodone.

Let me turn now to maintenance or prophylactic treatment of recurrent depression in manic depressive illness. The original study of Baastrup and Schou elegantly demonstrated the capacity of lithium maintenance to substantially reduce recurrences of both depressive and manic episodes in patients with bipolar illness as well as with recurrent unipolar depression. Lithium represents an extraordinary research accomplishment in psychiatry. Since it became available in the United States in the late 1960s, it has saved an estimated \$12 billion dollars which otherwise would have been required for the direct clinical care of patients with depressive disorders. In the era before the introduction of lithium, a patient with manic depressive illness typically spent nearly one-fourth of his or her adult life in the hospital due to manic or depressive episodes. With lithium, approximately 80% of these patients can be maintained successfully on an outpatient basis, leading normal or nearly normal lives.

There is a stepwise increase in rates of dementia among those 65 or over in the U.S. population. Overall, the incidence of severe dementia among persons 65-and-over is approximately 5 percent; in the U.S., this represents more



than one million individuals. Recalling the demographic data reviewed earlier, one can see how this problem is going to escalate in the decades ahead. Figure 2 illustrates the one-month prevalence of severe cognitive impairment, tabulated separately for men and women. Note that women are more vulnerable to the age-related increase.

Causes of dementia in the elderly for which treatments are, or are not, available, are listed in Table 5. Here, I call your attention to the condition of "pseudo-dementia." Depression in the elderly is all too frequently misdiagnosed as dementia. In the U.S., surveys have suggested that between 12 and 30 percent of those diagnosed as demented have, in fact, been misdiagnosed and instead have a treatable disorder with dementia as one of its symptoms. I cannot over-emphasize how important it is that depression in the elderly be recognized and diagnosed. Once a patient is given the diagnosis of dementia there is a tendency toward therapeutic nihilism; that is, for individual physicians and other health care workers to give up hope for them and simply wait for further deterioration. The fact that this misdiagnosis can have such tragic consequences underscores the importance of physicians' learning how to recognize clinical depression and to differentiate clinical depression with dementia as a symptom from primary dementia of the Alzheimer's type.

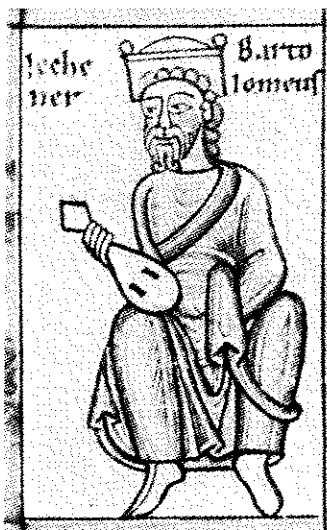
Table 6 lists the diagnostic criteria for Alzheimer's disease, and here, again, I emphasize the exclusion of known reversible causes of dementia. Table 7 outlines diagnostic features which are useful in differentiating primary depression in the elderly from organic brain disease with secondary depression, principally Alzheimer's dementia with secondary depression. Table 8 lists those symptoms which suggest the coexistence of depression and dementia in the same patient. One should be aware that treating the depression can improve the overall functioning of the patient de-

spite the fact that the primary dementia will not respond to antidepressant treatment per se.

At this point I would like to note several interesting experimental attempts to treat Alzheimer's dementia which now are being investigated by my colleagues at the NIMH Intramural Research program in Bethesda. One approach involved administration of the selective MAO-B inhibitor (1-Deprenyl) to hospitalized patients fulfilling criteria for primary degenerative dementia (Tariot, et al., 1987); a significant improvement in total symptoms was found. Foremost among the items showing improvement were those related to mood and motor behavior, but there was also some improvement in cognition, again suggesting that treatment of the coexisting depression in these individuals was helpful to their overall functioning. Whether the 1-Deprenyl had a direct effect on the dementia itself is not clear from this data.

There has been extensive research involving the variety of brain neuropeptides that are involved in the regulation and formation of cognition and memory function. Attention has been focused especially on arginine vasopressin and an analog of vasopressin called DDAVP (1-desamino-8-D-arginine vasopressin), as well as on thyrotropin releasing hormone (TRH) and ACTH, adrenocorticotrophic hormone. Animal studies with these peptides show enhancement of normal memory function under some conditions and, I submit, raise interesting philosophical questions regarding the wisdom of enhancing normal function rather than simply correcting pathological function associated with aging. Let me elaborate.

In animal experiments involving the enhancement of normal memory with DDAVP, it appears that one effect of enhanced memory may be a diminished interest in one's immediate environment. In one such experiment, in which the animals had learned not to enter the area of a cage where the floor gave



them a mild electrical shock, injection of the memory enhancer allowed the subjects to retain for a much longer time memory of the negative learning. Retention of this negative learning delayed re-establishment of normal exploratory behavior. One thinks of depressed patients who, because they retain memories of past injuries for prolonged periods of time, prove unable to move on to new experiences and to further explore their psychosocial environment. Perhaps we should consider that the capacity to forget is an important aspect of the acquisition of new knowledge and, conversely, that unlimited memory may have its downside.

In any event, a general ethical issue raised by this line of research concerns attempts to enhance or reverse normal aging processes as opposed to attempts to correct clearly pathological states. I know that this particular issue will be discussed by others in this symposium, so I will do no more than raise it as a question at this juncture.

An example of another new area of research relating to dementia involves the critical role of the neurotransmitter acetylcholine. The importance of this transmitter to those parts of the brain serving memory function is well-established, and we have evidence that neurons in the brain which contain acetylcholine degenerate in Alzheimer's disease. Research at NIMH involves the administration to normal volunteers of scopolamine, a drug which interferes with acetylcholine. The NIMH scientists found, as hypothesized, that scopolamine reduced memory function (Molchan et al., personal communication, 1988). Of considerable interest is the fact that the investigators were able to substantially reverse this decrease by administration of the peptide TRH. They are now exploring whether TRH administration might help alleviate cognitive deficits in patients with dementia who presumably have an acetylcholine deficit similar to the one that was induced in these normal volun-

teers by the administration of scopolamine.

At the level of basic neuroscience, Crawley and colleagues at the NIMH have been working with the peptide galanin which is known to co-exist with acetylcholine in key acetylcholine neurons in the central nervous system. Lesions placed in the acetylcholine rich basal forebrain produce animal models of Alzheimer's dementia. Administration directly into the brain of acetylcholine restored the defective memory in these animals. As galanin is added to the injection, cognitive memory performance goes down (Mastropaolo et al., 1988). Since galanin normally coexists with acetylcholine, these data would suggest that it serves some inhibitory role in acetylcholine's memory functions. Thus, a potential treatment strategy is suggested: if drugs could be developed that can inhibit galanin formation or function, the result might be to disinhibit the endogenous acetylcholine in the brain and improve functioning in Alzheimer's patients.

Dr Crawley and her colleagues currently are working with agents which show promise for interfering with the inhibitory actions of galanin. NIMH also is conducting studies of Alzheimer's patients using single photon emission tomography (SPECT) to study regional metabolic activity. These scans illustrate profound loss of brain material in different regions, corresponding to the nature of the defect symptoms. For example, patients who exhibit degeneration largely in the parietal areas show deficits primarily in spatial relationships and in coordinated motor movements; frontal lesions, on the other hand, are associated with cognitive and memory deficits. The technology of brain imaging offers considerable promise in identifying localization of lesions in Alzheimer's disease.

Finally, I call your attention to recent exciting progress in brain imaging strategies that would allow the imaging of



specific neurotransmitters and neurotransmitter receptors. Indeed, in the intramural program of NIMH, Weinberger and colleagues already have developed techniques for imaging the acetylcholine receptor in specific regions of the brain. Such techniques will allow us to progress more rapidly in efforts to elucidate the nature of the deficit of Alzheimer's disease and, potentially, aid in our search for new treatments.

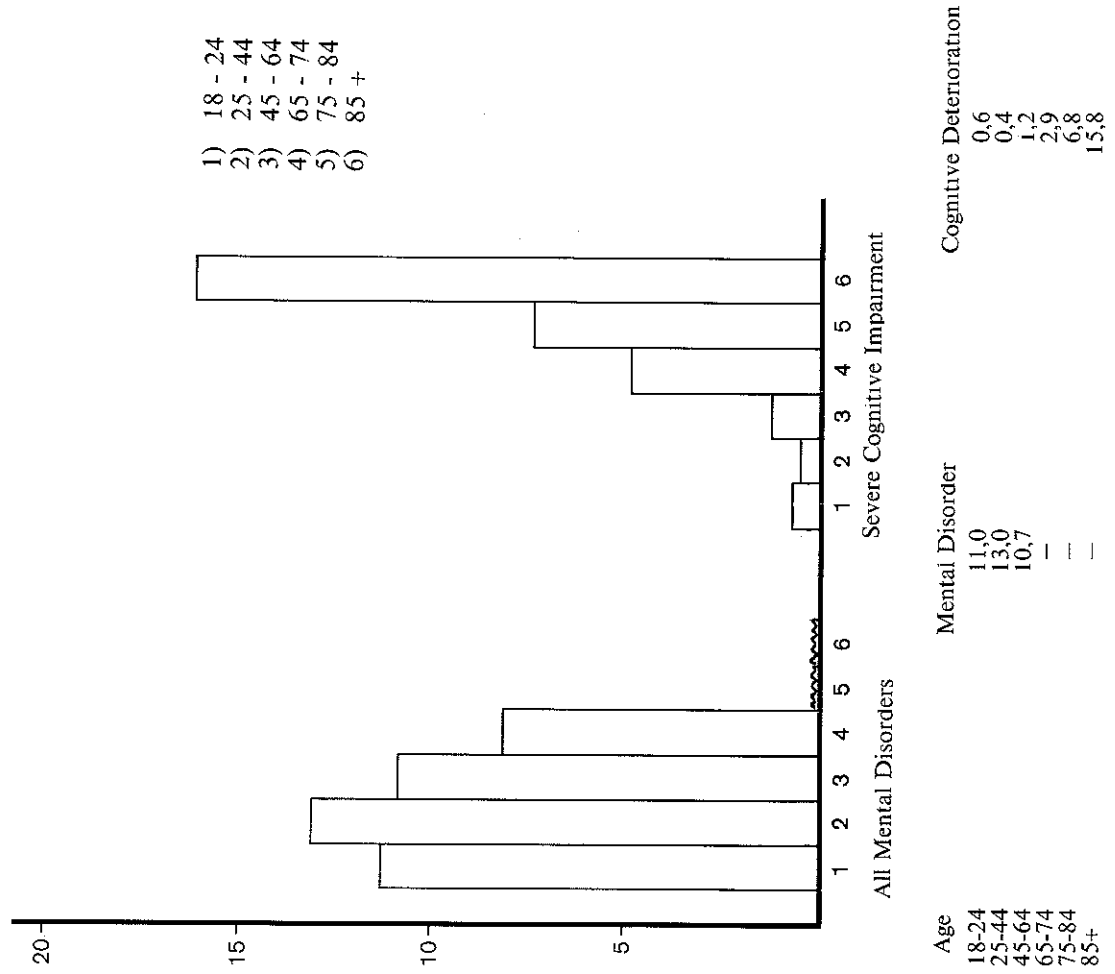
I would close with some general observations. Research depends upon hope, and, as well, generates hope. It is an interesting convergence that we discuss here today (research on aging) because it represents the coming together of the hope of the future with our elderly citizens who are, after all, our link to the past. It is a particularly challenging task to conduct research on the brain since the brain is really the organ of the human mind, that part of all of us that enables moral action. As the Holy Father said at his speech at a recent scientific conference here in Rome, "Our moral choices must be as informed as possible, and, therefore, the pursuit of knowledge, the unlocking of the mysteries of nature, is indeed in the service of our moral selves, and can be said to truly be God's work." Thank you.

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Figure 1

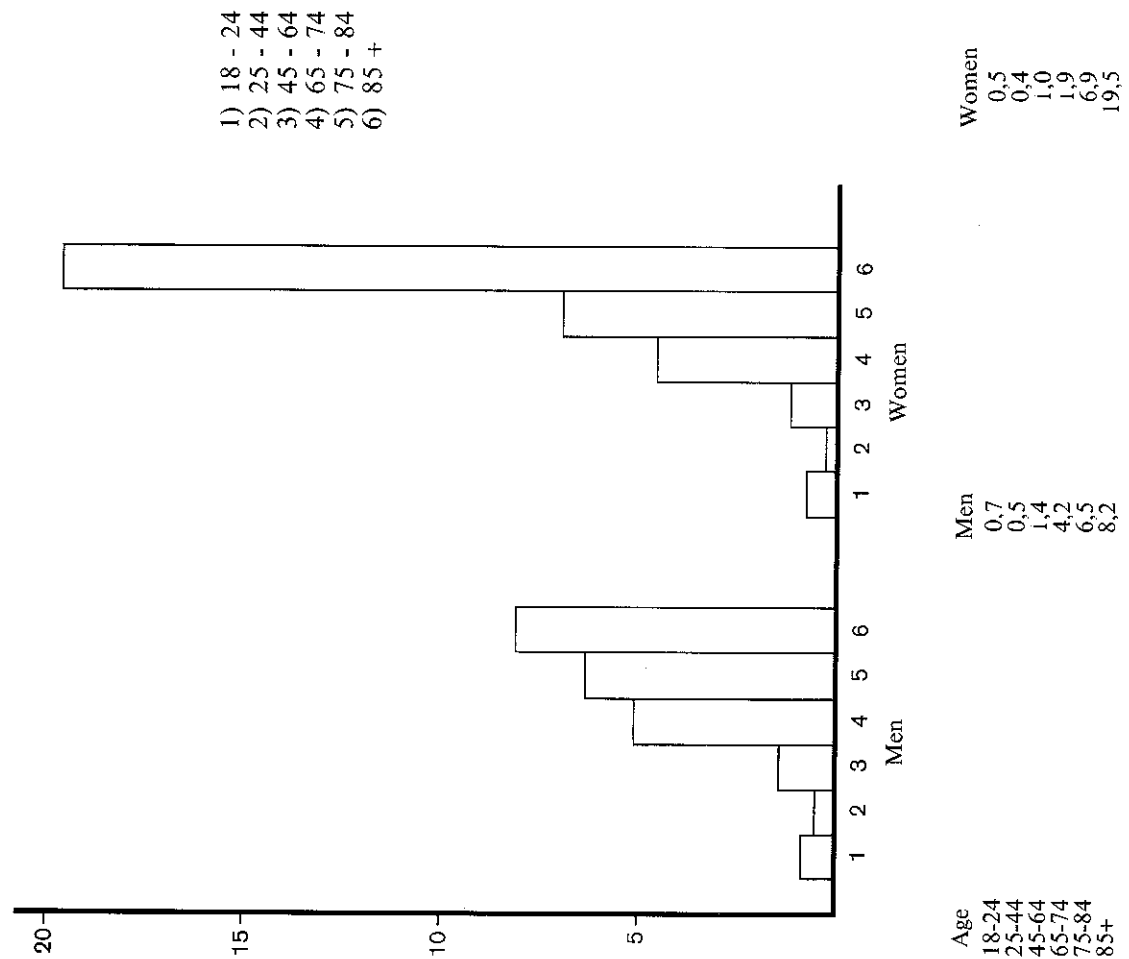
One Month Prevalence of All Mental Disorders and Severe Cognitive Impairment



Regier et al., 1988

Figure 2

One Month Prevalence of Severe Cognitive Impairment, By Sex



Regier et al., 1988

Table 1*Some Similarities Between Normal Aging and "Endogenous" Features of Depression*

- * Decreased sleep with early morning awakening
- * Decreased appetite
- * Decreased energy and psychomotor function
- * Decreased sexual function
- * Impairment of cognitive and memory functions
- * Increased physical complaints

Table 2*Age and the Problem of Loss*

- * More physical illness and partial loss of physical capacity
- * Loss of loved ones with increased social isolation
- * Loss of role anchors for self-esteem
- * Partial loss of psychological mastery
- * More helplessness with increased dependency

Table 3*Some Age Related Biological Changes with Possible Relevance to Depression*

- * Decreased endocrine function with age
- * Increased levels of monoamine oxidase in brain with age
- * Decreased levels of norepinephrine in brain with age
- * Increased plasma melatonin with age
- * Decreased flexibility of regulatory systems

Table 4

<i>Antihypertensives</i>			
Reserpine	Clonidine	Hydralazine	Methyldopa
Propranolol			Guanethidine
<i>Stimulants</i>			
Amphetamine	Methylphenidate		Cocaine
<i>Steroids</i>			
Cortisone			Dexamethasone
<i>Antiparkinsonian Drugs</i>			
Levidopa			Levidopa and Carbidop
<i>Hormone</i>			
Estrogen			Progesterone
<i>Others</i>			
Cimitine	Narcotics	Barbiturates	Neuroleptics
Benzodiazepines			Digitalis

Table 5*Causes of dementia in the elderly*

<i>Disease</i>	<i>Treatment Available</i>	<i>Treatment Unavailable</i>
Alzheimer's Disease		XXXX
Atherosclerosis (Multiple Infarcts)		XXXX
Slow Virus		XXXX
Depression (Pseudodementia)	XXXX	
Drug intoxication	XXXX	
Hypothyroidism	XXXX	
Vitamin B ₁₂ Deficiency	XXXX	
Normal Pressure Hydrocephalus	XXXX	
Subdural Bleeding	XXXX	
Infection	XXXX	

Table 6*Diagnostic Criteria for Alzheimer's Disease*

- * Insidious onset of memory disorder, intellectual dysfunction, and disintegration of social interaction and personal habits
- * A gradually progressive course of failure in the above functions for a minimum of 12 months
- * Exclusion of known, reversible causes of dementia
- * The absence of stroke-like neurological episodes or deficits

Table 7*Some Diagnostic Features Useful in Differentiating Primary Depression in the Elderly from Organic Brain Disease with Secondary Depression*

- * Prior history of affective illness
- * Family history of affective illness
- * Onset characterized by presence of mood changes
- * Relative predominance of depressive symptoms over "organic" symptoms with lower incidence of frank disorientation and delirium

Table 8*Symptoms Suggesting Co-Existing Depression and Dementia*

- * Acute or Subacute Change in Clinical State
- * Recent onset of tearfulness
- * Change in self-attitude
- * Change in vital sense, appetite, sleep quantity, or cycle
- * More reclusive
- * Symptoms suddenly worse in morning
- * Sudden worsening of cognitive state
- * Begins complaining of memory disturbance

Demographic Aspects

Prof. ANTONIO GOLINI

Professor of Demography at La Sapienza University, Rome
Director of the Population Research Institute

1. Introduction

Whereas the twentieth century has been the century of demographic growth, the twenty-first century will be that of the aging of the population, and it could not be otherwise; indeed, populations either grow — but cannot do so indefinitely — or age. The problem thus does not involve aging in itself, a phenomenon taken for granted and in certain respects *necessary*; the problem concerns the velocity and intensity of aging, and not just these, but also the way to provide for and administer aging. In regard to this last point, it should be considered that one difficulty connected with demographic tendencies and projections is that they fail to convey a sense of urgency. It is easy for problems to be shelved which will not become manifest until years have passed, but the next millennium is not unimaginably far off — it is just eleven years away, and expiration dates will “inexorably” come since they involve real persons and not hypothetical events; as only one example, let it suffice to recall that the children born in 1988 will retire around 2050.

Dealing specifically with the problem of aging, we may state that from a demographic standpoint the aging of a population consists of an increase in both the *number* of elderly persons and their *proportion* with respect to other age groups. Consequently, the main indicator of aging is constituted by variations in the relative weight of the oldest age groups within a population. In accordance with the criterion established by the World Assembly on Aging held in Vienna by the United Nations in 1982, as a first ap-

proximation the elderly population is defined as the group made up of persons aged sixty or more.

This demographic phenomenon, on the basis of which the proportion of over-sixty-year-olds in a contemporary population could go in just a few decades from 10% to 45% and that of over-eighty-year-olds from 1% to 10%, is unprecedented in history and definitely revolutionary, for it alters millenary balances to an extraordinary degree. It in fact spurs reconsideration of economic structure, social organization, views on life and the life cycle, and the system of interpersonal and intergenerational relations. It appears to be no less unsettling than the technological revolution under way and the heralded biological revolution.

The process is insidious and is not always fully and immediately perceived by nonspecialists, for it unfolds silently over long periods which, to be evaluated better, should be considered in both prospective and retrospective terms; taken jointly, they help to grasp the current situation and formulate the scientific analysis and political action needed to face aging.

2. Demographic Aspects of Aging

2.1. Generalities

The distribution by age of a population depends on past and present tendencies in fertility and mortality and, when significant in the life of a population, migration.

The great demographic transformation has been consummated in the West over a relatively short period: in about a century average longevity has tripled, and fer-

tility has been reduced to a third, or even less.

Indeed, the relatively high birth rate sixty or more years ago associated with the tremendous reduction in contagious and parasitic diseases and in infant and maternal mortality and with improved nutrition has permitted a very sensible increase in the *number* of those reaching mature and old age. Their number has also increased as a result of generalized improvements in public and private health services, instruction, and income.

Their *proportional weight* with respect to the entire demographic framework will, however, depend above all on variations in the births which sustain the lower part of the age pyramid. Aging thus relates to two rates: the rate of increase in the old and the rate of decrease in the young.

A more or less sharp drop in population growth among the young, mainly due to a drop in fertility and births, provokes “aging at the base” of the age pyramid, and this is the factor which until now has acted most intensely. An acceleration of the growth of the elderly population — which is generally the result of a decrease in mortality among the oldest age groups that is more marked than that among young age groups — provokes “upper-level aging.”

2.2. The trend in fertility

The lower part of the age pyramid, sustained by a flow of births being reduced year after year in all the western countries is gradually acquiring the shape of a spindle. Children and young people are becoming rare to a completely unforeseeable extent,

nor does it seem that this decline will come to a stop in the relatively near future.

In developing countries, however, the decline in fertility, though sensible, has not yet drastically reduced births, which instead continue to increase on an absolute basis for the great mass of people at the age of fertility.

In Italy the fall in the birth rate has greatly surpassed that of countries with traditionally low or very low fertility, such as France and Sweden (Table 1). The latest information available for Italy for a single year, 1987, shows the average number of children per woman is 1.3, which is 35% below replacement level; i.e., 2 children per woman, replacing parents numerically, ensure zero population growth. In absolute figures, the annual flux of live births was about one million in Italy for nearly an entire century; beginning in 1974, the decline has become accentuated, and a generation is now made up of slightly over 500,000 births.

With such a low fertility, the process of aging is accelerated; for this reason a vicious circle can be created which proves self-sustaining involving aging of the population and demographic decline due to low birth rate and high death rate; this could even bring about the disappearance of certain specific subpopulations. Research on "areas of demographic malaise" in Italy now enables us to see clearly that if in a certain population at a certain date there is low or very low fertility and the percentage of over-sixty-year-olds exceeds 30%, it may be expected with almost absolute certainty that in the following decade there will be an average yearly natural population gap (difference between births and deaths) less than -1%. This decrease further alters the age structure, leading to even more markedly negative figures of natural increase and so on, in a vicious circle bringing entire districts of municipalities to a percentage of persons over 60 on the order of 40% and to a proportion of births to deaths of about 1:4 or even 1:6.

What scenes can be envisioned for the future of fertility? It is certainly most difficult to respond. On the one hand, the cultural, social, and psychological stimuli which have led to the current level of decline in births could be further reinforced, and cheap, easy-to-use, safe contraceptives with long-lasting effects — another element for their broad dissemination — could be made widely available; it would, in fact, be possible to eliminate that small or minuscule remaining percentage of unplanned births. The prospect appearing on the horizon of being able to choose the sex of the unborn child would most likely favor a further decrease in fertility as well.

On the other hand, such a marked decline in the population might set off a kind of "social alarm," particularly when a population began to have 3-5 deaths for every birth over long periods. There thus might be a form of reaction by individuals and couples to a sharp decrease in births, favored as well by a noticeable slackening of pressure on the labor market at that point and by the size of the population, unquestionably smaller than before. This kind of reaction could also find incentives and stimuli in social policy aimed at returning to a stationary population, or one that is nearly so, which reconsidered the value of birth from a societal and collective standpoint as well and eliminated the penalties existing today for whoever wishes to have a child or an additional one. The sensation is that this scenario foreseeing the radical modification of too many factors hard to change is less likely to take place, at least on a short or middle range basis. On this path, it thus seems that aging must be prolonged and accentuated over time.

2.3 The trend in mortality

In 1881 the average lifespan in Italy was still 35 years for both men and women, and at that time no more

than 33% of a generation managed to reach 60, and 6-7%, 80. After 100 years, the average lifespan has reached 74 in Italy (71 for men, 78 for women); we observe very similar figures in most of the highly evolved countries (Table 2), whereas in developing countries the distance is even more sensible.

For the purpose of fully evaluating the future scope of the degree and rate of aging in the population, it seems fundamental to know if the number of those over 80 in a generation will ever reach the proportion of 70-80% and if average remaining life at 80 will reach 10-15 years (in current tables the figure for women is 7.4). In the psychophysical conditions in which the older elderly find themselves today, the attainment of these two targets would create far-reaching problems in all the advanced societies since the lifespan would be about 80 almost invariably.

In the light of current knowledge, after the rectification of Bourgeois-Pichat (1978) on the biological limits of average lifespan, re-estimated by him up to 73.8 years for males and 80.3 years for females, some demographers think (biologists have different criteria and standards of evaluation and judgment and go a good deal farther in their estimates) that average lifespan may reach 80-90 years and that the proportion of those over 80 may reach 70-80% or even 92%.

In such a situation, one might usefully ask what benefits can be expected from these increases. For a number of researchers, in fact, the gains in longevity may represent only added years of chronic illness. Treatments for these illnesses might be mere palliatives used to postpone death while leaving the patient's health seriously damaged.

This scenario, at least on a short and middle range basis, seems more likely to occur than the one foreseeing a longer and healthier life as a result of successful action in reducing environmental risks and those linked to lifestyles.

All of this while waiting for biological and medical research to come to control the degenerative processes of aging and maintain integrity at the maximum level possible or at least individuals' psychophysical autonomy. Where and when this took place, average lifespan might far exceed 100 years, and the events of aging on an individual and collective basis would all have to be restudied.

One of the most interesting and important aspects of trends in mortality concerns the difference between the two sexes. Men are characterized at all ages by an accentuated supermortality which increases over time as mortality from infectious and parasitic diseases diminishes and mortality from tumors and cardiocirculatory illnesses — regarding which women enjoy a kind of "protection" whose causes are largely unknown — grows; differences in mortality are for this reason particularly enlarged in the elderly and senile groups, where there is a decided majority of women increasing with age. In all the developed societies women on the average live longer than men: the average length of women's lives exceeds that of men's by over 8 years in France, Finland, and the USSR and by 6-7 years in almost all the other European countries (including Italy) and North America (Table 2)

While current trends suggest the possibility of a leveling off or reversal of such differences, it is too soon to tell whether the male-female difference in average lifespan will in fact be narrowed. In developing countries the difference is generally smaller, hovering around 3-6 years.

2.4 Classification of the elderly population

The classification of the elderly population has often been — and in many cases still is — approximate or, in any event, excessively summarized. Even in statistically evolved countries, for a long time in many classifications of the population by age groups the old and very old

have frequently been combined into a single group designated "60 and over" or "65 and over" as the final category

But numerical growth has served to demonstrate the obvious: the elderly population is anything but homogeneous in regard to the characteristics of the "60 and over" group, which in fact includes both the old, who are generally still independent, active, and in good health, and the older and very old, who are often completely dependent on others, unable to look out for themselves and in precarious or ill health. It is thus necessary to consider and analyze not only the size of the elderly population, its proportion with respect to the total, and its variations in regard to other age groups, but also the dynamics of the accumulation and the proportion of the different age groups within the large category of the old and very old.

For this reason, the two age thresholds deemed significant are 60 and 80, and synthetic classifications usually refer to them.

3. Aging in Italy and the Rest of the World

3.1. Italy

The values reported in Tables 3-5 show the dynamic of aging in the Italian population after unification, with prospects up to the first two decades of the twenty-first century; in order to clarify the meaning better, the tables also include all the measures and indicators of aging, among which the most commonly used are a) the percentage of the total population which is 60 (or 65) or over, b) the percentage of the population which is 80 or over, c) the percentage of the elderly population which is very old (80 or over in relation to 60 or 65 or over), d) the ratio, per hundred, of those over 60 or 65 to those under 15, which is usually called the "old age index," e) the ratio, per hundred, of the population over 60 or 65 to

that between 20 and 59 (or 64), which is usually called the "dependence index of the elderly population," when the populations to be compared lack profound alterations in profile because the average age of population members is also used.

It may be observed from the tables that the great turning-point in aging belongs to this century, particularly after World War II. Indeed, up to and including 1901, a little less than half the population was made up of persons under 20; in 1861 those over 60 were less than 7%, and those over 80, just 0.4% (one out of every 263 people), and the ratio of persons under 20 to those 60 or over was about 7 to 1. The situation at the beginning of the twentieth century was not very different, for the rate of increase of the old and very old population, though much greater than that of other population segments, applied to small numbers and thus gave rise to modest absolute increases for both the elderly population (about 40,000 people a year) and, even more, the very old (from 2,000 to 6,000 a year up to and including 1951).

In the last twenty years, during which every three calendar years there has been a year's increase in the average lifespan, especially after 1974, when the great drop in Italian fertility began, the phenomenon of aging has become manifest in its full significance. In the 1981-1988 period the under-twenty population has decreased by 337,000 each year, and those over 60 have, on the other hand, increased each year by 218,000. Those over 80 have, furthermore, increased by 60,000 a year, whereas the annual increase over the ninety years from 1861 to 1951 was 4,500. In the next decade no less intense will be the growth rate — very marked and involving a doubling of the very old population every 16 years — and the absolute increase, which will reach 82,000 a year. By 2018 one out of every four in the elderly population will be over 80.

In the more distant future,

however, the growth of those over 60 and over 80 will slow down in absolute and relative terms, but they will find themselves living with a foreseen decrease in the rest of the population. Between 1998 and 2018 those over 60 should increase each year by 112,000, but all the rest of the population, those under 60, on the assumption of unvarying fertility — and thus not the most pessimistic forecast — should drop by 317,000. The relative weight of the elderly and very old population will, then, grow sensibly in relation to the rest, and this is also verifiable in both the old age index and the index of the elderly's dependence on the working-age population (Table 5).

The growth over time of male super mortality makes the elderly population one which is increasingly made up mostly of women. In recent years women have represented 58% of those over 60; among those over 80, two out of every three are women (1,053,000 in 1989 over against 524,000 men).

3.2. *The rest of the world*

Temporal trends and territorial differences among the old and very old and in aging processes around the world are clearly seen in Tables 6-9, and we shall thus limit ourselves to stressing a few points.

The problem of aging is a problem of the developed world, at least for the time being. The advanced countries (AC) in 1985 had 24% of world population, but 44% of those over 60 (186,000,000 out of 427,000,000) and 61% of those over 80 (25,300,000 out of 41,700,000). In the total population, those 60 or over represent (1985) 15.8% in AC over against 6.6 in developing countries (DC), with a consequent ratio of 2.4 to 1; those 80 or over represent 2.2% in AC and 0.4% in DC, with a ratio of 5.5 to 1.

If in DC the problem is currently reduced, it must, however, be stated that it is tending to grow at a very

rapid pace, greater than that in AC. Indeed, in the former, between 1985 and 2025 those over 60 should go from 241 to 703 million, a 192% increase; in the latter, on the other hand, they should go from 186 to 308 million, a 66% increase. The fact is that aging grows extremely quickly, with marked transitional peaks, when the entire process of demographic transition takes place in short or very short periods as is occurring in different developing countries.

Among the advanced countries, Sweden is currently the "oldest" country in the world; 23% are over 60 and 3.5% over 80. Japan is, however, the country which "will age" fastest. The proportion of those over 60, 14% in 1985, should reach 28% in 2020.

Among the large countries, Italy is one of the frontrunners in the percentage of old and very old: 18.6% for those 60 or over and 2.7% for those 80 or over (1985); both these figures surpass those corresponding to the advanced countries as a whole and tend to grow very fast — at a rate exceeded only by that of Japan. In advanced countries one out of every nine people was 60 or over in 1950, and there should be one out of every four in 2020; one out of every hundred was 80 or over in 1950, and there should be one out of every twenty-seven in 2020 — a revolution of extraordinary scope consummated in the span of just seventy years.

3.3. *Subnational territorial differences*

In developed countries the territorial differences in the aging of the population are marked — indeed, enormous; there are areas where those over 60 are fewer than 6% and areas where they represent more than 23%. In Europe there is a belt of very pronounced aging running from North to South, from Sweden to Italy, along a semi-circle beginning in the south-central part of Sweden and Norway, passing through the

south-central region of the United Kingdom, the south of France, and the center of the Iberian Peninsula, and ending in certain Ligurian and Piedmontese provinces. It is the interplay of all past demography — births, deaths, urbanization, rural and mountain district depopulation, international migrations — which is variously combined in the different European countries to give rise to the current situation.

These factors come into play more than ever in Italy, where demographic events are strikingly linked to territory. They have provoked sharp differences among the most marked in the world which are not to be found even minimally in countries such as Canada, to cite just one example, where economic and demographic development have been much less heterogeneous.

Territorial differences are found at all levels. The percentage of those 60 or over in 1988 includes a difference of 4.6 points between the North-Center (21.2) and the South (16.4) tending to increase decidedly over the course of time; on the assumption that fertility remains constant, this gap will reach 7.2 points in 2000 and 12 points in 2015. At that time nearly one out of every three inhabitants could be old or very old in the North-Center, and one out of five in the South. The same trend is found in the population of 80 or more: a difference of 0.9% in 1988 (3.1% in the North-Center and 2.2% in the South) which should grow over time until 2018, when the North-Center could have twice as many over 80 as the South. The average age of the population would be 41 in the southern part of the country and over 49 in the northern central zone (Table 10).

Even more marked are the differences among the regions. The regional minimum for aging corresponds to Campania, where fertility always maintained a rather high level up to a very few years ago, whereas the maximum corresponds to Liguria, where the

Table 1 - Average Number of Children per Woman Around the World and in Certain Countries

Countries	1950-55	1960-65	1970-75	1980-85	1985-90
Whole World	5 00	4 97	4 45	3 61	3 27
Developing Countries	6.18	6 08	5 41	4 19	3 72
Kenya	7.51	8.12	8.12	8 12	7 81
Egypt	6.56	7.07	5.53	5 27	4 61
Argentina	3.15	3.09	3 15	3 15	2 82
Brazil	6.15	6 15	4 70	3 81	3 20
China	6.24	5 93	4 76	2 36	2 25
India	6 85	6 11	5 04	3 89	3 34
Turkey	5 97	5 81	5 43	4 75	4 10
Developed Countries	2 84	2 69	2 20	1 93	1 85
United States	3 45	3 31	1 97	1 82	1 77
Japan	2 75	2 01	2 07	1 76	1 65
URSS	2 82	2 54	2 44	2 35	2 35
Hungary	2 72	1 82	2 08	1 80	1 70
Sweden	2 21	2 33	1 89	1 66	1 60
United Kingdom	2 18	2 82	2 04	1 80	1 75
France	2 73	2 85	2 31	1 87	1 82
West Germany	2 08	2 48	1 62	1 36	1 36
Italy	2 32	2 55	2 27	1 55	1 40

Source for Tables 1 and 2: U.N., *World Population Prospects 1988* (New York 1988)

Table 2 - Average Lifespan (in years) Around the World and in Certain Countries

Countries	1950-55 MF	1960-65 MF	1970-75 MF	1980-85 MF	MF	1985-90 M	F
Whole World	46 0	51 5	56 6	59 5	61 1	60 0	63 0
Developing Countries	41 0	47 6	54 2	57 6	59 7	58 6	61 0
Kenya	41 0	46 0	51 0	56 0	58 4	56 5	60 5
Egypt	42 4	47 4	52 1	58 1	60 6	59 3	62 0
Argentina	62 7	65 5	67 3	69 7	70 6	67 3	74 0
Brazil	51 0	55 9	59 8	63 4	64 9	62 3	67 6
China	40 8	49 5	63 2	67 8	69 4	69 0	70 9
India	38 7	45 5	50 3	55 4	57 9	57 8	57 9
Turkey	43 6	52 1	57 9	61 6	64 1	62 5	65 8
Developed Countries	65 7	69 8	70 9	72 3	73 4	69 8	77 2
United States	69 0	70 0	71 3	74 5	75 4	71 9	79 0
Japan	63 9	69 0	73 3	76 9	78 1	75 4	81 1
USSR	64 1	69 2	68 6	67 9	69 5	65 0	74 2
Hungary	63 9	69 0	69 9	69 6	70 1	66 5	74 0
Sweden	71 8	73 5	74 7	76 3	77 1	74 2	80 1
United Kingdom	69 2	70 8	72 0	74 0	75 2	72 4	78 1
France	66 5	71 0	72 4	74 7	75 6	71 7	79 8
West Germany	67 5	70 0	70 6	73 9	74 8	71 6	78 2
Italy	66 0	69 9	72 1	74 6	75 6	72 4	79 1

decline in births has been more precocious and intense than in any other Italian region and towards which there is an appreciable migratory flow of retired people seeking to spend their final years there. The differences are such that in 1988 one out of every four inhabitants of Lig-

uria is over 60 and one out of every seven in Campania. On the assumption that fertility remains unchanged, in 2018 nearly 40% of the inhabitants in Liguria would be 60 or more, and 11% would be 80 or more. In Campania the aging process will be much less intense, and in 2018 its in-

habitants could have an average age of 40 as opposed to 52 among the Ligurians.

The differences between one province and another and between territories in the same region or within a single city are even broader. In numerous little towns of the inner North-Center for years

Table 3 - Total, Old, and Very Old Population in Italy, 1861-1988, and Forecasts up to 2018

Years	1861	1901	1951	1981	1988	1998	2018
Absolute Values (thousand of Persons)							
Total	26,328	34,015	47,540	56,557	57,399	57,814	53,713
0-19	11,465	14,849	16,471	16,816	14,790	11,840	9,216
20-59	13,136	15,901	25,293	29,890	31,452	32,658	28,948
60 +	1,727	3,265	5,776	9,851	11,157	13,316	15,549
60-79	1,627	3,061	5,267	8,604	9,550	10,887	11,909
80 +	100	204	509	1,247	1,607	2,429	3,640
Percentage Values							
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0-19	43.5	43.7	34.7	29.7	25.8	20.5	17.2
20-59	49.9	46.7	53.2	52.9	54.8	56.5	53.9
60 +	6.6	9.6	12.1	17.4	19.4	23.0	28.9
60-79	6.2	9.0	11.1	15.2	16.6	18.8	22.1
80 +	0.4	0.6	1.0	2.2	2.8	4.2	6.8
60 +	100.0	100.0	100.0	100.0	100.0	100.0	100.0
60-79	94.2	93.8	91.2	87.3	85.6	81.8	76.6
80 +	5.8	6.2	8.8	12.7	14.4	18.2	23.4

N.B. a) Population refers to the end of the years 1861, 1951, 1981 and to the beginning of the year for other dates.

b) Population from census data, reconstructed according to current boundaries up to 1981 ISTAT estimate for 1988

c) Population Research Institute forecasts for 1998 and 2018 (soon to appear); constant fertility and the absence of migrations are assumed)

Source: Our own formulation based on the sources indicated.

and years there has not been a single birth, so that districts encompassing a number of towns may be identified where in the 1981 census those over 60 already reached 35-40% and those over 75 15-20% (for single municipalities we lack data for ages exceed-

ing 75). In a little region like Molise in some districts grouping together municipalities the proportion of elderly is about three times that of other districts; it is also two or three times that of a single city, like Rome, if we compare the very aged historical

center to some outlying sections which are still extremely young.

Such a diversified situation poses political and organizational problems of broad scope which are not easy to solve. First of all, the problem of the money flow, of the

Table 4 - Absolute Increase and Rate of Increase of the Old and Very Old Population in Italy

Years	1861 1901	1901 1951	1951 1981	1981 1988	1988 1998	1998 2018
Average Annual Increase (Thousands of Persons)						
0-19	85	31	12	-337	-295	-131
20-59	69	188	153	260	121	-186
60 +	38	50	136	218	216	112
60-79	36	44	111	158	134	51
80 +	2	6	25	60	82	61
Average Annual Rate of Increase (%)						
0-19	0.65	0.21	0.07	-2.12	-2.20	-1.24
20-59	0.48	0.93	0.56	0.85	0.38	-0.60
60 +	1.60	1.15	1.80	2.10	1.78	0.78
60-79	1.59	1.09	1.65	1.75	1.32	0.45
80 +	1.80	1.85	3.03	4.32	4.22	2.04

N.B. and sources as in Table 3.

allocation of resources and the location of social and health facilities and services. Secondly, there is the theoretically simpler problem — though no less difficult in practice — of rationalizing existing resources. To cite just one example, the problem of reconverting hospital personnel and wards to deal with the very small number of births and the extremely large number of old and very old

4. The Condition of the Elderly in the Developed World

4.1 *The demographic-family structure and the organization of dwellings*

The presence and role of the family are intimately linked to the economic, social, and psychological well-being of the elderly. Modifications in civil status and dwelling-place thus constitute an essential component in analyzing aging.

From a third to half of the

elderly (we refer here, on the basis of available data, to the early nineteen-eighties and to those 65 or over) are widows or widowers, and among those 75 or over the proportion is from 46% to 61%. The lowest proportions (31-34%) are observed in Norway, Sweden, and Greece, whereas the highest (44-47%) are found in Hungary, West Germany, and Japan. Italy is in an intermediate position in regard to widows and widowers both over 65 (37%) and over 75 (54%). The proportions were higher in 1951: 42% and 58%, respectively. The drop in mortality has in fact increased the probability of the couple's survival as well.

But it is women who are much more likely to be faced with living alone. 1981 census data show that in Italy about nine out of every ten men in the 60-69 age group are still married, but only six out of every ten women. Among those 80 or over, more than one out of every two men still is, but only one woman out of every eight. This gap

between the sexes certainly does not help to live out one's old age serenely from a psychological and practical standpoint.

Furthermore, data from recent ISTAT research on family structures show that in 1987 one fifth of those between 65 and 75 and nearly a third of those over 75 lived alone (Table 11)

The tendency to live independently is thus widely extended in Italy, as in other developed countries. In the 1981 census only 224,000 over 60 were found to be living permanently with others (61,000 males and 173,000 females). Among those 75 or over, a very small proportion lives in institutions: 2.7% of total males (but 17% of the unmarried) and 5.3% of the females (19% if unmarried). Of the 480,000 people in Italy who live with others, 88,000, 18%, are unmarried women over 75.

From ISTAT research on health (Table 12), we also see that at all ages more women than men feel they are not in

Table 5 - Aging Indicators in the Italian Population

	Value of Indicator (multiplied by 100)						
	1861	1901	1951	1981	1988	1998	2018
Old Age Index							
^P 65/ ^P 0-15	13.2	17.7	31.4	59.7	77.2	116.9	184.3
Dependence Index of the Aged							
^P 60+/ ^P 20-59	13.1	20.5	22.8	33.0	35.5	40.8	53.7
Percentage of Women among the Elderly							
^P 60+	48.8	50.7	55.1	57.9	58.0	57.6	56.7
^P 80+	48.2	51.3	56.9	67.1	67.4	66.4	64.1
Average Annual Increase of the Indicators							
	1861 1901	1901 1951	1951 1981	1981 1988	1988 1998	1998 2018	
Old Age Index							
^P 65/ ^P 0-15	0.11	0.27	0.94	2.92	3.97	3.37	
Dependence Index of the Aged							
^P 60+/ ^P 20-59	0.19	0.05	0.34	0.42	0.53	0.65	
Women's Percentage of the Total							
^P 60+	0.05	0.09	0.09	0.02	-0.04	-0.04	
^P 80+	0.08	0.11	0.34	0.05	-0.10	-0.11	

Table 6 - 1985 Population (in Millions of Inhabitants) and the Percentage of the Population 60 or Over Around the World and in Certain Countries, 1950-1985, and Forecasts up to 2020

Countries	1985	1950	1970	1985	2000	2020
Whole World	4,854	8.0	8.4	8.8	9.9	12.9
Developing Countries	3,680	6.4	6.0	6.6	7.7	10.9
Kenya	20.4	5.0	3.4	3.0	3.0	3.7
Egypt	48	5.1	6.7	6.2	6.6	10.4
Argentina	30.3	7.0	10.7	12.5	13.2	14.7
Brazil	136	4.2	5.4	6.6	8.0	12.1
China	1,060	7.5	6.8	8.2	10.5	16.6
India	769	5.6	6.8	6.8	8.4	12.6
Turkey	50	6.0	7.0	6.5	8.3	11.3
Developed Countries	1,174	11.4	14.3	15.8	18.8	23.9
United States	239	12.1	14.0	16.3	16.8	24.9
Japan	121	7.7	10.7	14.5	21.3	27.7
USSR	277	9.0	12.0	13.1	17.7	19.8
Hungary	10.6	11.3	17.2	18.2	20.3	27.0
Sweden	8.4	15.0	19.6	22.8	22.8	29.6
United Kingdom	57	15.5	18.7	20.7	20.7	25.9
France	55	16.2	18.1	17.7	20.1	26.8
West Germany	61	14.0	19.2	20.0	24.6	32.2
Italy	57	12.0	15.7	18.7	22.2	26.6

Source Data taken from U.N. *World Population Prospects. Estimates and Projections as Assessed in 1984* (New York, 1986)

good health. But, if the number of days spent in bed and the number of hospital stays constitute indicators of seriousness, then at all ages women are affected by less serious ailments. The data show as well that elderly men turn to medical visits and diagnostic checks more often than women.

4.2. Socioeconomic conditions and work activity

The old and very old are more vulnerable not only because of the set of physical, health, and living conditions, but also because they are less educated and well off than the rest of the population. Education level markedly declines with age since we are dealing with older generations less exposed to schooling.

The differences in education among the various generations are enormous and perhaps go beyond what might be expected; in 1981 50% of those over 75 were virtually illiterate. The phenomenon is not just Italian, as is obvious: 62% of Americans over 85 do not have a

high school diploma; the figure drops to 13% for the 25-34 age group.

It will be necessary to wait until 2030-2040 in order for well-educated generations to reach the most advanced ages. Until that time in evaluating the problem of the elderly and the policies which may be adopted to face it this factor must be taken into account.

As regards involvement in productive activity among the most elderly, we may observe its decline in the majority of countries, and the drop is especially evident in developed countries.

In just ten years in Italy, to cite an example, between the 1971 census and that of 1981, engagement in work in the group over 65 as a whole was reduced by almost a half, and that of the 55-64 age group was reduced by 10%, since the extremely modest increase in women's work involvement did not counterbalance the sharp male decline among the elderly. Even in Japan and the United States the activity rate is de-

clining, though it still remains very high.

These very pronounced differences clearly illustrate the effects which the value system, culture, government policies, and concrete economic conditions can have on the level of economic activity of the oldest workers. It is also useful to stress that Japan has a completely negligible unemployment rate in general and for the young age groups. Even the United States is much better off in this respect than the European countries.

In countries where part-time work is widespread, studies reveal that a large percentage of it is done precisely by the elderly — more than half, for instance, in Japan and the United Kingdom.

For this reason, the oldest population sector is increasingly faced with having to compete with and succumb to the young and, above all, women of all ages in the part-time area. In all the developed countries unemployment, at least officially, is growing among elderly workers, who, moreover, present

the highest incidence of long-term unemployment. For example, an OCSE study has shown that of all the unemployed who are 50 or over, one out of two in West Germany, two out of three in France, and three out of four in Belgium have remained unemployed for a year or more.

The elderly and very old population, then, is unarguably characterized by a lesser degree of economic well-being with respect to the rest of the population, and this first of all results from the fact that that pension income is on the average less than that from work, and, as age increases, other conditions being equal, pensions steadily diminish. Secondly, it should be recalled that the large majority of elderly people are women and widows and that for them home maintenance and other related expenses (light, gas, telephone, television, etc.) are not proportionally reduced as regards the previous family situation. It should also be remembered that, especially in large cities, where the family networks of home support and assistance are necessarily less concentrated and effective, the more one advances in age, the more one needs home assistance on a paid basis. For all these reasons, studies find that in nearly every country as age increases the standard of living declines.

The *Luxembourg Income Study* brings into relief not only that the drop in standard of living is noticeable after the maximum attained between 45 and 65, but that there is another sharp drop, 15% on the average, after 74, with the increasing age of the head of the family. In the Scandinavian countries and the United States, with the highest relative standard of living for the first age group, the reduction thereafter is the most marked and, consequently, the most painful as well.

According to research on 1985 family consumption in Italy, the average monthly spending capacity of a person

living alone who is under 65 (L.1,069,000) is 50% higher than that of a person in the same conditions who is over 65 (L.617,000). This last category represents an important part of the total of families, since single-person families where the head is over 65 number 1,721,000 and constitute 9.2% of the total.

5. Economic and Social Aspects of Aging

Such a swift, sharp demographic transformation cannot fail to provoke a cascade of consequences which society is forced to provide for and face adequately; not to do so would mean its regression or even complete decadence.

There results a series of problems which are complex, growing, and interacting and which merge together to constitute the problem of problems — precisely that of preventing such a new, rapid, and progressive phenomenon as is the aging of the population from involving the aging of the whole society and thus economic, cultural, psychological, and political decay, in addition to generational tensions.

It is also a matter of keeping aging from reaching a demographic “point of no return” at the extreme where aging and decline in births, adding fuel to one another in a vicious circle, would come to determine the disappearance of the entire demographic framework. This prospect, which for the population as a whole is quite remote under current demographic conditions and thus uncertain even in the Western countries with the sharpest drop in birth rate, is not so distant, however, for the populations of some regions or, even more so, for some districts within them.

The basic circumstance that all phenomena and behavior patterns vary quite markedly with age links the aging of the population to the possible aging of society.

For example, clear findings show that a change in age

structure influences both the level and the kind of private consumption. Foodstuffs, first of all, correlate positively with age, along with health-hygiene spending; tobacco and alcoholic beverages, however, correlate negatively, just as spending diminishes, above all in relative terms, for clothing, furniture and household appliances, transportation, education, and free time use. But one of the main problems for analysis is that the results are often obscured by hidden variables, the most important of which is available income; it must thus be asked to what extent the elderly's reduced or modified consumption is the result of their changed needs or their reduced income.

Above and beyond income, relative prices as well play an important role in deciding family consumption, since population influence on consumption is twofold: in the first place, as we have seen, through the age profile for consumption, and, secondly, because changes in the size of the different age groups in turn influence the level of demand and, therefore, of prices. Another indirect manner in which aging influences consumption is by way of the evident relation between the age of every individual and the size of the family. The importance of this relation seems to be greater than that linking consumption to age, since for many expenses the basic unit is precisely the family rather than the individual (housing, heat, light, gas, telephone, and numerous durable goods).

As for the portion of *personal savings*, in accordance with the theory of consumption linked to the life cycle and the assumption of permanent income, the decision to consume or save is not based exclusively on the current income situation, but on past and future expected income, and also on the social security system adopted in each country.

Cost functions in relation to age have, moreover, been shown to be simple, sturdy analytical instruments for the impact of changes in the age

Table 7 - Average Rate of Annual Increase (%) in the Population 60 or Over

Countries	1950-70	1970-85	1985-2000	2000-20
Whole World	2.13	2.20	2.39	2.57
Developing Countries	1.96	2.83	2.96	3.20
Kenya	1.44	3.12	4.28	4.52
Egypt	3.84	1.99	2.54	3.81
Argentina	3.86	2.65	1.72	1.57
Brazil	4.21	3.73	3.22	3.47
China	1.57	2.88	2.82	3.02
India	2.55	3.01	3.05	3.10
Turkey	3.49	1.68	3.64	3.01
Developed Countries	2.32	1.46	1.56	1.37
United States	2.24	2.01	0.66	2.26
Japan	2.77	3.07	2.97	1.24
USSR	2.93	1.58	2.77	1.15
Hungary	2.63	0.61	0.63	1.00
Sweden	2.06	1.26	-0.24	0.93
United Kingdom	1.39	0.78	-0.10	0.82
France	1.51	0.70	0.35	-0.48
West Germany	2.59	0.03	1.05	0.49
Italy	1.95	1.60	1.24	0.61

Source as in Table 6

structure of the population on *public spending*. For instance, in reference to the cost of health care, this means that, in view of the demographic factor alone, to maintain people's health at least at the same level health spending will rise considerably on account of the aging of the population. In Holland, for instance, public spending for a person 80 or over is seven times as high, on the average, as that of person in the 20-44 age group. In France those 60 or over represent 18% of the population and absorb 40% of medical expenditures.

Demographic trends thus reveal the need for substantial shifts in government resource allocations among sectors. In addition, Austrian research shows that public expenditures are not necessarily always higher for the elderly than for the young; this depends on how much (and how long) government pays for education and on the fact that while all young people must attend school, not all the elderly need medical treatment in the hospital.

As for *private investments*, the main aspect is the home. If, on the one hand, slower

demographic growth in itself involves a drop in the demand for housing, it should be recalled that aging is associated with a reduction in the average number of family members, and the number of families may increase even in the face of a decrease in population. This has already occurred in some Italian regions, such as Liguria, for example, but the phenomenon is destined to expand to a very marked degree. By way of illustration, in the whole Italian North-Center in fifteen years, beginning in 1988, the population of 36.5 million inhabitants should diminish by 1.4 million (-3.8%), while the 13.6 million families should increase by 1.9 million units (+14%), with a reduction in average size of from 2.7 to 2.2 members.

Other direct links between aging and private investments may be found in psychological factors. If it is true that the oldest people's attitude towards future-oriented decisions contrasts with that of the young, then aging, other conditions being equal, leads to a reduction in investments. In rapidly aging countries, the spirit of initiative

— and thus the will to accept risks, without which capitalism cannot function — gradually atrophies and is replaced by a new and important sentiment: the desire for security. Some studies show, in any case, that it is aging associated with reduced demographic growth or, even more, decline rather than aging in itself which has a strong impact on investments.

In spite of the strategic role of *exportation* for a country's economic development, there have been no conclusive studies and results on the repercussions of aging on a nation's competitiveness, perhaps because of the very indirect link existing between the two variables. Countries specializing in the production of goods the demand for which is destined to increase on account of aging (for instance, sophisticated medicines or complex medical equipment) may profit from the aging process in other lands. Countries with a good climate and good environmental characteristics may attract retired people from other nations and thus export tourism.

The influence of aging on

Table 8 - Percentage of Population 80 or Over

Countries	1950	1970	1985	2000	2020
Whole World	0.5	0.7	0.9	1.0	1.1
Developing Countries	0.3	0.4	0.4	0.6	1.0
Kenya	0.3	0.2	0.2	0.2	0.3
Egypt	0.2	0.4	0.5	0.6	0.8
Argentina	0.5	0.8	1.2	1.7	2.0
Brazil	0.3	0.4	0.6	0.8	1.3
China	0.3	0.5	0.6	1.0	1.6
India	0.3	0.3	0.4	0.6	1.2
Turkey	0.3	0.3	0.5	0.6	1.1
Developed Countries	1.0	1.6	2.2	2.5	3.6
United States	1.1	1.8	2.3	2.8	3.2
Japan	0.4	0.9	1.7	2.6	4.8
USSR	0.7	1.2	1.7	1.8	3.1
Hungary	0.8	1.5	2.2	2.4	3.6
Sweden	1.5	2.3	3.5	4.5	4.8
United Kingdom	1.5	2.2	3.1	3.6	4.0
France	1.7	2.3	3.2	3.4	3.9
West Germany	1.0	1.7	3.2	3.4	3.9
Italy	1.1	1.8	2.7	3.0	4.6

Source as in Table 6

Table 9 - Annual Average Rate of Increase (%) of the Population 80 or Over

Countries	1950-70	1970-85	1985-2000	2000-20
Whole World	3.47	3.10	2.67	2.97
Developing Countries	3.35	3.28	4.23	3.81
Egypt	7.38	3.18	2.57	3.51
Argentina	4.32	4.67	3.41	2.00
Brazil	4.23	5.34	4.37	3.76
China	4.82	2.84	4.69	3.40
India	2.71	4.20	4.60	4.50
Turkey	3.88	5.29	2.60	4.53
Developed Countries	3.55	2.99	1.49	1.99
United States	3.90	2.52	1.93	0.80
Japan	4.77	5.09	3.52	2.92
USSR	3.99	3.09	1.44	3.33
Hungary	3.84	2.96	0.40	1.24
Sweden	2.88	3.09	1.43	-0.10
United Kingdom	2.54	2.28	1.00	0.26
France	2.62	2.69	-0.98	1.71
West Germany	4.19	3.71	0.10	1.71
Italy	3.26	2.71	1.14	1.91

Source as in Table 6

the cost of labor and scientific and technological research may alter a country's competitiveness, leading, on the one hand, to a parallel increase in prices due to a decrease in the work force and to an increase in salaries and, on the

other, to reduced innovation; furthermore, in societies like those of the West, where salary increases regardless of productivity, with the workers' advancing age the work force costs more, other conditions being equal, than one

made up of young people. And if, on the one hand, the process of aging is rather slow and thus permits the introduction with relative ease of productive and organizational adjustments, on the other, precisely because it is

Table 10 - Territorial Differences in the Percentage of Old and Very Old Population and in the Average Age of the Population, 1955-1988, and Forecasts up to 2018

Territorial Areas	1955	1970	1988	1998	2018
60 and Over					
Italy	12.6	15.9	19.4	23.0	28.9
Center-North	13.6	17.0	21.2	25.8	34.0
South	10.8	13.9	16.4	18.6	22.0
Liguria	16.8	21.5	26.8	31.4	38.0
Campania	10.0	12.4	14.7	17.0	20.4
80 and Over					
Italy	1.1	1.8	2.8	4.2	6.8
Center-North	1.2	1.8	3.1	4.9	8.6
South	1.1	1.6	2.2	3.0	4.3
Liguria	1.6	2.6	4.5	6.8	10.6
Campania	0.9	1.3	1.8	2.6	4.1
Average Age (in years)					
Italy	n.d.	n.d.	37.9	40.8	45.7
Center-North	n.d.	n.d.	39.7	43.1	49.1
South	n.d.	n.d.	34.8	36.9	41.0
Liguria	n.d.	n.d.	43.3	46.4	51.7
Campania	n.d.	n.d.	33.5	35.7	39.7

Source: Formulations by the Department of Demographic Sciences at La Sapienza University, Rome, and by the Population Research Institute. Forecasts assume constant fertility.

Table 11 - Elderly People Living in One-Person Families in Italy, 1983 and 1987

Years	1983			1987		
	Center-North	South	Italy	Center-North	South	Italy
Per 100 People of the Same Age						
55-64	8.9	5.8	7.9	9.2	7.4	8.7
65-74	18.1	12.5	16.4	20.6	16.1	19.2
75 or over	25.2	24.5	25.0	33.0	31.8	32.7
Percentage of Women in One-Person Families						
55-64	74.9	79.8	76.2	71.4	84.1	75.0
65-74	79.0	75.5	78.3	83.5	88.3	84.9
75 or over	83.0	77.0	81.3	83.9	84.4	84.0

Source: ISIAI study on families

slow, this process is often ignored or undervalued for a long time until it becomes very difficult and costly to intervene. Finally, it should be considered that if it is true that the aging process is common to the whole world, it is also true that the speed of aging is not uniform, and if aging cannot in fact be associated with a substantial loss of dynamism in an econ-

omy, even small differences between countries in the times and rates of aging could provoke a substantial redistribution of the commercial flow between developed countries and those of the third world.

All the foregoing considerations clearly illustrate the importance of the impact of aging on the level and structure of final demand (though

in many cases under the marked condition of *coeteris paribus*). To examine now the implications of aging on the realm of supply, the initial analysis should be carried out on various influences affecting the *labor supply*.

The first and most direct effect is that of the aging of the work forces, in the sense that the proportion of elderly workers increases within

Table 12 - Percentage of the Population Considering Itself Not to Be in Good Health and the Frequency of Chronic and Degenerative Illnesses, Invalidity, Medical Visits and Examinations According to Sex and Age, Italy, 1983

	50-59	Males 60-70	71 +	50-59	Females 60-70	70 +
State of Health (% of population)						
Health not good	28.2	34.8	26.8	33.0	36.9	
Average number of days in bed	4.8	5.3	6.3	4.1	4.8	6.1
Frequency of some chronic-degenerative diseases (rate per 1000 inhabitants)						
Diabetes	57	87	100	60	108	130
Hypertension	107	162	190	133	211	255
Chronic bronchitis	179	201	45	69	99	
Arthrosis and arthritis	451	426	483	567	580	
Paralysis and paresis of limbs	13	22	38	8	13	32
Hospitalizations	124	158	207	105	115	165
	50-59	60-70	71 +	50-59	60-70	70 +
Invalidity (rate per 1000 inhabitants)						
Mental insufficiency	3.7	3.0	7.5	4.1	3.7	9.2
Motor invalidity	28.8	34.2	49.9	15.5	26.5	47.2
Lack of autonomy	4.8	6.6	21.1	3.1	6.4	24.1
Medical visits and some examinations (rate per 1000 inhabitants)						
Total visits	573	757	966	660	789	955
Visits to specialists	202	250	292	234	261	262
Analysis of blood	108	143	140	103	152	143
Electrocardiograms	51	69	70	33	58	54

Source: ISTAI studies on state of health

Table 13 - Percentages of Persons Classified According to Education Level 1981

Age	Secondary and University	Obligatory Schooling	Illiterate and Literate Without Degrees
25-29	35.4	61.5	3.1
55-64	9.3	65.9	24.8
65-74	5.2	56.1	38.7
75 +	5.4	45.5	49.1

Source: ISTAI

them; in considering the male population aged 20 to 59 divided into two groups — 20-39 and 40-59 — let us observe that in Italy the respective proportions were 58% and 42% in 1951 and 55% and 45% in 1988; in 2018 they might be 41% and 59%. A second effect is due to the fact that, as has been

seen, the elderly's engagement in the work force is lesser than that of other age groups and an increase in their proportion will thus tend to cause a drop in the global growth of the labor supply; in this respect, it should be stated, however, that all the international analyses, including those con-

ducted in Italy, have indicated that this second drop is due much less to the structural modifications of age than to the impact of the decrease in the rates of activity and, therefore, of engagement in work, and the decrease is more pronounced as age increases. A third effect derives from the way the different

Table 14 - Percentage of Active Population by Sex and Age in Italy. Census Data of 1971 and 1981

Age	Males		Females		Total	
	1971	1981	1971	1981	1971	1981
55-64	58.2	50.6	13.4	14.0	34.6	31.0
65 +	13.4	6.8	3.2	1.9	7.5	3.9
65-69	21.1	11.1	5.4	3.4	12.5	6.8
70-74	11.8	6.0	3.0	1.8	6.7	3.6
75 +	4.6	2.3	1.1	0.6	2.5	1.2

Source: Istat

Table 15 - Relative Standard of Living (National Average Family Standard of Living = 1) in "Elderly Families" in Some Western Countries in 1986

Countries	Age of Family Head		Percentage Variation
	65-74	75 +	
Canada	0.94	0.81	-14
West Germany	0.85	0.79	-7
Israel	0.92	0.96	+4
Norway	1.01	0.79	-22
Sweden	0.96	0.78	-19
United Kingdom	0.76	0.67	-12
United States	0.99	0.84	-15
Average	0.92	0.78	-15

Source: Ringer 1986

generations about to enter or leave the world of work combine in time as a result of the drop in fertility and increased survival.

No less important are the implications for the *system of transfers*. In general, if it is true that individual income declines with age in all countries, it should be noted concerning the total wealth of the elderly that the portion of nonmonetary income due to transfers (medical care and social services, for instance) is certainly significant.

On the purely imaginary assumption that until 2028 the limits for retirement continue to be 55 for women and 60 for men and that employment rates remain at current levels, in 2018 there will already be one single jobholder for every retired person, and in 2028 13 retired people for each one working.

6. Conclusions

In concluding, we may recall that whereas old age is an individual, private situation, aging

is a collective, social phenomenon, so that the *third age* is as much an attribute of a population — or better, perhaps, of a nation — as it is of a single person. To comprehend aging is thus a vital demand, from whatever vantage point we take, and in this regard it would be opportune to get ahead with the task of informing and sensitizing public opinion on the subject of aging in such a way as to provide accurate data on the needs and capacities of the elderly.

Indeed, ordinary stereotypes of the aged as a marginal group which has ceased to contribute to the economy and production, which has lost much of its social role, which has become dependent on others and on the State are increasingly being reconsidered by economists, sociologists, and gerontologists because of the diverse ways people reach old age and live it out (or should live it out). In any case, such stereotypes are harmful not only to the elderly's acceptance as full-fledged members of the whole community, but also to the reappraisal of the im-

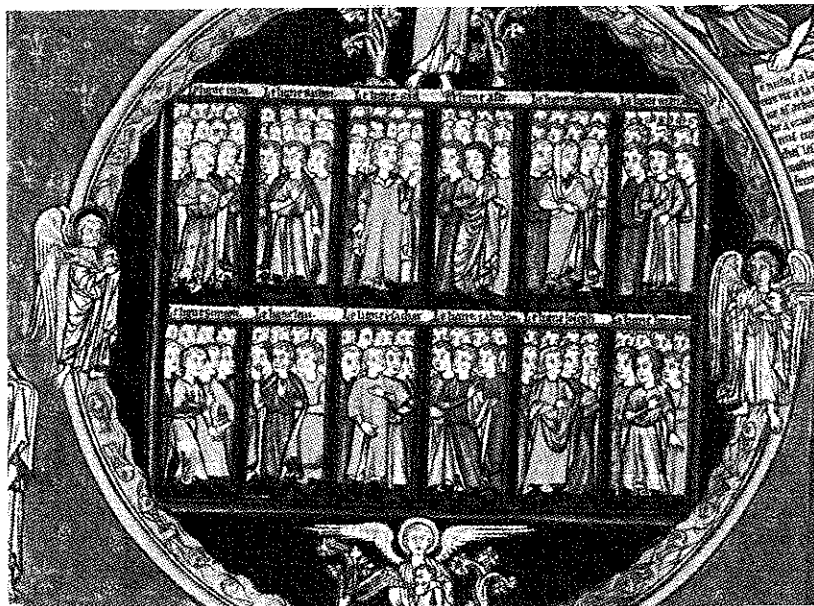
age and opinion the elderly have of themselves.

To face all the problems arising from the aging of the population, specific political attention is, of course, needed in fields such as the pension system, health care, and employment, but also a global social policy. Interventions of this kind will become all the more necessary, since the demographic transformations taking place — with the growing and substantial increase in the old, older, and very old and the violent alteration of the millenary balances among the various segments of the population — are very profound and in large measure uncontrollable.

Aging is a social process and not an "illness." It is the natural outcome of the evolution of the population which man has wanted and determined, but it is certainly revolutionary, and the new demographic world we are entering will fully test our technical-political capacity to ensure for society the necessary institutional and organizational dynamism.

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Old Age Is Still Life

Professor *PIERRE AMBROISE-THOMAS*

*Head of the Pharmacy and Nursing
Department, French Ministry of Health*

There is no solution of continuity between childhood and old age. From the cradle to the tomb, life is a *continuum*, and the date of our death does not belong to us, whatever our age may be. It is thus foolish to consider old age as the antechamber of death. In fact, unaware as we are of the moment of our end, it is our life as a whole which progressively leads us to death. Old age — and today even more than in the past — is still life.

Longevity never before posed so many problems in our society as it does today. Hence the topic's current interest.

For too long old age has been approached with exclusively quantitative criteria based on gathering and analyzing demographic data indicating the progressive lengthening of the population's age. The demographic phenomenon is noteworthy, for over the last two or three decades it has accelerated in spectacular fashion. It is about this that I would like to speak first of all, since the phenomenon entails clearly wider consequences on a sociological, economic, and moral level.

It would, however, be absurd to limit the problem just to the arithmetic standpoint. If the progress of urbanization, prevention, and medicine have enabled us to add years to life, it is our duty to succeed in adding life to years and making possible full realization for the elderly. This requires better awareness of physical and psychic phenomena, and of the intellectual and spiritual activities of elderly persons. I shall attempt to trace out some reflections on all these aspects before pausing to consider the elderly within society. To tell the truth, considerable pro-

gress has been made in this area in recent years, but, as always, such progress bears the seeds of developments which may prove disturbing if not carefully controlled.

1. The Demographic Aspect

Without going into details, since the problem has been dealt with by others, let it suffice to say that our society is witnessing a twofold phenomenon: on the one hand, an increase in the number of elderly and, on the other, a low birth rate. This leads to demographic aging, with an excessive disproportion between the number of the old and that of the young. At present this is already over 8%, a proportion which, in the judgment of the experts, touches the extremity of balance.

As for simple quantitative data, we observe that gerontological growth is a worldwide phenomenon: in 1950 214 million individuals were over 60; in 1975 the figure grew to 346 million; in 2025 there will be more than 1,120,000,000 people over 60.

In the year 2000 60% of those over 60 will belong to the Third World, with a series of new problems difficult to solve, especially on an economic level.

The socioeconomic weight of aging correlates, above all, with the ratio of the number of elderly to that of the active population, and it is precisely here that Europe and North America differ from the rest of the world. The proportion of those over 60 has already surpassed 10% at this time. The experts agree that the most critical period will be the decade of 2005-2015, with the massive arrival of elderly

people corresponding to the numerous generations of the 1945-1955 decade.

These quantitative data appear together with a twofold qualitative phenomenon:

* the progressive predominance of women as population ages — in France, for instance, where as 105 males are born for every 100 females, women represent 57% of those between 65 and 75 and 75% of those 85 or over;
* rapid growth of the elderly over 85 — in France there were 200,000 in 1950 and 580,000 in 1980; there are now 700,000.

Alfred Sauvy would say, "A population must either grow or age." In France, and more generally in the West, population is now growing very negligibly — it is aging. In the more or less near future, the socioeconomic weight of a significant number of old people threatens to be badly borne. Indeed, society's acceptance of a particular human group is in large part linked to merely quantitative causes. This process is well known in connection with xenophobia, not to mention racism. It is our responsibility and that of the generations immediately following us to avoid the same risk of rejection in regard to the elderly.

2. Old Age: Human and Spiritual Problems

It should at once be stressed that every global presentation of old age is inevitably arbitrary. The term "old age" in fact covers or encompasses both the newly retired and ninety-year-olds. More than 30 years separate them, and yet there is no hesitation about placing them in a "common category,"

whereas no one would think of associating in a single description a suckling and an adult, a jet pilot and a mother.

In human terms, one of the prime concerns of old age is physical appearance. Indeed, if all of us hope to live a long time, no one would, however, like to become old or at least appear so too quickly. This behavior can be explained by the fact that man is probably the only one in the entire creation who imagines himself to be immortal. In the course of our whole life we form an inner image of ourselves which is regularly 15 to 20 years younger than reality. Regarding our end as an injustice — i.e., a humiliating defeat — we are tempted to delay the fall, especially by maintaining the appearance of youth as long as possible. It is the old myth of Faust's philosopher's stone and, closer to us, what makes the fortune of more or less quack specialists anxiously sought out by the great ones of this world. Whatever means are adopted, what's important is not to show one's age. In large measure, such behavior may be regarded as positive, since it helps to combat that letting oneself go which is extremely harmful to the health and balance of the elderly. On the other hand, this unbridled pursuit of illusory appearance can prove to be pathetic or even ridiculous, since if the elderly clearly see others aging, only exceptionally do they realize this evolution, which is, moreover, ineluctable. This is what French humorist Alphonse Allais effectively conveys when speaking of one of his friends: "He has aged so much that he didn't recognize me!"

Medically, the old also pose a certain number of special

problems, connected, in the first place, with the kind of pathology encountered, consisting, above all, of chronic illnesses. It should likewise be stated, however, that the elderly's having recourse to care reflects the desire to feel surrounded, assisted, protected, along with the hope of being relieved of often slight ailments which, moreover, they have finally become accustomed to. The greatest prudence is indispensable in distinguishing among therapeutic interventions of varying degrees of importance. In fact, with the elderly, more than with any other type of patient, the notion of "supporting treatment" should be carefully examined; most of the time the boundary is uncharted between serious illnesses endangering even life itself and minor disturbances nonetheless capable of compromising the quality of life or causing people to lose their taste for living. It is not easy to identify this limit, which can be considerably shifted by a very active intellectual and particularly spiritual life. Paul Claudel effectively gets this idea across: "80 years old, plus eyes, plus ears, plus teeth, plus legs, plus breath! And it's incredible, after all, how one comes to overstep them."

From a behavioral standpoint, it is a commonplace to cite the elderly's egotism. Data superabound in psychology and literature, and this fact is often explained as a compensation or defense mechanism. This approach is especially grounded in the attitude of the elderly towards the progressive absence of those surrounding them, above all relatives. In this decidedly critical sphere, a certain at least apparent indifference and an almost obsessive

concern for giving priority to everyday routine activities and attaching exaggerated importance to the details of material life no doubt represent a process of defense.

Nevertheless, in most cases the alleged egotism of the old is only apparent. Age in fact spurs reflection, relativization, detachment, and transcendence. And it may thus be stated that every elderly person is a philosopher. But it is probably in this field where current society introduces the most significant disorders for the aged. At one time the elderly enjoyed the advantage of knowledge, since they possessed experience and wisdom in a world which evolved very slightly, where the experiences lived through by one generation could consequently be transmitted to the following one to a great extent. In archaic society, the "old man" was the one who knew. Oral tradition made him a living archive, as the beautiful African expression recalls: "Every time an aged man dies, it is a library which disappears." In contrast to all that remained true for millennia, modern society now possesses sources of knowledge quite different from oral transmission. Competence is no longer an exclusive privilege of age, while, in a world in which evolution is uninterruptedly accelerating and expanding, experience acquired over the course of decades is willingly regarded as obsolete. The elderly have, then, lost part of their knowledge, at least apparently. They are left with wisdom. The profound transformations of family structures, which, unfortunately, increasingly refuse the elderly, have progressively deprived them of the chance to convey this life experience to their children and grandchild-

dren. The profile of old age has become impoverished.

In any event, if age must evidently give priority to reflection, it is equally essential that it leave ample room for action. The American expression "He's a has-been" truly represents a condemnation without appeal. Indeed, in human terms we exist insofar as we are in a position to act and be useful. This is confirmed in a particularly dramatic way by the young retired people whom our modern societies condemn in increasing numbers to inactivity and who, still in possession of their abilities, find themselves brutally deprived of their habitual occupations. It is to be hoped that everything possible will be done so that this privation of professional posts will be gradual and delayed. Furthermore, it is fundamental for the elderly to continue to perform activities enabling them to maintain a keen interest in the external world, face new situations, and, above all, remain at the service of others as long as possible. This was precisely what at one time constituted the role of the elderly in regard to the youngest in the family nucleus. At present family links are much weaker, and charitable activities, as we know, try to reach the same objective, but they are very far from success. If for Sartre "hell is the other," we, on the contrary, must recall that it is precisely through the "other" that our own realization passes and that concern for others represents the condition not only for life, but for vitality among the elderly.

One who, thanks to his culture, takes an interest in everything, one who continues to be curious and devoted to others is safe. Aging is the opposite of death, whose antidote is activity. Alexis de Tocqueville rightly asserted, "The great illness of the soul is cold. To combat this fearful ill, one needs not only the living movement of the spirit through work, but also contact with one's fellows and with the things of the world: it is above all at this age that it is not permitted to live on what has been acquired, but one must

make an effort to acquire still more and not rest on ideas in which we would quite quickly be found to be asleep and buried..."

Even if "old age is still life," however, the relation between the elderly and death cannot be passed over in silence. This relation is complex; there are changing disturbances — everything which, in short, may be experienced to a large extent at any age in the face of the fatal moment. We shall not speak here about accompaniment to death, which has nothing specific to do with old age. This accompaniment in reality concerns all the seriously ill, whose capacity for survival has been greatly augmented by medical progress. It embraces a whole set of particularly delicate human and spiritual aspects.

Until it becomes imminent, death presents itself as an abstract notion which each, old or young, sees approaching with more or less lucidity.

The conscious or unconscious desire to deny death presents itself in the elderly through their concern about organizing "what comes next." Psychologically, this allows them to elude the idea of the fatal step, offering them motives to analyze scrupulously a whole series of material details. What is more, the elderly have a final occasion to manifest their possibilities for action, to influence events through a kind of posthumous power. This is what the French phrase effectively conveys in speaking of "last wills" to indicate the testament.

In the elderly person, the progressive disappearance of those surrounding him and, above all, in most cases, his entry into a hospice force him to become even more aware of the decisive event drawing near. Naturally, fear of death varies from one person to another, but what normally scares people the most is the thought of dying alone. They cannot bear the possibility of dying alone, without a friendly presence at their side, and they are especially terrified by the idea of dying without anyone's realizing it, with the risk of being found, more or less belat-

edly, in the form of a decaying body, without any chance to leave behind a final attractive image of themselves.

These relations to death inevitably lead us to consider what links old age to spirituality.

People love to repeat that the approach of, rather, the fear of death often leads the elderly to rediscover or deepen their faith. There is certainly some truth in this, although decreased activity and, above all, the chance to grant preference to reflection over action obviously permit a more intense spiritual life. On the other hand, it matters little to know whether or not the fear of death produces an increase in spirituality. What is essential is that this spiritual life develops, matures, and gives authentic meaning to old age. The elderly's spirituality does, however, pose a certain number of special problems — we might even term them "specific." Even though they are not the most important ones, certainly the most frequent concern difficulty in adapting to an ecclesiastical world and a liturgy which are no longer what they were 40 or 50 years ago. Now, indeed, the two intense life periods as regards spirituality are childhood and youth, on the one hand, and old age, on the other. For the elderly to rediscover religious rites identical to those they still recall obviously constitutes a source of intellectual comfort and security and averts the habitual tendency of age to grant priority to old memories. Well then, especially after the end of the Second World War, the Catholic Church has experienced profound transformations linked, as we know, to Vatican II, to the vocation crisis, to the necessary adaptation to a continually changing society, and so on. It is utterly necessary to explain this evolution, which, though often surprising and sometimes unsettling the elderly, does not affect what is essential. In old age, even more than in any other age, it is desirable to deepen awareness of the beautiful Carthusian maxim: "The world changes; the Cross remains."

3. Old Age and Society

Society apparently devotes much effort and considerable resources to the care of the elderly. In practice, however, the situation is a good deal less clear. From a material standpoint, this is illustrated, for instance, by the fact that in most Western countries more substantial financial aid is reserved for families after the birth of a child (family allocations) than for the maintenance of the elderly within the family circle. Things are conceived in such a way that it is as if modern society in fact rejected or, in any case, sought to marginalize the old, with, of course, the exception of politicians, who in most countries continue to hold important posts of responsibility until crossing the frontier of gerontocracy.

This attempt at detachment, this attitude of indifference, of forgetfulness, and even of rejection has its start at the level of that fundamental unit of society which is the family. Without a doubt, modern life, with its housing shortage and the professional commitments weighing upon couples, since both spouses work, make it hard to maintain elderly persons within the family setting. Theoretically, their being placed in rest homes becomes the way to ensure greater care for them, a more interesting and richer personal life, and better medical attention. And there is no question that notable improvements have been achieved through hospitality centers, homes for the elderly, universities and circles for senior citizens — initiatives which permit varied cultural and physical activities, including even long trips. Nevertheless, all this material progress is often accompanied by ridiculous and even painful aspects. This is one of the impressions we get on observing the spectacle of old people living in "sun cities" or belonging to diverse circles, feigning intense pleasure at cultural initiatives which remain utterly foreign to them or sports activities to which they have never felt attracted. Immersed — often in spite of themselves

— in a whirlpool of artificially jovial living, in the end they feel even more their solitude and sadness over being far from their families.

In short, to place old people in specialized institutions, including caring facilities, for many families amounts to satisfying the desire to be rid of a cumbersome presence regarded as useless. Such an attitude greatly resembles that of the parents who multiply young people's cultural and sports activities outside the family setting in order to be in a position to devote as little attention as possible to their children. Families' attitude of rejection towards the elderly increasingly translates into unacceptable situations. This is why in hospices and hospitals the number of old people who die without having received even a fleeting visit from their relatives in months is growing. In France, according to recent data, this state of affairs has now reached the incredible figure of 60% of deaths at nursing homes for the elderly.

Increasingly, then, the old place themselves at a distance before being abandoned by those who do not want to be burdened. But, beyond these purely material motivations, the need to remove the spectacle of old age as far as possible as a sign of physical decay and evocation of death is likewise at work. In a modern world in which images of healthy, tanned youth, beauty, and efficiency are given preference, the very sight of old age is regarded as unacceptable. Hence a whole series of measures which, consciously or not, society uses to set aside the elderly.

Independently of whatever unworthiness such attitudes display from a human and spiritual standpoint, they contain the seeds of very serious behavior. In fact, the old person is finally regarded as a useless being; it causes sadness to visit him frequently, and it is thus preferable to delegate to others responsibility for ensuring his material existence and treatment for illness. The risk of this old age policy is that its cost in

Western societies induces intolerance in the active population and leads to the rise of a real generational conflict. Within a more or less short period, people will begin to feel that expenditures for the elderly are excessive and unbearable for society. Even more, on a medical level, the temptation will appear to regard treatment reserved for the elderly beyond a certain age limit as unjustified, and it will be held that, costs being equal, society must devote the maximum amount of its resources to safeguarding young, active persons. This is one of the aspects linked to euthanasia — aspects not specific to old age, but which threaten to be called to the fore increasingly in regard to the elderly.

It is thus urgent to rethink the place of the old — first of all, within their family; secondly, in society. This new collective awareness should enable us to appreciate better what the elderly bring to their "entourage" and the considerable role they may play in the harmonious whole formed by the generations. Only under these conditions will the material means society reserves for the elderly not seem exorbitant. The "newly retired" should devote preponderant attention to this reflection, which is absolutely basic to the future of coming generations, acting as true catalysts of the debate. Current economic norms tend with growing precocity to separate from active life adults in full possession of their physical and intellectual capabilities. These young retired people undergo an often painful psychological shock, but in return benefit from greater freedom and better opportunities for reflection. Both could be placed at the service of more harmonious relations between society and the elderly.

Then it will be more evident that "old age is still life." This is what John Paul II stated in Monaco in another way: "Who are the elderly? ...Each is unique and unrepeatable. All persons are a treasure for the Church and a blessing for the world."

The Chemistry of Aging

Professor GIOVANNI BATTISTA MARINI BETTOLO

*Pontifical Academician, Director of the Chemistry Institute
of the Catholic University of the Sacred Heart, Rome*

What is a human being, what purpose does he serve? What is good and what is bad for him? The length of his life: a hundred years at most (Si 18 8-9)

The progress of science and particularly of medicine in this century, as has been clearly shown, has increased mankind's average lifespan, though with considerable differences in degree between industrialized and developing countries.

This is due above all to hygiene and medicine seeking to prevent illnesses occasioned by factors external to man (unbalanced and excessive nourishment, the abuse of dangerous substances such as alcohol, damage from smoking and from the general and work environments), but also viral, bacterial, and parasitical infections; let us recall malaria, poliomyelitis, and hepatitis, which leave consequences — very often extremely debilitating — in the organisms affected.

The aim of preventive medicine is to avoid this harm, ensuring not only survival, but a certain degree of well-being.

This goal, still quite distant (for less than half of the world can make use of the modern medicine ensuring these advantages), is pursued capably and tenaciously, and the increase in average lifespan is a very evident index of this fact.

The result of this effort is that in modern society the number of older people has considerably grown, in both absolute and percentage terms. According to UN estimates, in industrialized countries the older represent 11%

of the population, whereas in developing countries they amount to 4%. And neither public nor private facilities are now in a position to confront this situation adequately (public care, hospitalization, home care). And financially as well, social security systems are unable to maintain expenditures, for the additional reason that, with the transformation of the age distribution diagram, younger generations of tax-payers thin out.

Longevity is a notable achievement by man, but it must be accompanied by a certain degree of physical and mental health guaranteeing the elderly's independence and autonomy and enabling them to be maintained in society as active elements. This is a factor of very great importance to keep them interested in life.

The goal of medicine, especially the preventive variety, is to ensure for the old, within the limits of physiological processes, advanced age in as good a condition as possible.

To this end we must not only prevent certain syndromes, as seen above, but also know the transformations of biochemical processes intervening in the organisms of the elderly as a symptom of aging itself.

Cicero said, "Senectus ipsa morbus est." Though much has changed and an absolute value cannot be attached to this assertion, it is certainly true that, independently of the other factors mentioned previously, some modifications of the basic metabolism of the cell and organism due to aging may cause, if not illness, at least a state not of well-being.

It is fitting to deepen and reinforce research in this sector to seek to ensure as far as

possible longevity which is not tormented.

We all know that life has different lengths in man and all other living species; the lifespan is characterized by various phases, from the individual's growth to the reproductive stage and finally the period of decreasing activity up to its conclusion, represented by death.

Every biological individual possesses a mechanism theoretically ensuring the eternity of its genetic information in reproductive processes, but as an individual it has a limit marked by its lifespan.

All life processes are governed by a series of chemical reactions with an energy exchange characterizing all phases of existence.

This is true of unicellular organisms, isolated organs, and the most complex perfect organism as well — animals, plants, and, of course, man.

Until twenty years ago it was thought that a cell, according to Alexis Carrel's experiments with chicken embryos in the 1920's, had an unlimited capacity for reproducing itself through subdivision. In 1961, however, L. Hayflick and P. Moorehead demonstrated that this capacity diminishes in time after a certain number of transfers, by virtue of what was called "cell senescence." Every cell in a species, then, has a particular lifespan in a limited field. Abnormal cells, like cancer cells, are a strange exception to this rule.

From an energy standpoint as well, isolated tissue kept in culture, in optimum conditions of nutrition and environment, slowly loses the possibility of using the energy with which it is furnished as nourishment as it ages over time — i.e., it reduces its activity and then inexorably

dies. This is attributable to the decreased capacity of the enzymic systems responsible for energy utilization. The same is true of any living species or organism, whose life cycle is marked by biochemical and energy mechanisms which are modified and weakened with age.

This happens not only on a cellular level, in micro-organisms and plants, but on the whole zoological scale of more perfect and complex organisms, such as human beings, for whose existence myriad perfectly synchronized factors converge to guarantee all the life functions and particularly those associated with the intellect and movement through a series of specific mechanisms.

This ultra-simplification of the biological phenomenon of life in the single cell enables us to consider a higher organism as an aggregate of cells, each with its properties, which nonetheless differ according to the function they are to carry out and form new structures, establishing mutual relations through direct or indirect mechanisms and giving rise to those marvels of creation that are living beings.

All the mechanisms sustaining life processes in organisms and involving chemical substances, which constitute all matter, from ions to protein macromolecules, from messenger compounds to lipid complexes in the membranes, are based on a series of interactions among these substances commonly termed chemical reactions, to which the production and consumption of energy are also linked.

The vital processes of living matter, from the cell to higher organisms, which manifest themselves under normal

conditions are called *physiological*, whereas those which are characterized by a disturbance of such mechanisms and may be due to diverse factors, external or internal, are called *pathological*.

Biochemistry seeks to investigate the causes of the dysfunctions in mechanisms governing the various operations of cells and organs of living beings, particularly of man, though an animal is often taken as a model of man, at least to analyze the functions and behavior which come closest to the human

This preamble is quite general and superficial, but we must confine ourselves here to pointing to some essential facts which will allow us to focus our reflection.

First of all, we should pose the problem from a specific standpoint: In aging processes do we find a qualitative and quantitative change in the chemical reactions of cells, tissues, and organs over the course of time? Is it possible, through adequate intervention, always to manage to keep the organism in the best condition by acting upon the different factors in biochemical reactions? It ought to be added here that the normal state of a organism — i.e., the *physiological* state — is represented by the perfect and coordinated functioning of all the systems of chemical reactions sustaining life processes, whereas a modification in them indicates a *pathological* state. We may now be asked whether aging should be regarded as *physiological* or *pathological*. It is a question to which I could not respond, though Cicero has already given his reply, as we have seen.

At this point I realize that I cannot lead you into the

twists and turns of biochemistry to give an account of the phenomena of aging, and I shall therefore set forth a few facts in order to reach a few conclusions.

Aging of the organism may be considered the result of both the aging of individual cells and chemical — and thus functional — modifications in organs (brain, liver, kidneys) and cartilaginous structures (membranes, bone), with reduced capacity to get chemical substances (hormones and messengers) into circulation.

This perspective provides us with natural aging alone — i.e., *physiological*. If this is the goal scientists should aim at to favor perfect aging, it represents not reality, but an exception. In fact, in connection with age well-known pathologies become established sweeping away the picture of *physiological* aging. We can recall the most common pathology, the one affecting the *cardiovascular* system, which profoundly damages the persons involved; *tumors*, which increase with age and can strike any organ or tissue; pathologies of the *osseous and connective* system (rheumatisms, osteoporosis); and, finally, diabetes.

Table 1

Most frequent diseases in advanced age

Cardiovascular diseases (atherosclerosis and cerebrovascular diseases)

Cancer

Diabetes

Pneumonia and flu

Diseases of the skeleton and connective tissues

Urinary tract diseases

Specific diseases of the central nervous system

(Alzheimer's, Parkinson's)

There are also pathologies generally associated with age such as senile dementia, or Alzheimer's disease, which usually strikes people over sixty, with devastating effects. This illness is the result of a serious biochemical imbalance manifesting itself in the loss of a substantial part of the chemical messengers in the brain.

Parkinson's disease also falls under this heading and is due as well to the loss of a chemical messenger, dopamine, which regulates the brain's motor centers, thus provoking rigidities and difficulties in movement, without, however, altering the other faculties of the brain. The reduction in the content of growth factors — especially NGF, a protein molecule discovered by Rita Montalcini — may be the cause of decreased capacity to conserve functionality and the regeneration of neurons.

Research on the aforementioned pathologies or diseases is being conducted around the world on both a basic and applied or clinical level, with enormous financial, organizational, and structural efforts, employing numerous scientists and physicians, from genetics and molecular biology laboratories to clinicians and radiologists. This research has enabled us to gain a great deal of knowledge and make significant progress in certain fields, precisely through the interpretation of biochemical mechanisms determining pathological processes, as in Parkinson's disease, coming to understand the function of a molecule with extraordinary capacities, both positive and negative. Cholesterol in its interferences with the electrolytes, like the calcium ion, provides an example. This has made possible the appearance of valid proposals which may reduce the phenomena of atherosclerosis and also efforts to oversee the mechanisms of hypertension or water content in tissues determined by an excess of the sodium ion through delicate handling of ad hoc blocking or diuretic drugs.

Biochemical research on illnesses of the skeleton and connective have made lesser progress, but the relatively recent discovery of a protein, the calcitonine macromolecule regulating calcium metabolism in bones represents an important advance in this field.

Research engaging scientists and clinicians around the world in the struggle against pathologies favored by the conditions due to the general aging of the person affected has nearly caused us to forget that, for lack of an adequate commitment and financing, we know quite little about the natural — i.e., physiological — processes of aging.

This knowledge, in my opinion, could lead to better understanding of the biochemistry of the metabolic processes responsible for these transformations due to aging.

It is estimated that funds for research — and thus for basic studies — on aging represent less than 1% of what is devoted to research on cancer and cardiovascular diseases.

If an older person is healthy, he maintains conditions of efficiency longer, from basic metabolism to his membranes and thus to the system of immunity, to the processes of protein regeneration, from supporting proteins to indispensable enzymes, to hormone balances or those linked to the organism's relation system, for which the chemical messengers are responsible; when healthy, he can certainly, if not delay the moment of the end, at least diminish all the manifestations associated with physical decay, the result of the concomitant causes of aging plus those due to pathologies establishing themselves in the elderly. It would perhaps be the best way to ensure for the aged not just years of torments and disappointments — i.e., not just survival — but a life still worthy to be lived.

The diagrams relating age to the percentage of survival in recent years indicate a progressive trend towards the ideal curve, which represents

100% survival up to the moment of death.

This curve does not, however, take into account — and it would be difficult to construct one which did so — the state of well-being or, rather, the quality of life of the elderly.

The acclaimed longevity and, above all, activity level of certain Caucasus populations and also those of some areas in the Andes where people over 100 were said to be numerous were thought to be based on good general conditions among the old, along with adequate nourishment and physical exercise; today this theory has been exploded scientifically, for it has not been possible to demonstrate unequivocally the real age of those said to be over 100.

Scientists' resistance to greater commitment in studying aging as a phenomenon in itself and thus clarifying the mechanisms which cause it and coming to master them is due, above all, to a sense of skepticism about such studies inasmuch as they assert that brain damage alone — brought about by atherosclerosis or a specific pathology such as AD or PD — is sufficient in its seriousness to annul all the other concomitant causes.

I do not doubt that this is correct, especially if we take it as a statistical fact; but, on the other hand, the fact that most pathologies in the population appear in subjects over 65 — in the United States about 70% of medical care expenditures are for this age group — should induce scholars and research planners to go more deeply not only into symptomatology, but into the causes of lessened resistance to illnesses and physical decay connected with age. In this way we would have another guideline to be able to establish a strategy to reduce the negative and devastating effects of the main pathologies affecting the elderly today.

In Table 2 the chemical and biochemical processes thought to be causes and concomitant causes of aging are schematized.

Table 2

Biochemical mechanisms in aging

- 1 Lipid peroxidation
 - 2 Change induced by free radicals
 - 3 Conformational changes in enzyme structures
 - 4 Lowered production of hormones
 - 5 Changes in membrane properties
 - 6 Errors in protein synthesis mechanisms
 - 7 Formation of aging pigments (lipofuscins)
 - 8 Presence of anomalous aminoacids in some tissues
- Produced by cell enzymes (xanthine oxidase, flavo-protein dehydrogenase) and controlled by SOD (superoxide dismutase)
- In membranes, proteins, and DNA
- And of dependent enzymes
- Due to an increase in the cholesterol/lipid ratio
- D-aspartate, L-isoaspartate

I would like to add that in the causes of biochemical-physiological decay, from the cell to the human organism, the energy balance of the system characterizing all chemical processes should also be considered. In the phenomena of aging there is certainly manifested a progressive decline in usable energy and an increase in the entropy of the system, which inexorably tends to reach an equilibrium and thus provoke a standstill. We do not know which of these factors brings it about, but there is undoubtedly a decreased capacity in certain organs to supply adequately the enzyme system regulating energy use.

The biochemical patterns of the phenomena thought to cause aging represent another working hypothesis; none in every respect meets the requirements of the phenomenon of aging in both the individual cell and a complex organism like the human body.

Among all the experimental data gathered by researchers some results may emerge prompting a re-examination of

many hypotheses and posing many questions.

On an animal level, in rats, it has been shown that a minor calory input — thus not a qualitative but only a *quantitative* difference — is capable of increasing their average lifespan by 8% as compared to other rats fed with the same food in abundance.

Are these experiences valid for man as well?

Would it be interesting to examine the influence of metabolism at a presenile age on determining longevity?

Even today, though the fact has been known for many years, there is no plausible explanation for women's having a longevity clearly superior to men's. For every 63 men who reach the 75-79 age bracket in the industrialized countries there are 100 women.

In our limited — I would say "selfish" — vision leading us to concentrate on our industrialized society rather than the one constituting three-fourths of the world population, we have forgotten to consider longevity from a biochemical standpoint in developing and tropical countries.

Here average lifespan is greatly diminished because the pathologies characterizing the well-to-do peoples — except for illnesses from metabolic disturbances due to overeating — are common to those in developing lands. To these illnesses, which so significantly affect health and, therefore, longevity, should be added all the specific pathologies due to tropical diseases of a protozoan or bacterial origin (malaria, schistosomiasis, leprosy), extremely debilitating for one's entire life inasmuch as they strike vital organs as well.

For motives of ethics and social justice, it is necessary that, through UN guidelines, and particularly those of WHO, a greater commitment be made to research to overcome these illnesses so that by hygiene and prevention a juster distribution of health benefits will be achieved among men.

In spite of scientific progress, there are still many questions to be resolved, not

so much to understand the processes and their meaning as to grasp the causes behind them. The study of genetic information — which may also be expressed in chemical formulas if we wish — the patrimony of every individual, may throw light on these causes in the future.

We may still learn a great deal through research, but we believers must always pause before the mystery represented by man's nature, not just corporeal, but spiritual as well.

Until now we have sought an idea of how to express aging processes in chemical and energy terms and represent physiological and pathological processes with chemical equations.

These remarks on the nature of our constituents and their dynamic relations, both qualitative and quantitative, are not meant to reduce everything to material expressions, but only to know in depth those processes on which the chemical and physical mechanisms of life are based so as to discover how to intervene to improve physical conditions and thus the welfare of man, this unique and extraordinary being in whom spirit and matter are found, the object of study of the physician and of all scientists committed to human health, which also involves the spirit.

By way of conclusion, I would like to remind you what a word of affection, comfort, and love means to the elderly, producing a flash of joy in the spirit, a smile of hope and interest in life, as the Bible states: "Does not the dew perchance soothe the heat? So a word is worth more than a gift." This is a domain escaping all science, in the face of which we can only bow.

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General Clinical Aspects of Senescence

Professor ALESSANDRO BERETTA ANGUISSOLA

President of the Superior Council
of Health, Italy

We know that the elderly visit the doctor more often than adults and young people, and it is also true that they consume more pharmaceuticals, to such a point that over half of the medicines used are for those of advanced age. These preliminary observations suffice to grasp how important the clinical approach is.

We must acknowledge that in the kind of medicine offered today by public services there is little room and very little time for a thoroughgoing, exhaustive encounter with the patient, who, however, often presents — even more so in the case of the elderly — complex clinical problems, both physical and psychic, originating in past experience filled with pathological peculiarities and a present characterized by diverse pathologies. There are indeed many small or large functional and organic debilities proper to the elderly (cerebral, respiratory, cardiovascular, renal, osteoarticular, etc.).

Dialogue with patients — whatever their age may be — always represents the essential moment of the doctor-patient encounter. In the case of the elderly it takes on fundamental importance. The old invariably present a very close interconnection between physical and psychic states. From a practical standpoint, this interconnection makes the global evaluation of the clinical picture difficult, and only dialogue can render it possible.

Without in-depth dialogue it is not possible to evaluate the elderly medically, standpoint; without knowing, for example, the level of their psychic capacity or whether the deterioration of psychointellectual abilities is acceptable for their age or sur-

passes the limits of physiological senescence; without knowing, finally, how the elderly move in the social and family contexts.

In contrast to other ages, in the elderly evaluation of brain function is basic in every case.

As a result of the chemical alterations masterfully described in the previous talk, the cerebral involvement of neurotransmitter and receptor alterations is manifested in mnemonic and extrapyramidal disturbances and those of the higher integrative capacities, the humor tone, the sleep rhythm, etc. It is these which define the elderly's pathological condition more than any other visceral dysfunction. Analysis of the psychological and cognitive modifications accompanying the process of aging thus constitutes the priority moment of the encounter with the doctor. Senility is characterized (G. Penati, E. Bertaggia, G. Panza) by a series of physical, psychic, and social losses. Since the losses are always in relation to a better preceding state, the subject suffers greater losses the more he ages as compared to his prior lifestyle and habitual defense and adaptation mechanisms constituting a way of life which, once structured in childhood, remains intact in the course of life (cf. authors cited). The appearance and intensification of character traits such as egocentrism, excessive attachment to one's possessions, reduced interest, taking refuge in the past, a tendency towards isolation, and rigidity in one's convictions thus find their explanation in the use of defense mechanisms such as negation, regression, idealization, selective memory, or stimulus exclusion. Negation appears as the principal means of defense against the destructive demands generat-

ed by a constant sense of decay and the closeness of the end.

The elderly's psychic condition is as a rule patterned on the two terms anxiety-depression. Depression, above all, is commonly observed and makes the individual fragile in the face of stressful events. The lack of gratifying occupations leads to depression, which may prove dangerous inasmuch as defense capacities collapse and vital motivations are lost.

In the doctor-aged person encounter recognition of psychological traits is, then, basic to interpreting the disturbances present. At the same time, for the reasons pointed out, the description itself of the disturbances may not be faithful, and not only as a result of decreased memory. The elderly patient often tends to minimize his ailments in his account — which the doctor must try to stimulate with timely questions overcoming the shyness and reserve peculiar to the aged — because he also fears the danger of being separated from the family environment.

In this preliminary exchange, however, the doctor must seek not to become the protagonist: the patient is at the center of the encounter, and the doctor must only help him to bring out his identity. Later the physician will become the protagonist, intervening justifiably to suggest and counsel.

There is a fine statement by F.M. Antonini: "As a doctor and geriatrician, I have learned from my patients that the quality of diagnosis and care is due, above all, to the time I devote to listening to them." This agrees with what Proust wrote: "A great part of what doctors know is taught them by the sick." But the

hurried physician of today must find the time to learn from his patients!

Precisely because cerebral aging is the dominant element among the processes of senescence, neurological analysis immediately follows psychological study; the clinically healthy elderly may evidence only neuronal impoverishment on a physiological level, with a decline in functional reserve. In pathological senescence, however, much more serious alterations are manifested, among which senile dementia of the Alzheimer variety should be placed in the foreground. The clinical aspects of cerebral involution are well known. With sensible differences from case to case, memory and affective capacity are seen to be damaged, though serious interferences with daily activities do not usually follow. Sleep is often altered. Neurophysiological studies demonstrate an increase in stage 3 and a decrease in stage 4, while the number and duration of REM cycles are seen to be significantly altered.

The cranial nerves are more or less affected

Short-range and long-range vision diminish. Visual responses elicited present notable delays, suggesting damage to the central channels of vision. Pupil responses slow down. Extrinsic ocular mobility diminishes. The perception of visual stimuli progressively decreases with age. Hearing displays analogous alterations.

Motor disorders are second in frequency only to disturbances of mental state. A faltering gait with short steps and difficulty in changing direction is typical. Muscle tone is often increased with extrapyramidal characteristics. Osteoarticular damage certainly contributes to determining

motor disturbances. Finally, trembling is frequent (A. Agnali).

I have deliberately lingered over the description of the neuropsychic aspects of senescence because more than any others they define the elderly subject and also because the onrushing development of neurochemistry and neurophysiology has sparked scientists' and clinicians' interest in cerebral aging. Data have already emerged which revolutionize our traditional way of thinking. A set of mistaken assertions has indeed maintained for too long that senile cerebral involution should be attributed to vascular alterations of an atherosclerotic variety. We now know that cerebral aging is linked to neurotransmitter disturbances depending on the dopaminergic, GABAergic, serotonergic, cholinergic, and other systems. Research is just beginning, but already promises to be extremely fruitful. In recent studies limited to precise experimental models, it has, for instance, been observed that in particular conditions — i.e., in response to specific stimuli — a neof ormation of neurons may occur; it is an observation going against traditional frameworks and supporting the concept of a residual neuronal plasticity (H. Tralwisch). Without making rash deductions, it is nonetheless a universally noted fact that an intense life characterized by a high frequency of social contacts and thus stimuli constitutes the best antidote for senile cerebral involution.

I shall pass over well-known clinical aspects of senile visceral polyopathy which are now codified. This does not strike me as the place for a lesson on geriatric semiotics! I shall come down, then, on

some other considerations of a general nature

In the case of the elderly the fundamental difficulty emerges of distinctly separating the state of health from that of illness (F. Fabris). There are numberless examples of this difficult, sometimes impossible distinction. Nearly all old people are affected by osteoporosis, many by arterial hypertension, and many also by pulmonary emphysema, but only 5% of the elderly population is on account of these ailments reduced to a condition of non-self-sufficiency. Their effects on function must be evaluated. To establish in substance the degree of residual function — which may be such as to permit a satisfying quality of life for the elderly — constitutes the essential moment of the diagnostic process. Knowing the degree of residual function (brain, heart, etc.) may also involve the premise for recovery, for rehabilitation, or, even better, for an activation of the elderly. It is a fact that is clinically evidenced and also confirmed in the laboratory that the activation of the elderly is not a utopia but leads to significant physical, psychological, and sociological recovery, though the extent differs from case to case. It has now been scientifically documented — as has already been stated — that an active lifestyle represents an effective antidote for aging

Old age requires a conceptual adjustment by the doctor and in the general mentality as well. The "acute/chronic" distinction does not correspond to clinical reality. The concept of curing should be re-examined. In most chronic illnesses which are frequent at an advanced age, there is healing from a phase (perhaps acute or newly acute), an

episode is overcome, a contingent dysfunction is compensated for, thus rendering the individual fit for a certain level of service.

In the elderly there is often a kind of "coexistence" with illness, acceptance of a new situation, adaptation with small adjustments to everyday life. F.M. Antonini is right in saying: "It is like having an increasingly small, simple, and elementary computer available. It is as if for every age a different man were born, in a position to make the most of his capacities."

We said at the outset that the elderly consume more pharmaceuticals than young people and adults. It is obviously true, for in the old alterations and dysfunctions are much more frequent. What is more, as we have seen, it is nearly always a matter of illnesses evolving chronically. If, as unfortunately many doctors and patients think, the use of a drug must correspond to every pathological manifestation, it follows that the elderly end up taking more medicine for longer periods of time. This conceptual formulation, which is so widespread, may be criticized as a principle and is dangerous in practice. It is evident that the elderly, including one who has reached a very advanced age, must be cared for as well as possible and that the abstentionist attitude of the past (Because we're dealing with an old person!) should be rejected. But today there is surely exaggeration in the opposite direction to the point that doctors and patients must be placed on guard against the dangers represented by iatrogenic pathology. The elderly subject is very hard to treat pharmacologically: therapeutic behavior codified for the adult cannot be transferred to his condition on an equal basis.

I shall not dwell upon the physiopathological alterations modifying pharmacodynamics and pharmacokinetics in senescence. I shall limit myself to considerations of a clinical order. At the same time we must never forget



the very close interconnection between the physical and psychic, to which I have repeatedly called your attention.

Many patients, we may frankly state, among the elderly display behavior warranting little trust. The physician bearing in mind only what they say (or fail to say) runs the risk of underestimating or overrating the clinical situation present. We have already mentioned shyness in relating one's disturbances and the frequency of a state of depression and negation. Disturbances which are only functional in relation to deterioration of the psychic sphere may thus be regarded as due to organic alterations.

It is also common that because of a mnemonic defect useful elements for a correct evaluation of the clinical picture are not pointed out, and for the same reason it may happen that the patient does not remember the details of the medical prescription and forgets to take or forgets that he has already taken the drug indicated. He is led into error by the over-administration of drugs as well.

In short, the elderly subject's compliance leaves much to be desired, and the physician must be specific, not hasty in therapeutic indications, and ask for patients' collaboration. The presence of sight disorders may suffice — as with cataracts, which are so frequent — to make mistakes in dosage or even mistake one drug for another. The pharmacological case-history must also be minute: many older people have been carrying out more or less self-prescribed treatments for some time and are not led to say anything to the doctor about it; he thus adds new drugs to the old. The tendency to take the same drug over long periods of time — sometimes for years — which is so common among the elderly should be investigated and corrected. I recall an old and valiant general who, blushing with shame, told me about the progressive growth of his breasts. It was due to the continued use of an antihypertensive drug which was

widely employed at one time, certainly capable of solid therapeutic action, but in the long run not free from side effects of the kind he lamented. It is just one example among thousands which I have cited for its possible novelty.

There are numerous epidemiological studies on the frequency of adverse reactions due to drugs. Impressive percentages are reached: over 20%, 30%, or, according to some studies, even more of the patients treated.

Great prudence is needed in prescribing pharmacological treatment of the elderly. Meanwhile it is appropriate to limit oneself to advising the use of a perhaps very restricted number of drugs (naturally case by case), disregarding "minor" symptomatology (F. Fabris). Otherwise we are penalized with an iatrogenic pathology, which may be more serious than the disturbances prompting complaints. Indeed, the hospitalization of the elderly is rather often due to iatrogenic disorders.

Certainly, when faced with acute or newly acute episodes of chronic illnesses, we must intervene, even intensively. But in the vast majority of cases we are faced with an older person presenting many ailments which reduce his functional capacities, but which permit an acceptable quality of life. It is in these cases that the greatest and least justified use of drugs takes place.

Digitalis is resorted to in subjects who do not present real signs of cardiac failure, but only reduced cardiac reserve due to age. Older people tolerate digitalis poorly. Antihypertensive therapy is employed using the same drugs and doses as in essential hypertension in adults, when we may in fact be in the presence of senile hypertension, which has a different pathogenic basis and should be treated prudently because sharp tensile falls in the elderly are as dangerous as hypertensive crises.

Diuretics, which are so widely used, may cause seri-



ous hydroelectrolytic imbalances in the elderly.

A great deal of attention should also be paid to the use of psychoactive drugs. The sedation of the elderly requires great caution. Benzodiazepines, used throughout the world for treating chronic cases, should be administered after due consideration. Like other psychopharmaceuticals (barbiturates, neuroleptics, etc.), they may provoke states of mental confusion, in addition to other disturbances. Moreover, when many medicines are administered at the same time, an interaction process often takes place which is only partially understood and not free from risks, including serious ones. Numerous drugs present such phenomena: antiarrhythmics, anticoagulants, antidepressives, digitalis, etc.

In concluding on this essential clinical aspect — the therapeutic behavior to be observed with the elderly subject — it may be stated that in no other case is the admonition *primum non nocere* more valid.

In recent years there has been a deep, radical transformation of the principles inspiring the geriatrician's work. Arising as the trustee, though sharp-witted, of a biologically ineluctable bankruptcy — in the words of Professor Barbagallo Sangiorgi — as old age was considered to be until a short time ago, he has gradually become formally recognized as the physician of the third age whose task is to protect the quality of life of the elderly. Today the concept of recovery, of rehabilitation, has been transformed into that of reactivation, or rather activation of the elderly as global prevention of decline through cultural growth, the promotion of physical activity, socialization, and active participation in family and community life. The new gerontological culture presupposes an approach to the elderly which is quite different from that of the past and whose primary objective is to safeguard the psychosomatic integrity of the person and not just treat illness.

Reflections on the Biological Meaning of Senescence

Professor BRUNO SILVESTRINI

*Professor of Pharmacology and Pharmacognosy
at La Sapienza University, Rome*

Biology represents life for us as a single system which is at the same time structured into subsystems interacting and interfering with each other incessantly, in a perennial search for equilibrium which is always shifting. The various parts of this system are so closely linked and interdependent that it would be impossible to delimit them. It is equally hard to trace out within each of these precise limits between the various phases of their cycle: birth, growth, maturity, and senescence. Indeed, they are inextricably interwoven. Biology enables us, therefore, to examine senescence in a general context in which it is seen to be a characteristic moment of life at all levels, from the most elementary to the most complex.

These reflections on the biological meaning of senescence begin with proteins, which together with the polynucleotides may be regarded as the elementary components of life. They furnish a molecular model which lends itself quite well to the experimental and theoretical study of the life cycle in all its phases, including senescence (Fig. 1)

Protein synthesis corresponding to the procreation of the most complex organisms follows a project codified in DNA and effected through RNA. This is followed by a process of maturation which is favored and guided by other molecules present in the surrounding environment. Once mature, the proteins begin to carry out their characteristic functions: they catalyze certain chemical reactions, such as the synthesis of DNA and RNA; they store or transport other molecules, including hormones; they furnish cells with the energy needed for their functioning, and so on. After a certain period of time, which

varies from a few seconds to many years, the proteins become denatured or, as we would say in the case of more complex organisms, they age and lose their capacity to carry out the above-mentioned functions. Denaturation is generally accompanied by a reduction in hydrophily, that is, by affinity for water. This explains why denatured proteins tend to join together and precipitate, forming aggregates (Figure 2).

These phenomena account for many aspects of aging, such as withering, the loss of elasticity, and the wrinkling of tissues observed in the old. Denaturation exposes proteins to the action of proteolytic enzymes, which separate them into their elementary constituents: peptides and amino acids. In this way proteins go back into the life cycle in a different form, participating in the synthesis of new proteins or taking other routes.

The functions performed by proteins in their mature phase are generally termed characteristics, but this is a purely mental artifice. The phrase "characteristic functions of proteins" was in fact invented by scientists to indicate the first biological effects pointed out by them or those which at the time seemed most important on a physiological level; conventionally, they are made to coincide with the maturity of proteins. However, all the phases of the protein cycle produce equally important biological effects, though differing ones. Let us consider, for instance, protein synthesis, which, as we remarked previously, corresponds to procreation in higher organisms. It involves an occupation of the protein matrix, which cannot, therefore, be utilized for other purposes at that moment. That

is why the synthesis of a protein influences and regulates surrounding life. In the same way pregnancy is accompanied by a momentary blockage of fertility.

Even denatured proteins perform characteristic functions. First of all, their hydrophobic sites open, thereby permitting the interaction with other molecules which is the basis for numerous physiological processes, like the transport or depositing of other substances, the stimulation of certain receptors, and enzymatic digestion. Through this last phenomenon, protein denaturation also intervenes in the synthesis of new proteins, nourishing it with peptides and amino acids or regulating it with other mechanisms which are just now beginning to be explored. That is why senescence is indissolubly interwoven with birth, and vice versa.

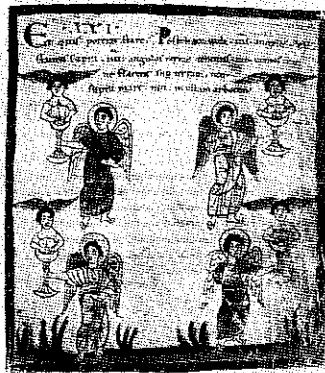
These concepts also apply to single-cell and multi-cell living beings, including man. Like the individual molecules comprising us, we are generated, mature, and then age. The biologist examines all phases of human life with equal interest, from the intrauterine stage to senescence. For some scientists, the former consists of an extraordinary trip back in time which expands, thus enabling the embryo to pass through the stages of phylogenesis once again which originally, according to the conventional measurement of time, took place over millions of years. Intrauterine development prefigures many aspects of basic importance which emerge in the neonate and accompany him throughout life. Procreation — and thus the being developing in the womb until seeing the light of day — profoundly influences the surrounding world. The parents are deeply

transformed by it, both physiologically and psychologically. In the same way a society rich in births is very different — socially in addition to ideologically — from societies with a low birth rate. The expansion of time which marks intrauterine life is partly maintained until adolescence. The young person does not yet perceive the passing of years and prepares to discover and conquer the universe, feeling to some degree immortal. He is impatient, an absolutist. He enters into conflict, then, with the world of adults, but in this way influences and stimulates it. Afterwards man begins to notice a progressive acceleration of time which is accentuated as his biological rhythm slows. Incidentally, it is probably an application of the law of relativity due to the confusion between two different systems: the perception of things and their intrinsic rhythm. In the same manner, when two trains are moving side by side, the perception of motion becomes more accentuated the more the gap grows between their respective speeds. The adult, then, observes the need to leave a sign of himself; at the same time he tends to focus his attention on particular aspects of life. He devotes himself, therefore, to specialized roles, those which in the case of the proteins are termed characteristic functions: as a doctor, a priest, a housewife, a writer, and so on. For the same reasons we mentioned in regard to the protein cycle, this is not so: man in fact plays an important role in all the seasons of his life.

In contrast to what happens in more elementary forms of life, maturity is also a period of procreation. In man, however, the continuity of the species does not depend solely on genetic procreation, but on the mechanism of cultural transmission as well (Figure 1). Everything expressing the capacity for adaptation to the environment and the evolution of the human species is entrusted to the latter: written and spoken language, humanistic and technological knowledge permitting scrutiny and examination of the universe well be-

yond the limits of the senses and corporeal structure, and religious faith. This cultural patrimony is not transmitted by the genetic code except as a potential, but is transferred after birth from one individual to another. If deprived of this enrichment, man would once again become that awkward, defenseless biped he was at the beginning.

We arrive, then, at senescence. The elderly are in a position to reflect on the experience accumulated over the course of years. They feel their strength begin to fail as time passes ever more swiftly. They are thus spurred to encounter a general meaning to things, what is beyond contingent motivations: wisdom, which in all



civilizations has been considered to be an attribute of the elderly. This is the contribution they make to the new generations, participating in the formation and transmission of a shared patrimony of knowledge with something worth more than technological information. In this way they contribute to the propagation of the human species, with a mechanism no less important than genetics.

It is interesting to stress that the above-mentioned phases are also found in civilizations, which result from the sum total of individual contributions: birth, growth, the apex or maturity, with its characteristic signs, and decadence. As happens with the protein molecule and man, civilizations as well transmit their basic values in the moment they age or decay. It is then that they progressively lose their identity while at the same time permitting the

start of a new civilization in which they in a certain sense rise again.

In this period we are witnessing the decline of industrial civilization and the birth of a different one taking up its best aspects. Industrial civilization was built up through the exploitation and sacrifice of whole generations, but once mature it has produced resources on a grand scale, thus generating widespread well-being. In industrialized countries, man is richer, freer, and healthier than he has ever been before. The economic means available have become tremendous. Not only is it possible to effect space exploration, but the individual has resources at his command far beyond those needed to meet his basic requirements. Access to higher levels of education and, therefore, to better paid and more prestigious careers no longer depends on social class, but on personal talents. Tuberculosis and other contagious diseases have practically been eliminated. Rickets and other forms of deficiency have disappeared, others, such as hypertension and gastroduodenal ulcers, may be readily controlled. The progressive increase in life expectancy is one of the consequences of these transformations.

These results, however, have been paid for at a high price. Man's value has been increasingly related to his economic productivity rather than to the qualities codified by religion and secular ethics. Modern businesses are evaluated in terms of sales, not the specific content of their production. Within broad limits, this also holds when the protection of man's basic goods is at stake, as in the case of health. There are no classifications of pharmaceutical enterprises taking into account their real contributions to the progress of medicine. Schools tend increasingly to provide the young with technical rather than humanistic culture; when this occurs, the need is felt to justify it by asserting that the young are thus enabled to follow and control the swift evolution of technology. It therefore causes no surprise that

current debate on school reform still concerns the capacity to provide suitable preparation for the specific needs of the world of production instead of man's spiritual needs. At the same time nature has been violated, often out of sheer cruelty. In a single day, frequently in pursuit of mere pleasure, a person consumes 700,000 calories of fuel with his car. This amounts to the food needed to maintain a person's life for 500 days or, if you prefer, the daily food intake of 500 people. In the process every kind of polluting substance is poured into the environment, and the biological cycle is altered for years.

Industrial civilization tended to exploit man and thus to marginalize him as soon as his strength began to decline. It also tended to reject the elderly's wisdom because it went against industrial logic. This does not mean that we should go back to farm society, where man retained a specific role throughout his life; it did not, in fact, succeed in meeting man's elementary needs. Post-industrial civilization will avail itself of modern technology, but only to meet man's real needs, with respect for the world in which he lives. It will be a more mature civilization which will restore dignity to all ages.

Biology thus teaches us that senescence is a basic component of life at whatever level it manifests itself: in the individual molecule, in the entity composed of millions of molecules, and in civilizations. This lesson must be borne in mind when dealing with the problems of this age from any standpoint.

In medicine it would be an error to propose to combat senescence or prolong its natural limits, as modern science is now theoretically in a position to do. That would not be for, but against life. Medicine should rather combat the pathology of senescence so as to ensure physiological treatment.

In this regard, someone might observe that biology is unfamiliar with the concept of

pathology: illnesses are a natural phenomenon forming part of the processes of competition, selection, and evolution as the basis of life. Even mutations, which are combated in medicine as the cause of malformations and tumors, are a fundamental instrument in this process. Indeed, the sun, other forms of energy, and many products of plants and of our metabolism itself have mutagenic effects. Neutralizing them would mean arresting the evolution of life. Tumors, one of the scourges of our era, are also inherent in cell physiology as a potential for repair. Without this capacity, living organisms could not repair the damage to which they are continually subjected. But the instinct of survival and conservation of the species forms part of the natural order as well. Man's right to defend and conserve his own identity and health derives from it. In this sense, biology regards medicine as an expression — a particularly sophisticated one — of instincts innate in all living beings.

The pathology of senescence is to a great extent common to other ages, though obviously with special connotations which have been brought out in other papers: it suffices to recall contagious and dys-metabolic diseases, hypertension, tumors and mental disturbances of the aged. Even Alzheimer's disease or senile dementia is manifested in relatively young persons. As a result, gerontology has availed itself of the more general process of medical science in coming to ensure a healthier and longer life for the elderly. There is also a pathology specifically connected with the very process of senescence, however. I will devote a few thoughts to it by way of conclusion.

The study of the pathology of senescence constitutes one of the most fascinating challenges — and also one of the richest in unknown factors — in modern science. To understand why we should go back to the protein cycle, i.e., to the molecular level of life. We have already referred to the

denaturation of proteins — their aging — when freed from the coat of water protecting them and beginning to interact with other compounds. In this way they can carry out certain basic physiological functions, but are attacked by proteolytic enzymes, which separate them into their elementary components. These processes, in themselves natural, become pathological when excessively accentuated or anomalous. Figure 2 shows the molecular aspect of a phenomenon of this kind taken from crystalline proteins. Normally these proteins present themselves as either globular bodies clearly separated from each other and transparent to light or small aggregates due to their ordinary process of aging. In the cataract, an illness due to the opacification of the crystalline lens, the proteins appear, instead, as large aggregates. Figure 3 shows the appearance of a cataract crystalline lens.

The mechanisms of protein denaturation, both physiological and pathological, are beginning to be known. Drugs with anti-denaturing effects have also been discovered. Some of them directly interact with specific denaturing agents, like the free radicals, neutralizing them. Others, such as bendazac, bind themselves to the hydrophobic sites of proteins, thus rendering them more resistant. The danger is that man will use this knowledge and these instruments not to safeguard his natural right to survival and to the propagation of the species, but to combat senescence itself. In this way he would eventually alter the very cycle of life.

All of this leads us back to the problem of ethics. This concerns not just medicine, but all the other spheres of human activity and is becoming increasingly dramatic as the pace of scientific and technological progress quickens. The time has come to face it openly, with courage and singleness of purpose.

As Archbishop Angelini stressed at the outset of this Conference, respect for life, in

all its forms and seasons, is rooted not only in religious faith, but also in secular morality. These reflections show us that science as well, through biology, brings us a message with analogous content.

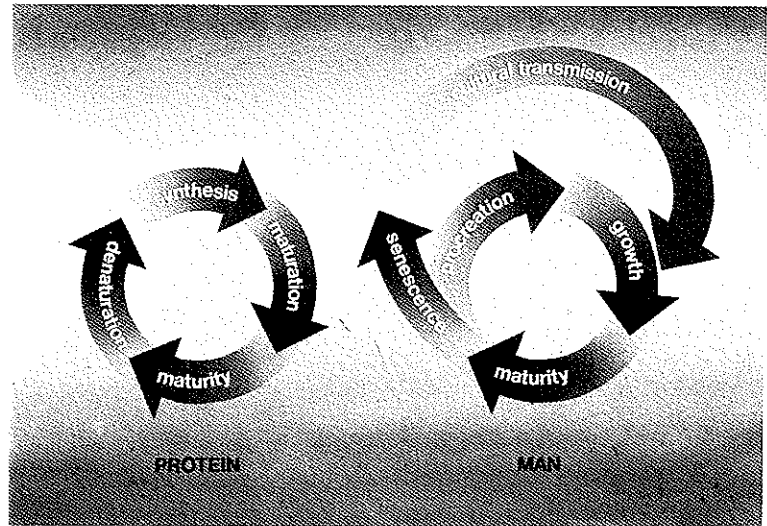


Figure 1. Biological cycle, from proteins to man. In both cases the various phases of the life cycle are inseparably connected. It should be noted that in man the continuity of the species is entrusted to two mechanisms: genetic, which is implemented after reaching biological maturity, and cultural, wherein the elderly contribute their wisdom.

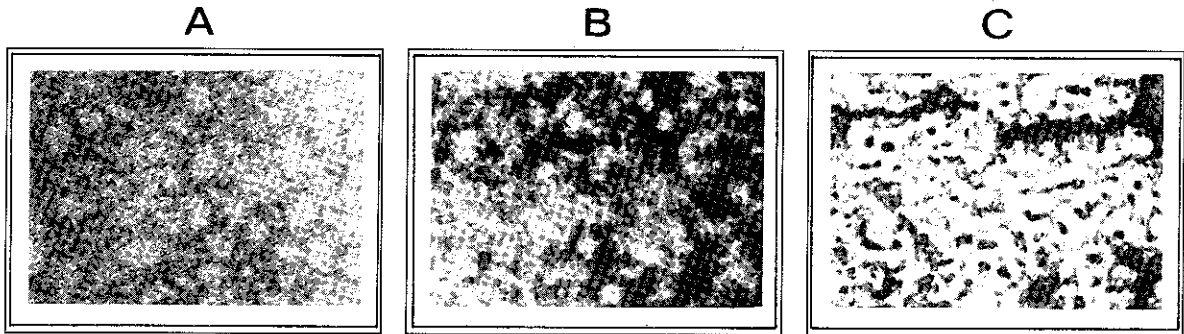


Figure 2. Electronic microscope images of crystalline lens proteins: A, normal proteins visible as globular bodies; B, small aggregates corresponding to physiological aging; C, pathological aggregates corresponding to those taken from the cataract.

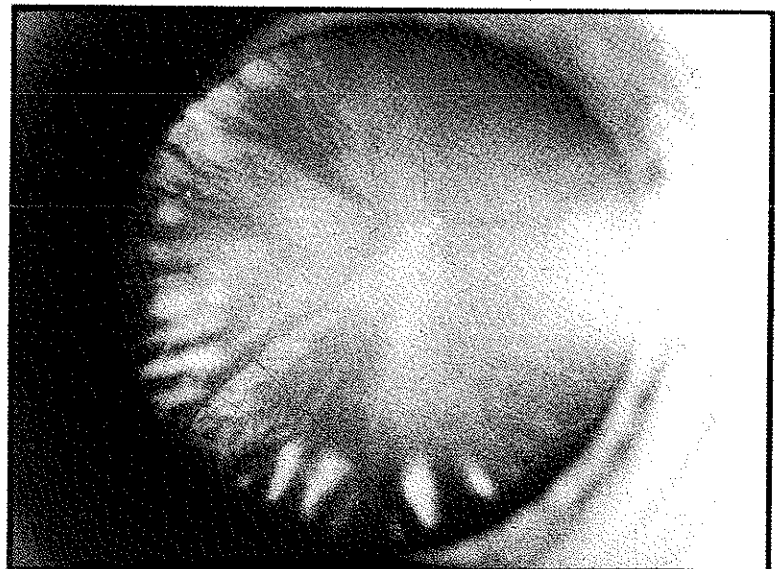


Figure 3. Aspect of the crystalline lens in the cataract, a sight disturbance associated with pathological denaturation of proteins.

Mental Problems of the Elderly

Z. S. KHACHATURIAN, PH.D.
A. A. MONJAN, PH.D., M.P.H.T., S. RADEBAUGH, SC.D.

*National Institutes of Health, National Institute on Aging,
Neuroscience and Neuropsychology of Aging Program (USA)*

Introduction

Medical science and society at large are faced with new biomedical and psychosocial challenges associated with old age. Societies are aging, whether in the industrial or in the developing countries. As recently as 100 years ago, the average life expectancy in the U.S. was 40 years. Age-associated social problems and diseases were as rare as the aged. People rapidly succumbed to disease and died because of poor sanitation, malnutrition, and harsh environments or work conditions. During the last several decades, there has been an extraordinary and steady growth in the number and proportion of older people worldwide. The numerical growth of old in the population of the world is evidence of improvements in health services, education, and income. Other factors which have contributed to this increase include reductions in infant and maternal mortality, reductions in infectious and parasitic diseases, and improved nutrition, sanitation, and water supplies.

In the year 2020, the proportion of individuals who are 65 years or older will nearly double in the United States. The accuracy of these projections depends largely on the precision of estimated projected mortality rates, which have been declining moderately. Even under the most conservative estimates it is clear that the special problems associated with old age, specifically the health care needs of the old, will require progressively larger shares of national resources. The potential of these vast demographic changes already has begun to profoundly influence the thinking of biomedical and social scien-

tists, health and social service providers, religious, business, and political leaders.

In a report summarizing detailed demographic and socioeconomic statistics on the older population in 31 countries Torrey et al (1987) indicate that "the growth of older populations poses a considerable challenge to public policy because our needs change as we age. Rapidly expanding numbers of older people represent a social phenomenon without historical precedent, and one that is bound to alter previously held stereotypes of older persons. There is a growing awareness that the term "the elderly," as a concept, is an inadequate generalization that obscures the heterogeneous nature of a population group that spans more than 40 years of life. The elderly are at least as diverse as younger age groups in terms of personal and social resources, health, living arrangements, and integration into social life. The disaggregation of statistics on the elderly into narrower age groups reveals important demographic and socioeconomic differences which have direct bearing on policy-making, both present and future."

As we stand at the threshold of the 21st century, we face one of the most critical periods in the history of man since the Industrial Revolution. This new Demographic Revolution will challenge our ability to adapt to a different mosaic of a society and will require drastic changes in the attitudes, perceptions, thinking, and priorities of individuals and of institutions. The human species has had a remarkable history of intellectual, scientific, and engineering achievements. The technical and scientific knowledge accu-

mulated through the ages has allowed us in modern times to conquer outer space, explore the dark depths of the seas, to expose the most tightly held secrets of particle physics, unravel the puzzle of genetic messages, and to virtually eliminate some killer diseases. Given the impressive array of accomplishments of man, would it be logical to conclude that we either have the necessary technical information at hand or have the potential to develop the needed scientific knowledge to solve most of the problems associated with an aging world population? The critical question is whether we have the will, the courage, and the wisdom to allocate the necessary resources to address these problems. I hope mankind has the resolve to face the challenges of bringing about the changes necessary to create a new order and a more humane society.

The spectrum of issues associated with an aging society is broad and varied, it includes: housing, transportation, pension, work-retirement, health, and many other topics. In this presentation I will focus my discussion primarily on health-related issues, particularly mental health and dementing disorders. Although the majority of older individuals, the 65 and older group, are healthy and function effectively, they are at a greater risk of disease and consequently have greater need for medical services. The extremely aged segment, i.e., 80 years and older, which is expected to grow rapidly over the next 40 years, uses a disproportionate share of health resources. If we are to improve the quality of life of the old, then we must learn more about biological, behavioral and psycho-social processes of

normal aging and the diseases of old age. We need such information to reduce the cost of health care, eliminate pain and suffering, prolong effective functioning, and maintain independence.

Normal vs. pathological aging

Early studies on aging often compared older, ill populations with young, healthy individuals in an attempt to distinguish age-related changes from those due to pathological changes. More recent research has shown that the differences between younger and older age groups are partly related to disease and partly to aging. Careful studies of disease-related and age-determined declines in human populations, have shown that during the aging process substantive declines do occur in kidney, brain, and lung functions and in the cardiovascular system.

It is important to recognize the difference between disease-related decline and age-related decline, which can increase the risk of developing certain diseases. The aging process is a highly individual experience and varies from individual to individual. As people age they become less alike. Biological processes of normal aging and decline in functional capacities cannot be understood clearly without recognizing the substantial variability within the aged group. Studies on the factors that are responsible for these differences have shown that many of these changes are not the result of aging itself, but may be due to a variety of factors, such as diet, personal habits, and psychosocial factors. For example, in the area of cognitive aging, although

patterns of age-related differences and change are reported very frequently, an increasingly common observation is that age itself is not the strongest correlate of such differences. NIA-supported researchers are now investigating a range of variables including health status, experience, and genetic versus environmental contributions, to try to identify more precisely the causes of such age-related changes and differences in performance. Changes in health status are one obvious candidate for why there should be changes in cognitive function at different ages. In this regard, preliminary results of a longitudinal study of hypertensives indicates that memory and speed tests (measures of fluid intelligence) do reveal a small decline is observed for normotensives. Also, normotensives improve their vocabulary scores on a standard intelligence test, while hypertensives show no change in performance. These results, then, suggest that hypertension is associated with some age-related changes in performance. Another study on the relationships among physical exercise and measures of working memory, reaction time and reasoning ability in older adults has found that adults who exercise vigorously are superior to adults who exercise less vigorously on all three measures of cognition. The correlation between exercise and cognitive functioning held even when controlling for differences in age, education, self-report of health, and medications.

Brain aging

In discussing issues related to cognitive aging or the men-

tal health problems of the aged, one must inevitably consider the aging brain a reality that cannot be dismissed. There is no doubt that "aging" is a profound biological phenomenon which changes a variety of the mind and body processes. But the term "change" does not necessarily mean an inevitable decline in mental processes and functional loss. As early as the 16th century, Montaigne, the French philosopher who lived to the age of 61, an uncommon event, made the following observation about the intellectual faculties of the older person.

"Since I was 20 years of age, I am certain that my mind and body have deteriorated more than they have developed. It is likely that knowledge and experience increase with aging, but activity, alertness, strength, and other important qualities nevertheless decline. Sometimes the body capitulates first to age, sometimes the mind. I have seen many men in whom the brain becomes diseased before either the stomach or the limbs" (Michel Eyquen de Montaigne, 1581, "Essay On Aging").

Among the many age-related decrements in functional capacity and disabilities that require institutional care or render a person dependent on others, those related to changes in brain functioning have the most significant implications for public policy and priorities for further research. It is generally accepted that there are age-related changes in brain functioning, just as there is some loss in physical ability.

Failure in central nervous system (CNS) functioning, such as decrements in hearing, vision, taste, motor skills, and

cognition for the aged. Such changes influence the attitudes of others toward the aged, affect the individual's self-image, and often determine the nature and quality of health care services. Failure in cognitive functioning is one of the principal indicators for institutionalization of the elderly.

Such custodial care is extremely expensive, often impersonal, and frequently contributes to further deterioration of health and, ultimately, to death. Although studies on the brain have a long history, it is only recently that we have begun to understand how the brain functions in health and the diseased state. The aging brain has become a topic of intense study only very recently.

To understand cognitive functioning, dementias of old age, or mental health problems of the aged we must learn more about the aging brain. Investigators who accept the challenge of studying the brain need to take into account three difficult issues. First, brain functioning is intricately coupled to other physiological control mechanisms or homeostatic functions. We still do not completely understand the underlying biological mechanisms of aging in the various physiological systems, nor do we have a clear picture of how aging affects the relationship between these systems. Second, the relationship between functional and chronological aging is not well understood.

Functional aging proceeds at different rates for different individuals, and physiological deterioration begins earlier in some individuals than in others. Finally there is a lack of appropriate biological markers for distinguishing normal age-related changes from pathological ones.

The process of normal aging is relatively poorly understood. There exist no consistent, established values for what constitutes "normal" cognitive impairment and memory loss with advancing years; nor are the neurologic changes, the neurochemical

changes, the neurophysiological changes, or the gross and fine anatomical changes that accompany normal aging well enough understood to provide a firm base for determining "abnormal" changes. After the age of 80 years, the brain of a patient with dementia may be difficult to distinguish from that of an age-matched normal patient without dementia; it is also true that the brains of some elderly patients have few or no senile (neuritic) plaques or neurofibrillary tangles. Even at earlier ages, the neurofibrillary tangles and senile plaques that characterize the brain with dementia of Alzheimer's type may also appear in the normal brain, although in small quantities.

How best to determine the definitive pathologic lesions of Alzheimer's disease (AD) on the basis of counts of neurofibrillary tangles and plaques remains controversial among neuropathologists. Until we achieve a better understanding of the normal aging process, the diagnosis of AD will continue to be difficult, sometimes inaccurate, and, at least currently, a combined clinicopathologic process.

Dementias of aging

The dementias of later life are the most common cause of cognitive disorders. Among the dementing diseases, Alzheimer's disease (AD) is the most prevalent in the U.S., accounting for at least 50% of all cases of dementias in older people. The older population of the world is growing at a rate of 2.4% per year, which is a more rapid rate than the total population growth. It is projected that by the year 2000 there will be 410 million people over 65 years of age with 59% of the total residing in developing countries.

Unless there are dramatic differences in age-specific incidence rates worldwide and in the duration of the disease, AD and related dementias will become increasingly important.



Diagnosis

Early and accurate diagnosis of Alzheimer's disease has a major impact on the progress of research on dementia. In its early stages in older persons, the diagnosis is difficult. In its later states, AD is sometimes mistaken for other kinds of dementias and mental diseases. Incorrect diagnosis is thought to be common, perhaps ranging from 10 percent to 30 percent in the general medical population.

There is a need to stimulate further research focusing on the specific scientific issues concerning the diagnosis, etiology, and treatment of AD. Progress in understanding and diagnosing AD will most likely come about through amassing, evaluating, and comparing data and material from many sources. All data collected, both retrospective and prospective, will be maximally useful only so long as they are carefully screened for accuracy of diagnosis, relevance, and reliability and are comparable across studies. The following are some of the topics that are in particular need of further research.

Diagnostic criteria

There is an immediate need for improved diagnosis and diagnostic screening for AD. However, the diagnosis of and screening for AD will continue to be difficult and sometimes inaccurate until we achieve a better understanding of the normal aging process.

The major difficulty in diagnosing AD involves the definition of the disease itself and its varied and, at times, subtle manifestations; AD remains a combined clinico-pathologic diagnosis. The relationship between neuropsychological, neuroradiological, and neuropathologic indexes of the disease is not well understood. A continuing effort to define the disease precisely and to develop methods of definitely distinguishing AD from other nervous system diseases must remain the sub-



strate of all research in the field

Neuropsychological diagnosis and other behavioral measures

There is a need for the development of neuropsychologic and behavioral tests and markers for AD. Practical screening for AD in the older population requires reliable neuropsychological markers. Measures of very subtle changes in behavior that are the first signs of aberration to be noticed by family members are needed.

Neuropsychological testing involving abilities other than cognitive ones may also be useful and important. Tests of first-order capabilities such as visual perception, reaction time, or motor ability might be closer to measuring substrate levels of central nervous system integrity or disability without the complication of trying to measure abstract-conceptual-cognitive behavior.

Biological and chemical markers

Sensitive and specific biological and chemical markers to stages of AD are required, preferably derived from extraneural sources such as urine, saliva, blood (cells or plasma), CSF, or fibroblast cell cultures. Before any marker is proposed or made available, it is essential to validate it against the neuropathological diagnoses and all other significant disease signs.

Techniques of molecular genetics provide a promising new approach for understanding AD diagnosis-etiology therapy, especially in view of the growing evidence that there is a familial factor present in some portion of the disease.

Neuroimaging

There is a need to understand and to resolve the conflicting data produced by

studies using different noninvasive imaging instruments, particularly brain localization of the imaged data, and stereotactic location of prominent landmarks in the brain using methods borrowed from current neurosurgical technology.

Neuropathological markers

The relationship of plaques and neurofibrillary tangles to premortem cognitive function and to the pathogenic mechanisms of AD must be clarified. While standards have been suggested for the neuropathological diagnosis of AD, questions still remain. For instance, if a presumptive diagnosis of dementia resulting from Alzheimer's disease is made pre-mortem, the presence of plaques and tangles at autopsy is generally considered confirmatory. However, the frequency of plaques and tangles in representative population samples of persons who were cognitively intact prior to death is unknown.

Epidemiological studies

There is a clear need for scientifically sound international and cross-national studies. Differences in incidence rates among countries, in distinct subpopulations or by acquired characteristics may yield clues about risk factors which might then lead to new hypotheses about etiology. While it is fairly well agreed that a portion of the burden of AD is genetically linked, other robust risk factors, besides advancing age, are as yet unidentified.

Clear, operationally defined, and reproducible diagnostic criteria are required for cases very early in the course, as well as for those with more advanced disease. Screening instruments for field studies of cognitive disorders are required. The instruments should be able to be used by paraprofessionals and trained nonprofessionals in a variety of settings. These instruments

must be culturally, socioeconomically and educationally nonbiased for use in cross-cultural and cross-national studies. The screening instruments must yield reliable findings, must be sensitive to intellectual decline resulting from dementing disorders, and must be easy to use in large-scale field studies.

Reliable, valid, and culturally fair risk factor assessment interview methods and instruments are needed for determining exposure to putative risk factors (for example, parental age, affected pedigree, thyroid disease, head trauma). The most parsimonious set of procedures for differential diagnoses, which can be applied cross-nationally, must be determined. The yield of the selected differential diagnostic procedures over against neuropathological assessments must be known.

Longitudinal epidemiological studies with post-mortem investigation are also required. Longitudinal studies collecting detailed information on individuals already suffering from AD and studies involving general populations of older persons may provide information on premorbid events and conditions of those who might come down with the disease.

Pedigree studies investigating the familial-genetic aspects of AD should be established through central family registries that maintain records on well-characterized AD cases. Family registries would also provide the means to study more closely the natural history of AD and to explore the hypothesis that there may be different varieties. Isolated communities or groups which have a high degree of consanguinity may be especially useful in studies of familial incidence of AD.

Treatments of neurochemical deficits

The search for the etiology of this disease has never discouraged investigators from searching for ways to treat it.

Unfortunately, AD appears to be a very complex neurochemical puzzle. Present efforts to treat AD have not produced any consistent or long-lasting results, although there is still hope that a drug, or combination of drugs, may ameliorate some of the cognitive deficits of some patients, at least early in the clinical course of this disease.

During the past few years, it has been clearly established that the hallmark of AD is a serious defect in the cholinergic system (Bartus, et al., 1982). This finding has stimulated considerable scientific activity aimed at identifying the exact nature of this neurochemical defect and finding a pharmacological means of ameliorating the disease. This type of research has been driven by the assumption that the neurochemical deficits in AD result primarily from biochemical abnormalities in the synthesis or release of acetylcholine; it is assumed that the affected brain cells would function normally if these biochemical abnormalities could be corrected. Thus, the search for treatment has focused on pharmacological manipulations aimed at one of the following strategies: 1) increasing the supply of the substrate necessary for the synthesis of the neurotransmitter, such as use of choline or lecithin; 2) increasing the amount of the neurotransmitter released through the use of 3,4-diaminopyridine or muscarinic agonists; 3) prolonging the availability of the neurotransmitter at the synaptic junction by blocking its breakdown through the use of cholinesterase inhibitors such as physostigmine or tetrahydroaminoacridine (THA); and 4) manipulating the sensitivity of receptors at the postsynaptic membrane.

Despite some promising initial results in treatment of AD with agents such as choline, lecithin, and physostigmine, the effort in cholinergic pharmacology has not produced any consistent or long-lasting treatment for AD. There are several possi-

ble explanations for this apparent lack of success.

First, it is unlikely that AD results from a deficit in a single neurotransmitter system. There is mounting evidence that this disease involves deficits in multiple neurotransmitter systems and neuropeptides.

Second, the neurochemical deficits might be a consequence of other changes within the cell, such as abnormal oxidative metabolism, or other biochemical changes within the cytosol.

Third, the observed neurochemical changes in AD might be epiphenomena associated with or consequent to cell death.

There is still need for further research on the neurochemistry of AD. The aim of such research is to learn more about fundamental chemistry of the disease, which may shed light on etiology and pathogenesis. If, through such research, we discover an agent or agents that can ameliorate the symptoms of the disease, even for a short time, it will still be worthwhile, because such agents may provide a welcomed relief, however brief, to the victims and their families.

In the past, the effort expended on the neuropharmacology of neurotransmitters has proven to be useful for some neurological and psychiatric disorders such as Parkinson's disease and depression. These models may not be totally appropriate for the development of treatment of AD. The pharmacology and the pharmacotherapy of AD may need to have a different objective. A strategy that focuses on maintaining the structural and functional viability of neurons may be an appropriate model. We need to find agents that can restore or maintain cell metabolic processes, membrane structure, and functional processes associated with synthesis and degradation of membrane proteins and cytoskeletal proteins.

Factors leading to cell death

There is growing evidence that the fundamental problem in AD is associated with cell death. In AD, structural changes in cells and the death of cells occurs in specific regions of the brain, particularly in areas richly innervated with cholinergic cells. However, to date, we do not know why brain cells die in AD; why specific types of cells in particular brain regions are vulnerable to cell death; and whether or not such cell death can be averted by pharmacological means.

At present, there are several very promising leads concerning the possible mechanisms of cell death in AD. The following section provides a brief outline of some of the most significant ideas being explored by various investigators.

Infectious agent(s)

It has been proposed that a transmissible infective agent might be involved in the etiology of AD. However, to date, it has not been possible to generate any convincing evidence for this hypothesis. Despite an initial seemingly positive transmission of AD into monkeys, which produced a disease indistinguishable from CJD, replications have been unsuccessful (Traub, et al., 1977; Goudsmit, et al., 1980). Prusiner (1987) has proposed that these failures to transmit AD can be due to an inability of the agent to replicate in the laboratory host, or the incubation times studied were insufficient to develop the disease, or an infectious agent is not involved in the pathogenesis of AD.

Another possibility has been put forth by Manuelidis, et al (1988) that evidence for infectivity should be sought in the early stages of the disease rather than in the end stage autopsy material. In very preliminary findings, these investigators report a possible transmission of a CJD-like disease into ham-

sters from homogenates of buffy coat cells drawn from five of eleven healthy relatives of AD patients. These very provocative data need further confirmation as well as attempts to identify the transmissible agent.

Prusiner's work with the scrapie prion protein (PrP) has demonstrated that there are two isoforms of PrP: scrapie (Sc) and cellular (C). PrP and candidate PrP genes have been identified in a number of species (Prusiner and McKinley, 1987). In healthy cells, PrP^c is the product of the PrP gene and is susceptible to digestion by proteases, unlike the scrapie isoform, PrP^{sc}, which is resistant. Both PrP^c and PrP^{sc} are transmembrane imbedded proteins. Upon detergent extraction, the cellular form solubilizes, while the scrapie form polymerizes into amyloid-like rods. The available evidence indicates that these two isoforms are coded from the same PrP gene and have the same amino acid sequence. Thus, the difference between PrP^c and PrP^{sc} seems due to a post-translational event which modifies PrP after the polypeptide chain is assembled.

Prusiner's studies of prions suggest the possibility that an infectious process may induce the conversion of normal necessary proteins into aberrant pathologic molecules. These conversions most likely result from post-translational modifications that occur after the proteins are assembled. We need to have a better understanding of the chemical mechanism by which proteins, e.g., PrP, interact with membrane phospholipids and how that interaction alters the surface characteristics of membrane imbedded proteins.

The aging nervous system may be particularly vulnerable to a host of infectious insults. Normal barriers such as the bloodbrain barrier, active and passive cellular "pumps", and expression or de-expression of cell membrane receptor molecules appear to be altered during both normal and pathological ag-

ing. These events may predispose the aging nervous system to increased risk of perturbation by pathogens.

Toxins

Both endogenous and exogenous toxins have been associated with neuronal death. The association and colocalization of aluminum with the paired helical filaments (PHF) and other elements within tangle-bearing neurons has stimulated considerable research. However, it still is not clear whether the aluminum accumulation is a cause, contributor, or consequence of the cellular pathology in AD.

The emerging body of research on the susceptibility of the nervous system to 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), vis-a-vis a model for Parkinson's disease, raises the possibility that toxins may also play key roles in the etiology of AD. Aging may increase the susceptibility of the nervous system to toxins and other environmental insults. Such vulnerability is likely not to be uniform but will reflect the phylogenetic development and vital nature of the specific regions of the nervous system. It appears that the susceptibilities of the murine (Gupta et al., 1986) and primate (Forno et al., 1986) nervous systems are age and system specific; aged animals are more sensitive to the toxic effects of MPTP with the additional involvement of the dopaminergic ventral tegmental area and the noradrenergic locus coeruleus.

While the principle attention has been focused upon the cholinergic hypothesis as the etiologic model for AD, it is clear that the pathologic changes associated with this disease encompass a far greater spectrum of alterations, including the adrenergic, serotonergic, somatostatinergic, glutamatergic, and other neuroptnergic systems in addition to the cholinergic system. Maragos et al. (1987) have proposed that glutamatergic dysfunction can bet-

ter explain the etiologic mystery of AD. Glutamate and other excitotoxic amino acids may induce hyperactivity of cortical association and hippocampal pyramidal neurons resulting in disruption of intracellular energy resources and inability to maintain normal cytoskeletal structures. With continued activation, neurons would lose control of membrane polarization and thus become more vulnerable to excitatory input.

A provocative set of findings related to this excitotoxic hypothesis is the potential etiologic role of the seed of the cycad plant (*Cycas circinalis*) in the pathogenesis of the Guam form of amyotrophic lateral sclerosis (ALS) and of the Parkinson dementia complex (PDG) as a clinical variant of ALS (Kurland, 1988). It appears that the active component of the cycad seed in this disease process is the excitatory neurotoxic amino acid beta-N-methylamino-L-alanine (BMAA). Acute administration of BMAA to monkeys produced motor neuron deficits (Spencer, 1987). A related plant derived amino acid is beta-N-oxalylamino-L-alanine (BOAA) which is a potent stereospecific glutamate agonist. It has been suggested that exposure to such environmental toxins at high enough concentrations early in life may result in prompt expression of disease, such as ALS, as seen in the MPTP model. On the other hand, lower levels of chronic exposure combined with age-associated changes in the nervous system could find expression as PDC (Calne, 1986) and possibly AD.

Abnormal proteins

The presence of abnormal proteins is regarded as the hallmark of AD. Considerable progress has been made in understanding the protein chemistry of tangles and plaques. The location of the gene responsible for one of the amyloid precursor proteins has been identified and the chem-

istry of PHF is better understood now than a few years ago. However, it is still not clear whether plaques have any direct role to play in the etiology of AD. The presence of these abnormal proteins is not unique to AD. It is very likely that they may be coincidental to the disease process. We need to know how these proteins affect cellular function. There is no clear and direct evidence that these abnormal proteins play a role in cell death. If they do, we need to understand the mechanism by which this occurs.

Metabolic abnormality

There is evidence indicating that AD might involve abnormal metabolic activity in affected neural tissues: 1) glucose utilization is diminished; 2) pyruvate dehydrogenase complex activity is reduced; 3) biopsy material shows abnormal oxidative metabolism; 4) positron emission tomography images show patterns indicative of reduced glucose utilization. However, these could be due to reductions in cell number. There is a need for more accurate assessment of neural metabolic activity since it may account for both changes in neurotransmitter chemistry and cell death.

Recently, Sims et al. (1987) have demonstrated that skin fibroblasts from AD patients have abnormal glucose and energy related metabolism. This study suggests that the predisposing genetic factor associated with AD may be expressed in tissues other than the brain. This finding may provide an important clue to the pathogenesis of this disease and provide a useful model for noninvasive studies.

Membrane proteins

The mechanism by which the structure, function, and assembly of membrane proteins change in aging and pathological condition is an important issue for the etiolo-

gy of AD. Spectral NMR indicates that membrane structure changes in aging and AD. Pettegrew et al. (1988) have found evidence for the hypothesis that abnormalities in the synthesis of membrane phospholipids are early metabolic events in the pathogenesis of AD. The issue of how membrane structural changes interact with membrane proteins and affect the functions of these proteins is an area that needs much attention.

An important issue for the neurobiology of aging is to understand the mechanisms by which intracellular messengers mediate neuromodulation and are mediated by neuromodulators. There is compelling evidence that membrane linked inositol lipid signalling pathways play a crucial role in neuromodulation and, possibly, in the acquisition of long-term memory. We need to know more about age-related changes in the phosphatidylinositol second messenger system (diacylglycerol, inositol (1,4,5)triphosphate, and protein kinase C pathway). There is growing evidence that neuromodulation depends on opening and closing of ion channels by second messengers, but we do not know how these systems are altered as part of the aging process, or affected by disease processes. The role of the second messenger system in triggering the onset of gene transcription and protein synthesis required for long-lasting neuronal changes seems essential for better understanding of age-related changes in memory.

Research on the neurobiology of aging and AD needs to focus on issues related to structures and functions of cellular membranes and cytoskeletal proteins. The key question is how changes in membranes affect binding characteristics and transport mechanism across extracellular as well as intracellular boundaries.

Studies of the dynamic changes in the structure and function of the cerebral mi-

crovasculature need to identify functional changes in the microvasculature which may degrade or alter O₂ and glucose transport systems in a subtle but persistent manner. Such changes may not produce an immediate effect but may produce a chronic, graded hypoglycemia or hypoxic condition over a long period.

Recent evidence indicates that hypoglycemic neuronal damage might be mediated by excitotoxins, especially the excitatory amino acids glutamate and aspartate. Cell death is induced by agonist action on the N-methyl-D-aspartate (NMDA) receptor. Stimulation of the NMDA receptors by the excitatory amino acids increases the intracellular calcium levels, which could be an important mechanism for selective neuronal death in aging and AD.

The above-presented arguments are intended to indicate that although traditional pharmacological studies directed at modifying the synthesis or release of neurotransmitters may play an important role in treating AD, we need to develop a new form of pharmacological approaches to modifying the cell-membrane, regulating the second messenger system, effecting post-translational changes, or gene-regulation. The technology for these approaches is now available. However, more research is needed to bring it to fruition.

Hypotheses on etiology of AD

At present, no single known etiologic factor under study can fully account for the clinical picture of AD and the post mortem pathological markers of the disease. We proposed that as a working hypothesis the role of any single etiologic factor needs to be examined in the broader context of other ideas concerning the etiology of this disorder, e.g., genetics, infective agent, metabolic disorder, blood-brain barrier changes, and neurochemical deficits. This broader view is necessary because of the

strong possibility that AD may not be due to a single event or an insult but is brought about by a series of different events over a long period. In discussing the cause(s) and effect relationship of this disorder, it might be useful to use the analogy of an AND gate (a digital logic element) to conceptualize the process I have in mind. As is well known, an AND gate can have two or more inputs and one output. In order to get an output, it is necessary that certain well-specified rules (a truth table) be followed. That is, a discrete event has to take place at each of the inputs of the AND gate for an output to occur. The timing of the events at the various inputs can vary almost infinitely, but once an event takes place, its effect must linger on. The basic rule is that an event has to be present at all inputs at the same time for an output to occur. Now, transposing this model to AD, the input gates could be such events as:

- a) genetic predisposition for a metabolism or functional disorder;
- b) aging;
- c) cerebral microvasculature pathology so that there is graded but prolonged reduction in glucose;
- d) O₂ changes in oxidative metabolism due to enzymatic deficiencies;
- e) exposure to toxins,
- f) other changes in brain chemistry;
- g) reductions in cerebral blood flow.

According to the AND gate model, these events do not have to occur at the same time, but each could produce a lingering effect which eventually might lead to cell loss and clinical symptoms. Therefore, to understand the etiology of AD, it might be important to examine evidence showing a relationship between a particular variable, such as toxins, and AD, in the context of other preceding critical physiological events during the lifetime of the patient which may have predisposed the vulnerability of the brain to the disease.

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The Role of Pharmacology in Aging

Professor JEAN CHARLES SCHWARTZ

*Director of the Inserm 109 Unit
Paul Broca Neurobiology Center, Paris*

In regard to the role of cardiovascular drugs or those used against infections, antibiotics, in increasing lifespan, it should be noted that their application has entailed a certain number of affections, among which mental disturbances may be distinguished. I would like to limit my remarks to these.

It must not be forgotten that while, on the one hand, we are still using drugs discovered by chance, so to speak, and administered experimentally, on the other we are on the way to significant progress in the care of the most serious disturbances.

The achievements of neurobiology are accompanied by those of neuropharmacology.

We are attempting to follow a rational, ordered policy which ought to lead us to substantial progress in the near future.

Among the different psychotropic medicines administered to elderly persons, three main categories may be distinguished. The first is constituted by the drugs designed to fight against disturbances linked to the problem of aging. It should be observed that these — which are substantially cognitive — in quite a few cases appear together with structural modifications. These represent changes in connection with which we would like to have instruments capable of intervening in the process. The modification — in this case, the decrease — in brain size is accompanied by a decrease in the number of neurons. At one time the extent or scope of these modifications was exaggerated; we now know, however, that they are relatively limited and, in any case, not over about 15% of the number of neurons in the brain.

Such modifications are accompanied by changes which are

not only quantitative, but qualitative. Their influence is not univocal: it may be manifested in impoverishment or in the opposite direction. I want to point out these modifications in neuron morphology are undoubtedly influenced by so-called growth factors, one of which was discovered in Italy by Dr. Rita Levi Montalcini — in this case, a nervous growth factor. We are probably faced with numerous factors still not sufficiently well known.

The modifications associated with fibrilla lesions, the senile plaques characteristic of Alzheimer's disease, are in fact already found in the normal brain, but are much less frequent. There are modifications on the level of the brain vessels, of course, and for a long time age was thought to be accompanied by the sclerosis of these vessels. This has not been demonstrated, however; it is true, on the other hand, that some modifications of vascular properties form the very basis for the greater frequency among the elderly. There are, in effect — and I wish to close on this point — modifications of the neurotransmitters. In the previous talk it was explained that these neurotransmitters are the chemical messengers through which neurons speak to one another or communicate; some are freed and reach other neurons. This "conversation" between one neuron and another seems to encounter difficulties in the elderly person, as is demonstrated by the smaller number of them in his brain. But it must be added that these neurotransmitters are very important for the pharmacologist. Indeed, over the course of the last twenty years, between fifty and one hundred different substances have been discovered capable of playing the role of neurotransmitters;

every discovery in this sense, though confirming the complexity of brain chemistry, nevertheless offers the pharmacologist a supplementary indication to develop new drugs.

Among the compounds ordinarily employed to treat cognitive disturbances of the elderly, some seem to improve the hematic flow in the brain, whereas others apparently improve and strengthen brain metabolism. Finally, some appear to have the function of facilitating the cognitive processes with an increase in wakefulness. These compounds or products are used quite frequently for the elderly; this use in fact reflects the need to avoid the reduction of cognitive capacities. It must, however, be stated that the mechanism by which most of these compounds act remains largely unknown and that their action itself must still be understood.

The second category of compounds used in the elderly involves drugs to treat illnesses common to adults and the aged. Among them are three large classes of hypnotics which are psychiatric drugs, but which are often used to combat problems of insomnia, more frequent in the elderly than in adults; nevertheless, we find here as well tranquilizers, antidepressives, and antipsychotics.

These compounds are used very often, and recent statistics indicated, for example, that in about 50% of the cases admitted a prescription for one of these three types of drugs was observed; their fame was once again demonstrated.

Another common characteristic of these three types of products is that they were discovered by chance in the fifties and sixties during clinical use. The discoveries were made in Europe. Only gradually has

their action on the brain been understood — they activate a certain number of neurotransmitters. What does this mean? We are confronted with a vast field of study so as to be able to perfect more affective agents than those we have been using since the sixties.

Another general characteristic of the use of these agents in the elderly is the difficulty in their ingestion. This was stressed in a previous paper. There are side effects presenting themselves in nearly the same way in adults, but with much more serious consequences in the elderly. It is a question of motor problems, hypertension, and so on, all contraindications which may be graver in old age than in adulthood. Moreover, there is a metabolism modification induced by these compounds in the elderly which frequently entails a lessening of intestinal absorption and hepatic inactivation. It is thus harder to adjust doses of these drugs for the old than for healthy adults. Finally, the third category of drugs designed for the elderly is for the treatment of the illnesses proper to advanced age. Among these, as has already been pointed out, the most frequent and significant for research at present are the forms of dementia. Why? Precisely because of the frequency of these affections, but also because current pharmacological resources for them are practically nonexistent. In view of its high incidence, we are particularly interested in Alzheimer's disease within this group. I will not repeat what has already been stated, but among the different characteristic modifications there are included those attacking certain kinds of neurons, among which the most important ones are the cholinergic, which use acetylcholine as a neurotransmitter and undergo marked degeneration in this illness.

I would like, then, to formulate the question in terms somewhat different from those of the previous speaker. We may ask how we hope in the coming years to perfect effective drugs for this illness. It seems to me that, among the different strategies, we can dis-

tinguish, on the one hand, those starting from an animal model of illness. It is an approach which, as regards mental illnesses, has been disappointing until now; however, with the greater knowledge we have today on Alzheimer's disease, we may hope for the development of animal-based models which will help us to prepare such therapeutic drugs. The second approach consists of starting from so-called biological targets. We may distinguish three concrete kinds: the neuropathological changes already described, degenerated neuron systems, and the neuron systems which have been preserved from illness.

The most important protein in the senile plaque was recently isolated with a very modern method, that of molecular biology, which is quite effective in that without purifying the protein we may know its structure and even predict its function.

Now one of the important points I would like to stress — important, that is, for the pharmacologist — is that this activity, carried out at the same time at three different laboratories, with results in perfect agreement, has enabled us to see this protein, which we know is present more often in the brains of Alzheimer's patients and has quite a particular enzymatic action, or, if you prefer, possesses the power to inhibit enzymatic activity. On the basis of this observation, which is completely surprising and may give rise to well-grounded research into the treatment of Alzheimer's disease, the hypothesis could be posed, for example, that the enzymatic activity which is inhibited by the protein in question is one enabling the individual to fight against affections. In other words, this plaque, this protein, would be of benefit to the subject, and if this is so, we should at this time identify the substance inactivated by the enzymatic activity so that it will be protected. And the synthesis inhibitors may be quite readily prepared; they will not, of course, be much easier to illustrate than this protein.

Another hypothesis is that

protein plays a harmful role; and the substance hydrolyzed by the aforementioned enzyme is again identified. Here we may hope that by protecting it a new approach to this disease can be found. It is a new, very stimulating line of research which has opened up in recent months. Among the neurotransmitter systems affected most seriously are the cholinergic ones; indeed, acetylcholine, a neurotransmitter, is produced and located at the base of the brain in a concrete nucleus, that of Meynet—or, if you prefer, the neurons producing it, which are of interest to us. From this nucleus the neurons send out to virtually the entire encephalon—or, rather, the part involved in cognitive processes—the long neurons. These disappear simultaneously at the points of departure and arrival. An initial approach might possibly consist of attempting to avoid this degenerative phenomenon. Some experiments were recently carried out by Varon and his colleagues. They consisted of effecting experimental degeneration in a rat's brain. There was a nearly complete disappearance of cholinergic denervation, as evidenced by the antibody system. This disappearance is virtually total after the lesion.

The animal itself, having received the previously mentioned nervous growth factor, which is a natural substance produced in the brain, manifests markedly delayed degeneration; especially on the side where an injection was made the neuron system is conserved. One might then ask, "Why not treat our patients with this neuronal growth factor available today?" There are, in fact, greater difficulties for the use of this substance, because it is a protein not absorbed well by the digestive system; it does not enter easily into the brain, and it would be necessary to find systems of administration which are now—or border on the—unthinkable. I am referring to intracerebral administration systems. It is quite likely, however, that knowledge of the way this nervous growth factor acts and of how it may be replaced by sub-

stances which might have the same effect will lead us to compounds which may well serve to delay these phenomena of nervous degeneration. One possibility suggested recently is the use of certain substances, such as the canglosites, which, when administered systemically, prove effective on the basis of a somewhat different model which I shall not deal with in detail, but which consists of causing degeneration in the cholinergic systems

Another approach attempted is the following: the cholinergic system--i.e., the neuroacetylcholine--is degenerated; then we somehow try to replace the acetylcholine which is lacking. The afferent neuron ending is seen here, the neuron receiving the message, that is, the acetylcholine released by the first neuron. Tests have been conducted consisting of administering substances to facilitate the production of acetylcholine by the few neurons remaining in the brain. This approach has generally proved rather disappointing.

Another possibility involves the administration of substances similar to acetylcholine; pharmacology has a number of them at its disposal. These cholinergic-type agents would in fact be destined to act upon the receptors of acetylcholine. Here we observe that we are faced with a difficult situation, for these acetylcholine receptors are present not only in the part of the brain degenerated by Alzheimer's disease, but also in many other apparatuses, like the digestive system, outside the brain.

The administration of these agents produces numerous harmful effects. How can we overcome this difficulty, then, if today no system is glimpsed?

Nature, in showing us its complexity, nevertheless offers us new paths for research to find more selective drugs. Let us examine them in the receptors. The receptor is the constituent of the membrane which receives acetylcholine. It was long believed that there were only two receptors, and the chances for specific selective action were rather slim. Recent discoveries in molecu-



lar biology show us, however, the possibility of six or seven different receptors for acetylcholine belonging to different categories. These multiple receptors of acetylcholine once again give us the chance to develop new drugs to act on one receptor or another. They offer us, then, the hope of acting precisely upon the most important systems in maintaining cognitive functions.

The final approach consists of making use to some extent of the neuron systems which have not suffered degeneration in the course of Alzheimer's disease. One of these is of special interest to us. I am referring to the system using histamine as a neurotransmitter. Here we have a system which greatly resembles the previous one (i.e., that of acetylcholine) — once more a neuron found at the base of the brain, but it is no longer a question of Meynet's basal nucleus, but of the mamillary tubercle. From there this group of cells sends messages to virtually the entire encephalon, messages somewhat resembling the kind sent by acetylcholine. The difference lies in the fact that these histamine neurons do not degenerate in Alzheimer's disease, and there is thus a possibility of replacing the missing circuit with a pre-existing, but operative one.

We thus have the chance to modify histaminergic activity in the brain and hence arrive at new drugs which for the first time will be capable of markedly increasing histaminergic transmissions. Accordingly, we have succeeded for the first time in producing increases in wakefulness by new methods which were previously not available. They consist of simplifying histaminergic transmissions. In conclusion, it is true that there are many other approaches. Dr. Cacciaturi mentioned some of them in the preceding paper, and I have dealt with others.

I would like to close with a quip: shrewdness is to succeed in dying young, but as late as possible. And I wish to express my conviction that pharmacology will help us enormously in the coming decades to reach this goal.

Quality of Life and Longevity: Psychosocial Correlations

Dr. URSULA MARIA LEHR

West German Health Minister

1. Historical aspects of "longevity research"

To reach an advanced age with a feeling of well-being has long been a human desire and has occupied poets, philosophers, and physicians. This issue was already a point of discussion over 4000 years ago in the Dead Sea Scrolls (cf. Streib & Orbach 1967). Over 2000 years ago (460-377 B.C.), as rules for a healthy life, which would in turn guarantee a long life, Hippocrates recommended (cf. Schmid 1974): "All parts of the body, which are designed to serve a function, will remain in good health, grow and reach an advanced age if they are used in moderation. However, if they are not used, they tend to become diseased, cease to grow, and age prematurely." (Hippocrates: *De articulis respondis* 56: cf. Muri, 1962, p. 361).

Along with the proper diet, Pergamon v. Galen (129-199 A.D.) also recommended exercise and gymnastics (cf. Steudel - 1962). 1500 years later in his "Discourse on the Maintenance of the Health of the Aged," which was published in 1778, the well-known Viennese physician Van Swieten (1700-1772) wrote: "First, the dryness and stiffness of the body part must be corrected. To this purpose, baths, gentle massages and moisturizing with a mild oil are the use; ... however, nothing prevents the stiffness of the limbs better than frequent stretching and bending. Only the lack of exercise causes stiffness or even curvature of the limbs at an early age" (v. Swieten, 1778, p. 37).

Similar references to a life-long preparation for old age, a geroprophylactic, which be-

gins in childhood and adolescence and encompasses the physical as well as the mental sphere, can be found in Plato's (427-347 B.C.) *Politeia* and Cicero's (106-43 B.C.) *cato maior de senectute*. Physical activity, mental activity, and social activity throughout the whole life, as well as pleasant and gratifying experiences and the proper nutrition, have been considered prerequisites for successful aging since antiquity (see Lehr 1982).

These assertions were not tested empirically at that time. For the most part they were based on single experiences or on examples of famous individuals. This paper examines these assertions in the light of recent gerontological research, especially with respect to results of the research on so-called, "survivor" or "longevity" research.

1.2. Longevity - a sign of our time?

In ancient Greece during the times of Pericles, life expectancy averaged 20 years. In the middle of the 19th century the average life-expectancy in the western world was around 35 years; today, it is 70.4 years in the more developed countries, and 49.6 years in the less developed countries. By the year 2000 the average life-expectancy is expected to increase by 2.8 years to 73.2 years in the more developed countries, whereas for the less developed countries a sharp increase by 15.7 years up to 65.3 years is expected.

But these average figures are problematical because they are confounded by neonate and children's mortality. The statistical trends

show, however, that there is not only an increase in average life expectancy, but the probability for many individuals to reach a very high age has also increased considerably. The proportion of the over 60-year-olds is increasing rapidly; 5% in Germany a century ago, it is now 21% and will be 26% in the year 2000.

But, whereas in the three decades from 1970 to 2000 the population in Europe is expected to increase by 17.5%, the proportion of the over 60-year-olds will increase by 62.4%. In the Latin-American countries there will be an increase of the group of over 60-year-olds of 150% and the proportion of the over 80-year-olds will increase by 215% during the period 1970 to 2000.

The expected figures for the year 2000 are: 231 million persons over 60 in the more developed countries, but 354 million in the less developed countries.

An increase in average life expectancy is a typical phenomenon of the end of our century. The current life expectancy in our country is 71.4 years for a male and 78.0 years for a female newborn. But a 60-year-old man has an average further life-expectancy of nearly 17 years, a 60-year-old woman of 21 years. In 1987 our Bundespräsident sent birthday-greetings to 2,252 persons 100 years of age and older. And in the year 2000 in our country more than 10,000 persons will be 100 years or more.

This "graying world" is a direct challenge for scientists of all disciplines and faculties, but for policy makers, too, in order to combine longevity with a state of psychophysical well-being. What can be done to ensure the

quality of life in old age? Our life expectancy, as well as the quality of life, is dependent upon our lifestyle.

"Life expectancy does not only mean length to life, but also quality of life. It doesn't count how old one will become but how one will become old" (Schaefer, 1975)

2. Results of empirical research on the conditions of longevity

2.1. Methodological approaches

First some remarks regarding methodological problems:

2.1.1 Single case studies

Various methodological problems arise in answering the question of causes and determinants of longevity. One of these problems lies in the generalization from single cases of nonagenarians or centenarians. Most of these cross-sectional comparisons describe differences between long-living and short-living people, but do not answer the questions regarding functional or causal determinants.

2.1.2 Study of centenarians

But during the last decade there are some scientific studies on centenarians, undertaken in various industrialized countries as well as in less developed countries: e.g. in the Federal Republic of Germany Franke et al. (1970, 1971, 1972, 1973, 1979, 1981); in Hungary Haranghy et al. (1965); in Japan Oikawa et al. (1981), Suzuki et al. (1981), Masazuki et al. (1981), Sakugawa et al. (1981); in Bulgaria Lambrev

(1951); in Pakistan and Ecuador Nagahor (1981); in Korkushko (1981). The data basis for all these studies was gathered by a large variety of methods and instruments: e.g., medical and clinical data; analysis of the family doctor's records and reports on the individual; ecological data such as occupation, life satisfaction, stressful life events, eating and drinking habits; categorized informations yielded by intensive interviews and explorations of the nonagenarians and centenarians as well as interviews of family members, friends and acquaintances.

Summarizing the most important findings from these studies we can say: life conditions of a middle altitude (1000-1500m) seem to correlate with longevity; in addition, certain occupational types seem to be favorable — such as farmer, gardener, fisherman and also soldier, that is, occupations which have in common only the fact that they are to a great extent outdoor activities and require certain muscular exertion (Felstein 1973) —, with the intervening variable of occupational satisfaction (Palmore, 1970; Felstein, 1973).

The biographical analyses of 217 centenarians (Franke et al. 1973) also demonstrated the significance of the variable "lifelong engagement in hard work" in intellectual as well as in physical fields, for teachers or college professors as well as for craftsmen, farmworkers, or housewives.

Another characteristic of centenarians demonstrated by the investigations is a low degree of emotional tension, but not at all an exemption from stressful life events. In regard to eating habits, low calory food as well as protein rich and low fat food seem to be

favorable for high longevity. For the smoking and drinking habits the findings of various heterogeneous samples of centenarians do by no means demonstrate the abstinence that could have been expected. Temperance in regularity was also characterized for sexual behavior. In all of the above named behavior fields it is necessary to take into account the confounding influence of genetic factors.

In any case — and despite some methodological shortcomings — the findings yield strong evidence for the importance of a favorable combination of endogeneous and exogeneous factors for longevity. The hereditary disposition, however, especially the genetic influence of the mother seems to be the *conditio sine qua non* (Franke, 1977, 1978).

A general problem of centenarian studies in some countries is the great difficulty connected with the accuracy of self-reported age (Nedveden, 1974, Nagahori, 1981, Mazess & Forman, 1979).

This is not the case in a study on 50 centenarians we have just finished (Terinde, 1988). Most of these centenarians showed a high degree of interest and mental flexibility. The physical mobility was poor in only 25% of the cases. But the bedridden women and men were also alert and mentally flexible. At this advanced age there was a high degree of interindividual variability. With regard to social competence almost half of the sample belong to a cluster labeled as "very active and socially involved centenarians even in the presence of moderate physical inability." One sixth of the sample included physically and mentally very able and active centenarians. Another

group included mentally very active, but physically disabled centenarians and one fifth were physically disabled and mentally passive

2.1.3. *Analyses of statistical and demographic data*

Other approaches to longevity studies are given by analyses of vital statistical and demographic surveys (see Rose & Bell, 1971). Genetic factors, that means ages reached by grandparents and parents, show some relationships. But here we have to ask the critical question, whether longevity in certain families was primarily determined by genetics or whether commonly experienced environmental factors are to be implicated. Analyses of demographic data also show a correlation between family status and longevity, and also between socioeconomic status (qualification of occupation) and longevity (references see LEHR, 1982).

Recent scientific discussions concerning longevity are based on biological and physiological cross-sectional studies. Despite the dominance of medical and biological factors, there is no doubt, on the one hand, that biographical, psychological, social, economic, and ecological factors are of influence, and there is no doubt, on the other, that longitudinal studies are needed. A set of lifestyle patterns, but no single factor, could be directly related to longevity. Therefore an intensification of interdisciplinary approaches will be required in view of the causation or correlates of longevity, as well as the practical consequences resulting from increased life expectancy for almost every aspect of life. Inevitably, these consequences will bring about changes not only for the individual himself, for the family life and family relations (from 3- to 5-generation families), for the health-care system, but also for the labor market, for retirement and pension policy (two generations in retirement-age), the economy, and, last but not least, for the

social welfare system — consequences which were discussed at the UN-World-Assembly on Aging in Vienna in 1982.

2.2 *The longitudinal approach in longevity research*

There are many methodological approaches in empirical research on psychosocial determinants of longevity: singlecase-studies, studies of centenarians, analyses of statistical and demographic data — and, last not least, the longitudinal approach. The comparison of “survivors” and “non-survivors” in longitudinal studies at the first measurement point seems to be the most promising approach.

It can be stated that carefully controlled and wide-ranging longitudinal studies which pay as much attention to biological, physiological, and medical aspects of human development as they do to the social and psychological aspects' additionally taking into account historical, biographical, and ecological data, can contribute to an understanding of the determinants of longevity and psychophysical wellbeing in old age

The term “longitudinal study” encompasses a variety of different types of repeated measurement studies. The main differences involve the number and spacing of measurement points, range of variables under study, and assessment instrumentation. These differences in longitudinal studies go, of course, along with the size of the sample of subjects under study: the more intensive, basic, comprehensive and longer-lasting the study, the fewer the number of subjects. But all these different types of longitudinal studies contribute to research on determinants of longevity, insofar as they are based on multiple data of long-living persons or “survivors” and also offer the data of “nonsurvivors,” that is, of persons who died within the duration of the

study. It was primarily the sophisticated method — and the data basis — of the longitudinal studies which made it possible to obtain scientific evidence for socialpsychological and psychological correlates of longevity because the researcher now got the opportunity to compare the “input data” at the beginning of the longitudinal study of persons who participated in all of the subsequent measurement points (“survivors”) with the “input data” of persons who died after a certain measurement point (“nonsurvivors”).

2.2.1 *Drop-out studies*

This line of research on the determinants of longevity was originally motivated by one of the major methodological problems and challenges faced by every longitudinal study: the problem of analyzing as accurately as possible the “drop-outs” — that means the original sample at the beginning of the study and the reduced sample at the end of the study — to answer the question of comparability of the sample of the first or the 5th or 6th measurement points. Thus you can find the typical characteristics of the “drop-outs” (that means cases who did not participate in subsequent measurement points). But not all of the drop-outs are real “nonsurvivors”; only a portion of them were claimed by death (here we have an “experimental mortality”).

2.2.2 *“Survivor-nonsurvivor”*

But the large-scale gerontological studies in the United States which were initiated in the late 1950's as well as the BOLSA, started in 1965, have by now been subjected to a first analysis in regard to a comparison between “survivors” and real “nonsurvivors” (and not generally “drop-outs”). Summarizing the results of the different studies (references see LEHR, 1982) the initial measurement points yield strong evidence for the following characteristics of the survivors: higher

activity, higher complexity and variability in everyday life activities, a more extended future time perspective, a more positive mood, and more involvement in social contacts. In addition, longevity seems to correlate with more years of schooling, with a profession of higher reputation and greater engagement in occupational activities, with higher socio-economic status, and — at least for the male samples — higher intelligence

2 2 3. "Longevity index" and "longevity quotient"

Another methodological approach in the analyses of longitudinal data was proposed by Palmore (1971), who has introduced the terms "longevity index" (LI) and "longevity quotient" (LQ) in his analyses of Duke-study data (Palmore, 1969, 1970, 1971, 1974).

The longevity index (LI) represents the total number of years from the subject's entry into the initial study to his/her death. For living subjects, the index is the number of years from initial examination to the sixth examination plus the expected number of years remaining at the time of the sixth examination plus the expected number of years remaining at the sixth examination based on the actuarial life expectancy table (U S. Public Health Service 1966). The longevity quotient (LQ) is the ratio between the longevity index and actuarial life expectancy at the time of the initial examination. A longevity quotient greater than one means that the individual lived longer than expected; a longevity quotient of less than one means that he did not live out his life expectancy.

2 2 4. "Typical decline" and "terminal drop"

Some of the well-known longitudinal studies that investigated determinants of longevity also raised the question whether or not there is specific change or typical de-

cline or "terminal drop" in physiological, psychological, or social functioning shortly before death (Wilkie & Eisdorfer, 1974; Jarvik & Blum, 1971). But here we have to criticize the fact that until now terminal changes have been studied primarily with regard to intellectual functioning; other psychological variables have to be included, 1979, Faulkner et al. found increasingly negative self-concept, decreasing life-satisfaction and decreasing social interaction scores and decrease in activity for persons close to death.

To summarize, longitudinal studies may contribute to questions of longevity and psychophysical wellbeing in old age:

1. by comparisons of "survivors" and real "nonsurvivors" not generally "drop-outs" at the first measurement point;

2. by comparisons of the original data of persons with higher and lower longevity indices and longevity quotients;

3. by comparisons of persons who died between 60 and 70 and others who died between 70 and 80 or 80 and 90 years of age;

4. by answering whether or not there is a typical decline or "terminal drop" shortly before death.

Furthermore, it must be stated that carefully controlled and wide ranging longitudinal studies can identify variables which may presage impending death.

2 3. The Bonn Longitudinal Study on Aging (Bolsa)

The Bolsa was started in 1965 (see Thomae, 1976, 1983; Lehr & Thomae, 1987) and included originally 220 men and women in the following periods: born 1890-95 and 1900-1905.

During the 15 years of investigation (1965/66 to 1980/81) a "normal" reduction of this sample was given. During the last measurement points our 51 subjects were 76-81 and 86-91 years of age. At the seven measurement points a large set of demographic, so-

cial, psychological, and medical variables was assessed, adding up to about 1,000 items per person and measurement point. These data were obtained from a weekly testing program (including very extensive interviews, intelligence and personality tests) and about 200 items from a medical screening program (mainly under the aspects of internal medicine), which included a more "general health rating," i.e., a global score for the "objective health status."

2 3 1. "Survivors" and "non-survivors"

If we compare the original data of these persons who survived and participated at the last measurement point with those who had died during the previous 15 years, we could find a number of considerable differences already evident at the first measurement point in 1965. Here the importance of the subjective health status (as perceived by the individual) may be emphasized, with highly significant differences between the two groups, while the objective health status (as rated by a physician) in this — relatively healthy — sample did not have any predictive value. We only can state that at the first measurement point non-survivors had more sclerotic symptoms and lower auditive capacity. There was no difference, however, in respect to the physician's rating of general health, cardiovascular insufficiency, vision and the degree of mobility. But in interviews regarding the present life situation and the daily round, survivors expressed more concern about their health (more "active coping styles") than did non-survivors, who reacted in a more depressive or aggressive way to their health problems.

On the one hand, the survivors 15 years ago were more concerned about their health, but, on the other, they also had a more positive feeling concerning their health status and got higher scores in "subjective health."

The "subjective health-status" of 1965 was the best predictor of longevity. Positive subjective health was not correlated to mental test scores (as the "objective health status" did), but highly related to many personality variables: those who perceived themselves as more healthy (mainly the group of the survivors) in 1965 rated as more active ($p 0.002$), had a better mood ($p 0.003$), were more secure ($p 0.001$) and more responsive ($p 0.087$). Future time perspective was also related more to subjective than to objective health.

Comparing the 1965 data on survivors and nonsurvivors we can find some differences in the verbal scores of intelligence tests and better psychomotor performances in the group of survivors. While survivors and nonsurvivors did not differ significantly in terms of general social participation at the first point of measurement, the survivors had more extrafamilial role activity and showed an increase of these scores during the time of observation and at the same time a decrease of family role activity; the nonsurvivors (1965) had more innerfamilial role activity (mostly correlated with a lower degree of satisfaction with this role activity), which increased during the following years, but a significantly lower score in extrafamilial social role activity, which decreased to the end of life. However, survivors had a higher "feeling of being needed" than nonsurvivors.

2.3.2 Longevity quotient and longevity index

Comparing persons with a longevity quotient lower than 1.25 (the group of "short-living persons," which also had a longer life than the average of the population with a LQ of 100) and persons with a longevity quotient higher than 1.25 ("long-living-persons"), we found that short-living-persons at the beginning of our study differed significant-

ly regarding:

- 1) lower degree of satisfaction with the present life situation;
- 2) lower degree of the "feeling of being needed";
- 3) higher scores of rigidity and dogmatism (Riegel-scale);
- 4) more negative mood;
- 5) more involved by reduction of range of social contacts.

In the male group a lower LQ was correlated with family status: single (widowed and divorced) men more often belonged to the short-living group, married men to the long-living group. This is not true for the female group: to the short-living female group belong more married women; to the long-living female group belong 62% single and 38% married women.

Men, living in one-person-households belong to the short-living group (90%), but women, living in one-person households mostly belong to the long-living group (61%).

We also found differences in the social and ecological situation: LQ lower than 1.25 correlated with lower SES, lower income, and a higher degree of stress in the spouse role, also with a lower degree of activity. LQ 1.25 or more is correlated with higher SES, higher scores in some intelligence-tests, higher activity, higher scores in "feeling of being needed," more positive mood. There are no differences in perceived stress situations between these groups, but persons with a LQ over 1.25 have had significantly more active coping styles.

In the female group a higher LQ is correlated with satisfaction in the area of former occupation, also with satisfaction with the present housing situation. In the male group there are no differences regarding occupation and housing situation. A lower LQ ("short"-living persons) is related to lower vital-capacity and to higher weights in the female group and hearing problems in the male group.

Men and women with a LQ lower than 1.25 had higher activity in the parent role (7.62 to 5.81 by persons with LQ more than 1.25), and —

but only in the female group — higher role activity in the grandparent role (7.25:4 by women with LQ more than 1.25). There are some more specific data which show clearly the sex-role specific correlates of longevity.

Summary and conclusions: the multidimensional determinants of longevity

As this paper has made apparent, the many findings on longevity correlates point to one major conclusion: no single variable can independently explain longevity. As influential as genetic and physical factors may be and emphasizing biological factors, they do not suffice as exclusive determinants of longevity.

The results of recent international longevity research point to a number of interesting relationships. And yet, considering the present state of research, it still seems premature to derive theories or even lawful relationships which may be related to long life expectancy. And what must receive primary consideration is the fact that a series of factors that can possibly influence increased life expectancy interact with each other and seem to be part of a complicated reciprocal causal network.

A possible model for these interacting influences upon longevity is provided in Figure 1.

Genetic, physical, and biological factors can be regarded as having a direct influence upon longevity (1) and also upon the personality development (2) of an individual (intelligence, activity, morale, adaptation, self-esteem, etc.). Personality development, moreover, is determined by socialization processes: child-rearing methods, the teachers, significant others, and the social environment in general determine the experience and behavior of an individual; historical factors also play a role in this process (3). In addition, ecological conditions have an impact on personality develop-

ment(4). A number of studies have determined direct connections between personality and longevity (5) Correlations between ecological factors and longevity (6) are frequently referred to in studies of centenarians (see section 4 of this review). Personality variables, on the other hand, have an impact on education and occupational training, on occupational activities, and on socioeconomic status (7). Correlations between social status and longevity (8) have been determined primarily from vital statistics and demographic analyses (see section 3 of this review) and have been further corroborated by follow-up and longitudinal studies finding increased life expectancy for persons with high socioeconomic status (SES).

Social status (9) and personality (10), as well as ecological factors (11), influence nutritional habits. Moreover, a direct correlation between nutrition and longevity (12) is

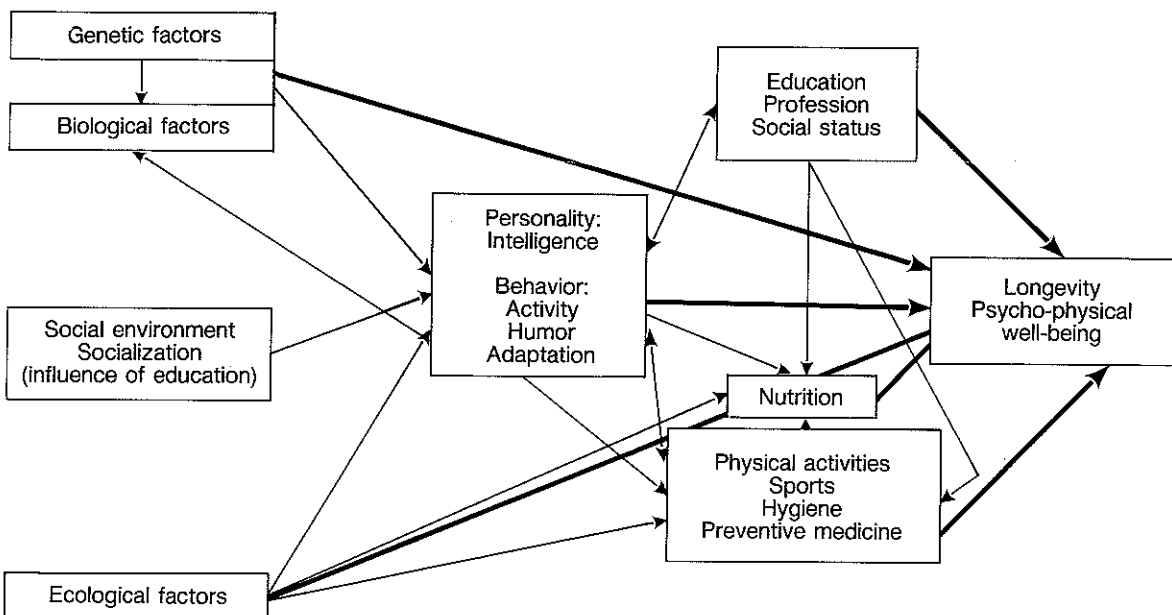
claimed to exist, especially by studies on "macrolongevity" among centenarians (see section 4). However, many problems remain to be addressed, since most of the conclusions about human nutritional requirements have unfortunately been extrapolated from experimental work with lower mammals, especially the albino rat. Undernourishment and overnourishment as well as chronic malnutrition are important factors in sharply limiting survival; obesity has been correlated with high mortality rates. The effects of aging on spontaneous activity may contribute to overnutrition and further accelerate aging. Increased activity may retard aging; in any case, there seems to be an experimentally demonstrated correlation between nutrition and activity. In addition, the role of nutrition for diabetes in relation to age and nutritional aspects of stroke and atherosclerosis ought to be mentioned. It is clear that the

longevity of the atherosclerotic, the diabetic, and the stroke patient is reduced. Smoking and the use of alcohol must also be mentioned; when indulged in excessively, they considerably raise mortality rates.

Genetic and biological factors (13), personality (14), ecological variables (15), and socioeconomic status (16) preventing medical care and hygiene. Correlations of the latter variables with longevity (17) have also been demonstrated.

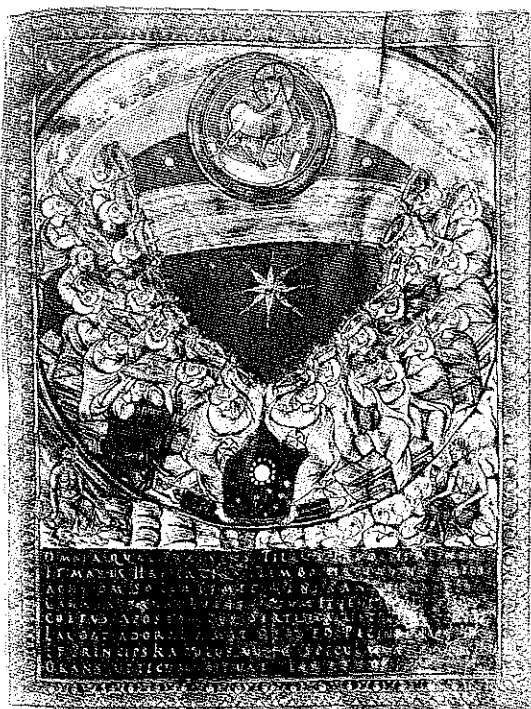
Our model by no means includes all variables that may possibly influence longevity. It is merely meant to stimulate further empirical studies which will critically reexamine the relationships described in this review and to provide encouragement for future modification, elaboration, and differentiation.

CORRELATION BETWEEN PSYCHOPHYSICAL WELL-BEING AND LONGEVITY



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Ethical Aspects of the Third Age

Monsignor DIONIGI TETTAMANZI

Rector of the Lombard Pontifical Seminary
Professor of Moral Theology at the Gregorian University

Introduction

I shall start from a statement by St. Thomas which is quite simple and luminous: *Idem sunt actus morales et actus humani* (Moral acts and human acts are identical).¹

This assertion defines what ethics is: *ethics concerns man as such*, and thus not under any particular aspect among many, but under all aspects, and, moreover, taken in their deepest root, where the very truth of man is found. The path of ethics is admirably described by St. Augustine in his *Confessions: Et direxi me ad me et dixi mihi. Tu quis es? Et respondi: Homo.*² It is a matter of knowing the truth about man, but also of embodying it in life. It is, then, "doing the truth" in freedom and responsibility.

The intimate and living link between anthropology and ethics, between the vision of man and ethical commitment, thus emerges immediately. This is a fundamental point, for the diverse visions of man logically lead to different ethics. This takes on a very special prominence in today's cultural context, characterized by an exasperated anthropological pluralism, often expressed in visions of man which are not only profoundly divergent, but even mutually contradictory and irreducible.

From the anthropology-ethics link derives the fundamental criterion for discerning good and evil: the criterion lies in the *personal dignity of man*. Good resides in recognizing man's personal dignity — that of each and every man; evil lies in its disavowal. Personal dignity is in fact precisely the *specificum* of the human being with respect to other, subhuman beings.

This may appear to be a

commentary far removed, too far removed, or even foreign to our topic. It is quite the opposite: it is the only line of discussion capable of introducing itself into the decisive core of the ethical aspects of the third age and the elderly.

Let us take the ethical aspects back to a threefold essential assertion: 1) the elderly are persons as well; 2) the elderly must also be persons and increasingly become persons; 3) the community must place itself with and for the elderly.

I. The Elderly Are Also Persons

It would seem superfluous to affirm that "the elderly are also persons," since it is obvious and taken for granted. But the statement is obvious and taken for granted only among those professing an *ontological and rational anthropology*, i.e., an anthropology rooted in man as he is, in his objective reality, which reads man's values and exigencies in the light of reason and makes use of critical or mature rational reflection.

But the assertion that "the elderly are also persons" proves problematic, arguable, and is to a certain extent contested and in fact rejected by those professing a *phenomenological and cultural anthropology*, i.e., one regarding man as he appears in our society and as he is judged by our dominant culture, which indeed tends to eliminate the objective ontological datum and replace it with a subjective one — concretely, the datum of man wishing to be and considering himself the creator of himself; however, he ends up handing himself over — to the point of becoming a slave (he,

the creator!) — to the "values" (?) of *possession, power, and pleasure*.³

It is not hard to perceive that this last anthropological perspective is by its nature *discriminatory, selective*: it chooses some and marginalizes others — it chooses those having, those able, those enjoying and rejects those not having, those unable, those not enjoying.

The application to the "planet of the old" is immediately made: a great many of them are not among those having, able, and enjoying, so that their fate is one of *marginalization*. A student of the "elderly condition" in our society writes, "Their status, after the gratifying parenthesis of *social gerontocracy*, is returning to the phase of the *nomad populations*, in which the old were left to perish alongside the trail the tribe was following. In those periods, their uselessness for the ends of tribal survival was so evident that one less mouth to feed and one less delay were regarded as more functional and positive for the purposes of group life. Their "defect" as aged people has repercussions today on their defect as a "condition," since standard cultural models must justify social decisions, which force the elderly to make themselves scarce, to hide in their private lives, not to constitute a problem for others. Here we find an exhaustive explanation for the "conspiracy of silence" weighing upon the elderly and their problems and the disconcerting superficiality with which "presumed" remedies receive periodic publicity — they are said to be suitable for eliminating the estrangement and marginalization of the old."⁴ A society and culture placing the trinomial production-consumption-

prof-it as the foundation of existence are inevitably led to evaluate people no longer for what they are, but for what they have and produce: in such a society the elderly state can only assume the form of a "marginalized condition."

It is utterly necessary to go back to the roots of the person to rediscover what is common to all, what is absolutely equal to all: the very *being* of the person. In this being the personal dignity of each and every individual is grounded and develops. There is no other datum which can be defended as common and equal in each and every one. It is what has been traditionally termed "nature," in our case "human nature," proper and specific to the human being, the human person.

Now, this "human nature" is proper to every phase or period of the person's existence, from the first instant to the last, i.e., from the instant of conception (when the first human features have not yet appeared) until the end (which is sometimes consummated in bodies and spirits which seem to have lost even the slightest trace of humanity). This "human nature" is thus found as well in every life condition of the person, not only in the vigor of psychic and physical forces, but also in their more or less serious decline. Hence the appeal of Holy Scripture in Ecclesiasticus: "My child, support your father in his old age; do not grieve him during his life. Even if his mind should fail, show him sympathy; do not despise him in your health and strength" (Si 3:12-13)

The personal dignity of each and every human being is rooted in the inexhaustible fount of absolute Being, of God: man, in fact, as the first page of the Bible reminds us, has been created in the image and likeness of God (cf. Gn 1:26-27). For this reason, the *inviolability of the human being in his personal dignity must be termed a mysterious and real participation in the very inviolability of God*, of whom man is a living image. In this precise sense the Vatican document on bioethics,



Donum Vitae, expressed itself: "The inviolability of the innocent human being's right to life 'from the moment of conception to death' is a sign and an exigency of the very inviolability of the person, to whom God has made the gift of life."⁵

It follows that an offense to the person, as a violation of his dignity, resolves itself into an offense to God, to him in whose image the human person has been created. Furthermore, God himself, according to the explicit words of the Bible, intends to take up the defense of human life: "And I shall demand account of your life-blood, too. I shall demand it of every animal, and of man. Of man as regards his fellow man, I shall demand account for human life. He who sheds the blood of man, by man shall his blood be shed, for in the image of God was man created" (Gn 9: 5-6).

In this perspective both the recognition and disavowal of the inviolable personal dignity of every human being — and, therefore, of the elderly as well — possess not *only an ethical, but also a typically religious meaning*: they are either an offer or a refusal to glorify God in his creature.⁶

II. The Elderly Must Also Be Persons and Increasingly Become Persons

This assertion, perhaps less common and habitual, seeks to call attention to the *dynamic aspect of personal dignity* in man. Certainly, personal dignity is a *datum* which is proper to the person always and in any condition — from the first to the last instant of existence, in the states of health and illness. Man is always a person and in every condition enjoys his personal dignity. Moreover, this personal dignity is itself also and specifically a *task* entrusted to man — it cannot be otherwise if man is a conscious, free being responsible for his self-realization.

In creating man in his image and likeness, *God entrusts man to man himself*; to him

he entrusts the realization — prior to external works: dominion over the earth (Gn 1:28) — of the inner work of “becoming what he is” (self-mastery). Once again St. Thomas shows himself to be ever so incisive and effective in presenting this truth in the light of man as a living image of God. To be in the image of God means to be enriched with reason and freedom, it means having self-mastery; it means holding one’s self in one’s hands (*per se potestativum*).⁷ And, in addition, man, precisely because he has been created in the image of God, is subject to God’s providence in a more excellent way than all the other creatures; i.e., he becomes a participant in providence inasmuch as he provides for himself and others.⁸

It is in this sense that we can and must speak of an *increase in personal dignity*: an increase in that it is progressively recognized and realized responsibly.

But what is the concrete meaning of “The elderly must also be persons and increasingly become persons”? The answer depends on the progressive realization of the essential givens of the person, which may be brought back to the specific values and demands of “communion” and “donation.” As the Holy Father recently recalled in the Apostolic Letter *Mulieris Dignitatem*, the capacity for relation is an intrinsic and essential characteristic of the person as a living image of God: “We read... that man cannot exist ‘alone’ (cf. Gn 2:18); he can exist only as a ‘unity of two’, and thus in relation to another human person... Being a person in the image and likeness of God, then, involves being in relation as well, in relation to another ‘I’.”⁹ The fruit and sign of relation is communion, which in turn depends on mutual donation.

Precisely along these lines the Second Vatican Council expressed itself in the Constitution *Gaudium et Spes*, which offers a kind of “definition” of the human person by resorting explicitly to the

double and unitary category of communion and donation: “The Lord Jesus, when praying to the Father that ‘all may be one’ (Jn 17:21-22), placing before us horizons inaccessible to human reason, has suggested to us a certain similarity between the union of the Divine Persons and the union of the children of God in truth and charity. This similarity manifests that man, who is the only creature on earth God has wanted for himself, cannot find himself fully except through a sincere gift of himself.”¹⁰

As we know, a similar consideration of the person continually reappears in suggestive categories in the long catechesis by John Paul II on the “theology of the body,” particularly in stressing the *nuptial meaning of the human body*, the sign and “place” of the person, who enters into communion with others and donates himself to them. In an address on January 9, 1980, he stated, “The gift reveals, so to speak, a particular characteristic of the person. When Yahweh says that ‘it is not good for man to be alone’ (Gn 2:18), he affirms that ‘by himself’ man does not realize this essence completely. He realizes it only by existing ‘with someone’ and even more deeply and thoroughly by existing ‘for someone’.” And in the address of January 16, 1980: “The human body, with its sex, and its masculinity and femininity, seen in the very mystery of creation, is not only a source of fecundity and procreation, as in the whole natural order, but contains ‘from the beginning’ the ‘nuptial’ attribute, i.e., the capacity to express love: precisely that love in which man the person becomes a gift and — by means of this gift — effects the very meaning of his being and existing.”

The person is a being “with” others and “for” others. For this reason he has the task of maturing in his personal dignity by maturing his being “with” others and “for” others.

And this can and must be said of every person, including the elderly.



This means that ethical commitment not to yield to the temptation, on the one hand, to marginalize oneself and to cultivate, on the other — though on occasion in different modalities and times — his own inclusion and participation in community life, both ecclesial and civil.

1) Ethics demands, above all, the *rejection of self-marginalization*. Not long ago I mentioned the unjust tendency of today's society and culture to marginalize the elderly, forcing them into isolation, the loss of roles, and a drop in status, that is, in prestige and social significance.

This is clearly unjust, as I shall shortly repeat. But it is no less unjust for the elderly to marginalize themselves. We can and must certainly understand the weariness — which for some of the aged is insurmountable — in continuing to be present in social and cultural contexts whose rate of development is too rapid and which by nature marginalize those unable to “keep the pace.” It should, moreover, be acknowledged not only as legitimate but proper to leave positions and tasks in both the family and society when these responsibilities demand youthful forces and new competence. In this respect, the biblical episode of eighty-year-old Barzillai the Gileadite is most beautiful. He follows King David, forced to flee from the rebellion of his son Absalom. After his son's death, before returning to Jerusalem, David wishes to repay those who have helped him. He also addresses Barzillai, saying, “Come with me, and I will provide for you at my side in Jerusalem.” But Barzillai replies, “How many years have I left to live, for me to go up to Jerusalem with the king? I am now eighty years old; can I tell the good from the bad? Has your servant any taste for his food and drink? Can I still hear the voices of men and women singers? Why should your servant be a further burden to my lord the king? Your servant will go a little way across the Jordan with the king; but why should the king reward

me so generously for that? Please allow your servant to go home again, so that I can die in my own town near the grave of my father and mother. But here is your servant Chimham; let him go with my lord the king. Treat him as you think right” (2 S 19:32 seq.).

What is not ethically admissible, however, is behavior by the elderly which on principle involves renunciation, usually rooted in and fueled by the conviction that one is useless or, indeed, a weight on family and society. Such behavior can be overcome only if and in the measure in which the elderly maintain their inclusion and continue their participation in the life of society, through those modalities which are appropriate and most in keeping with their age.

2) We thus encounter the positive aspect of the elderly's ethical commitment: be always and increasingly become a person, i.e., *an active and responsible subject*. This demands the rediscovery and exploitation of the “gifts” or “talents” proper to the elderly. Like all people, the elderly must live out the *logos* and *telos* of their being “with” others, that is, their being “for” others. Man, in fact, “cannot find himself fully except through a sincere gift of himself.”¹¹

Particularly rich and stimulating — and still quite up-to-date — is the biblical message on the “resources” of the elderly within and at the service of the People of God. In addressing the elderly at Monaco in Bavaria on November 19, 1980, John Paul II admirably summarized the biblical datum: “Old age deserves our respect, the respect shining forth in Holy Scripture when it places Abraham and Sarah before our eyes, invites Simeon and Anna to go to the Temple to encounter the Holy Family, calls priests ‘elders’ (Ac 14:23, 1 Tm 4:14, 5:17-19, Tt 1:5, 1 P 5:1), sums up the homage of all creation in the worship of the twenty-four elders, and, finally, designates God himself ‘the Ancient One’ (Dn 7, 9:22). Could a



more splendid hymn of praise for the dignity of the elderly be offered up?"¹²

I am especially struck by the calling of Abraham and Sarah in the Old Testament and of Simeon and Anna in the New. It is an invitation to reflect, particularly on God's way of acting: to carry out his saving designs God even makes use of persons who, in view of their age, could consider their mission over. It is divine logic, which leaves man disconcerted and which the apostle Paul describes as follows in his First Letter to the Corinthians: "God chose those who by human standards are fools to shame the wise; he chose those who by human standards are weak to shame the strong, those who by human standards are common and contemptible — indeed those who count for nothing — to reduce to nothing all those that do count for something, so that no human being might feel boastful before God" (1 Co 1:27-28).

The call of Abraham and Sarah, Simeon and Anna also invites us to be particularly attentive because the main part of the mission entrusted to us by God may sometimes be totally reserved for old age. In this sense, old age is a period in life which is not only equally valuable, but even more precious than those preceding it.

Life must thus be fully and responsibly exploited at every age until its close. In this regard, the psalmist prays, "Teach us to count up the days that are ours, and we shall come to the heart of wisdom" (Ps 90:12). And Ben Sira warns, "Call no one fortunate before his death; it is by his end that someone will be known" (Si 11:28). If old age is involutorial from a biological standpoint, from a spiritual one — and more profoundly so in relation to the Spirit — old age is evolutionary. Advanced age, then, can be verdant, in contrast to the illusory youth of the wicked. This is the suggestive contrast of Psalms 92 and 37: against the backdrop of the fragile budding of the wicked, who will quickly be uprooted

forever (Ps 92:8), the flowering tree of the just rises towards heaven: "The upright will flourish like the palm tree, will grow like a cedar of Lebanon. Planted in the house of Yahweh, they will flourish in the courts of our God. In old age they will still bear fruit, will remain fresh and green, to proclaim Yahweh's integrity" (Ps 92:12-15). In his address to mark the Jubilee of the Elderly, the Pope stated, "According to the divine project, every human individual is a growing life, from the first spark of existence until the final breath. The program for continuous development projects itself upwards, towards the stirring imitation of the very perfection of God."¹³

"In old age they will still bear fruit" What fruit? The Bible, even in the Old Testament, seems to recognize a typical "charism" of the elderly in the People of God rendering them "dispensers of wisdom," as Ben Sira recalls: "How fine a thing: sound judgment with gray hair, and for graybeards to know how to advise! How fine a thing: wisdom in the aged, and considered advice coming from people of distinction! The crown of the aged is ripe experience, their glory, the fear of the Lord" (Si 25: 4-6). "Wise" in the Bible has a very precise meaning: it refers to one who, having experienced in himself and throughout the various circumstances of life on how to effect the synthesis between the demands of God regarding man and the concrete human reality with all its fragility, "can show (and must show in practice) by his life and counsel how such a synthesis is achieved."¹⁴ The biblical wise man possesses the "wisdom of life," the "wisdom of the heart." Of course, the elderly's task as masters of life was amply justified by the farming and handicraft structure of Israel and by a culture grounded on faithfulness to tradition. Today, however, modern technical-scientific structures abundantly simplify the elderly's role in the field of science. And yet their sapi-



ential role is not at all exhausted: in a certain sense, it is even more urgent in a society whose technocratic development threatens to compromise it in its authentic human values. Cardinal Giovanni Colombo writes, "Over the span of many years And yet their sapiential role is ly's role in the field of science. And yet their sapiential role is not at all exhausted: in a certain sense, it is even more urgent in a society whose technocratic development threatens to compromise it in its authentic human values. Cardinal Giovanni Colombo writes, "Over the span of many years the elderly person has gradually accumulated a rich patrimony of experiences: experiences of work and experiences of life. The swift technical progress of our time may have superseded the former, rendering them anachronistic and nearly useless but the life experiences remain always as an up-to-date, substantial treasure." ¹⁵

John Paul II spoke in the same sense in the aforementioned Monaco address: "Old age is the crowning of life's stages. It bears the harvest of what has been learned and experienced, the harvest of what has been done and attained, the harvest of what has been suffered and borne. Like the end of a great symphony, life's dominant themes return for a powerful sonorous synthesis. And this concluding resonance confers wisdom ... Wisdom confers distance, but not a distance of estrangement from the world; it enables man to raise himself up above things without disdain; it makes us see the world with the eyes and heart of God." ¹⁶

III. The Community Must Place Itself with and for the Elderly

The elderly are also persons; the elderly must be and increasingly become persons. This is a given and a task in regard to each elderly person in his uniqueness and singularity. We are not, however, faced with an individualistic problem. In reality, the problem takes on an *essential social dimension* on

an ontological and ethical level.

On an *ontological* level, above all: the human person is a social being, for the self is a living relation to the other, called to enter into communion with the other and give itself to the other. As *Gaudium et Spes* states, it follows that "the perfecting of the human person and the development of society itself are mutually interdependent." Man needs society to live, just as, *Gaudium et Spes* continues, "the principle, subject, and end of all social institutions is and must be the human person, as the one who by his nature needs society to the greatest extent." ¹⁷

Ethically, on the one hand, the human person, to be and grow in his identity and personal dignity, must open himself, take his place, and participate in the life of society; on the other, society must help the human person to grow by offering him the necessary means. In this perspective, the principle of reciprocity in *rights and duties* should be stressed, not only in the individual, but in relations between the person and society: if the elderly have rights to claim and duties to perform with respect to society, society as well is burdened with specific responsibilities to the elderly."

What are the responsibilities of society (or, in more concrete terms, of the "community," if we understand thereby both the Church and civil communities)? These responsibilities may be summarized in carrying out *effective recognition* that the elderly are also persons and that the elderly must be and increasingly become persons. This means:

- * negatively, *combatting the varied forms of marginalization* to which the elderly subject themselves and, even more so, are subjected by others;

- * positively, *exploit the situation of the elderly*, making it possible for them to attain their rights and perform their duties.

In this respect, we speak of a community which "must place itself with and for the elderly."

We thus enter into the sphere of education and social, cultural, and political action with and for the elderly, i.e., aimed

at defending and promoting their rights and duties.

It is not possible here to review the various *rights of the elderly*, particularly the civil rights which are not respected. After slightly over a decade, the document by the American Bishops of May 6, 1976 — significantly entitled *Society and the Elderly Towards a Reconciliation* — is still of interest, at once disturbing and stimulating. The document is structured into three parts, and the central one ("Human Rights and the Third Age") shows that the elderly are deprived of many human rights. The document lists and analyzes seven rights which among the elderly are not respected or at least seriously threatened: 1) the right to life, 2) the right to a decent income, 3) the right to work, 4) the right to medical care, 5) the right to sufficient nourishment, 6) the right to a suitable dwelling, 7) the right not to undergo treatment.

Others prefer to speak in terms of *needs*, legitimate and, unfortunately, largely unmet needs. These, in relation to our society and culture, may be formulated as follows:

- * the need for economic *autonomy* and movement in managing one's home and daily existence;

- * the need to remain rooted in one's life *environment* as an active member;

- * the need for worthwhile *human and social relations*, which is not the — erroneously presumed — need to "live with one's contemporaries" on which the "philosophy of socialization" at homes for the aged is grounded;

- * the need to be listened to, to express oneself, to have, in short, the chance for real *communication* with others;

- * the need to be *active* (Who invented the formula "old age = well-deserved repose"? Is this just because of an altered pace and level of efficiency in physical and psychic performance?);

- * the need to compensate for lost roles by taking on new ones and finding room for *participation*. ¹⁹

Since we cannot go into detailed analysis of these rights and needs, we shall limit ourselves to four brief points:

1) The responsibility of the community to place itself with and for the elderly pertains to everyone composing it and should be carried out *in solidum*: it is, in fact, a *specifically community responsibility*. This does not eliminate the fact that these grave responsibilities weigh upon certain *categories* of people in a particular way, such as families and social and government workers. As for the *family*, its task has been described as follows by John Paul II: "It is necessary to reconstruct the image of the family as a community of persons where, in the light of the Gospel message, the members of all ages live together, with respect for the rights of all: women, children, the elderly. It is necessary to construct the family as the richest and most complete school of humanity, in the communion of persons, in the sharing of joys and sufferings." We read in the *Letter on the Rights of the Family*: "The elderly have the right to find within their families — or, when this is not possible, in appropriate institutions — an environment which will enable them to spend old age serenely, performing those activities which are compatible with their age and put them in a position to participate in social life"; and, consequently, "families have the right to measures in the social sphere which take their needs into account, particularly...every time the family has to bear social burdens for the sake of its members because of old age..."²¹

This last statement brings out the typical responsibility of social and political workers, a responsibility which has become more serious and demanding today as a result of the complex shape the phenomenon of the elderly takes on in our society

2) Community responsibility involves not only civil society, but also, as is evident, the *Church community*, which can and must become active with and for the elderly in the originality of her mission and her resources. In this regard, the *evangelization of the third age* falls within the evangelizing mission of the Church, i.e., the

consideration of the elderly according to God's design, wherein there emerge with singular luminosity the elderly's personal dignity, their "charism" for the service they are called to render to the growth of the People of God, and their spirituality.

In this perspective, the "third age" represents a *necessary and unrenounceable part of the Church's pastoral action*, in addition to being in keeping with the indications of the apostle Paul and with the entire history of the Church herself and with innovations required by the development of society and culture. In the Church's pastoral approach with and for the elderly, we should also refer to a fundamental value and exigency which urgently need to be rediscovered, disseminated, and more deeply examined: the value and exigency of *spirituality* (of "life according to the Spirit") in the elderly

3) There has been repeated mention of community "with" and "for" the elderly. This phrasing seeks to avoid the danger of unilateral — indeed, deformed and deforming — intervention by a community regarding and treating the elderly as "objects," mere "recipients" of a series of services, sometimes imposed even against the will and, more radically, against the psychology of the aged. The older person is and must remain always and only a "subject," an active and responsible subject. In this sense, the end of community intervention by both civil society and the Church is *sharing with the elderly and promoting the elderly*, that is, recognizing and favoring the elderly's own *protagonism*. And this is an exigency not only of respect for the elderly's personal dignity, but also of fidelity to the finality and the very essence of community intervention (by civil society's "policy" and the Church's "pastoral ministry"), which is the good of the person, of each and every one. It goes without saying that the recognition and promotion of the elderly's protagonism produces benefits for the community itself, which is not deprived but enriched by the elderly's specific contribution.

4) Finally, we wish to call attention to the *particular seriousness of the moral problem* which, though only in terms of broad content, we have delineated. Moral theologians themselves, aside from certain rare exceptions, seem not to have even perceived the enormous lacuna in their scientific production.

In reality, in the "elderly condition," as it is regarded and treated by much of our society, a grave and evident social injustice — indeed, *one of the gravest social injustices* — should be acknowledged, for, as a moral theologian (one of those, "rare exceptions" we alluded to) writes, "This treatment is accorded people who have given civil society — and often the Church as well — decades of commitment, labor, sacrifice, and society is still enjoying the fruits" And he concludes with rigorous logic: "I feel it is superfluous to insist on the moral seriousness of this 'social sin'."²⁵

Now ethical commitment in the face of injustice is inseparably resolved by the clear and firm *denunciation of injustice* itself and concrete action aimed at *overcoming* it. The aforementioned moral theologian continues, "We are evidently in the presence of one of the most markedly anti-Christian aspects of our society and culture.

To humiliate, marginalize, and nearly trample on the socially weakest human beings, as the elderly as well usually are today, is in strident contrast to one of the fundamental demands of the Kingdom, which even in the Old Covenant sought instead to give these persons a special welcome, respect, and protection"

In this regard, the moral problem of the elderly condition today presents the traits characteristic of an *appeal for conversion*: in receiving, respecting, loving, and serving the elderly we find a fundamental requirement of the Kingdom of God.

In such a perspective, it is not irreverent to reformulate the words Jesus will pronounce on Judgment Day as follows: "What you did to the oldest of my brothers you did to me" (cf. Mt 25:40).

¹ ST THOMAS, *Summa Theologica*, I-II, 1, 3

² ST AUGUSTINE *Confessions*, X, 6

³ In such a simple and popular expression we find the biblical datum concerning the threefold concupiscence (cf. 1 Jn 2:16).

⁴ S. BURGALASSI, "La condizione anziana: Un approccio globale a livello antropologico e sociologico," in *Medicina e Morale* (1977), pp. 263-264

⁵ Congregation for the Doctrine of the Faith, *Instruction on Respect for Human Life in Its Origin and on the Dignity of Procreation* (February 22, 1987), Introduction, 4. The Instruction directly links the inviolability of the right to life to the inviolability of the person; furthermore, though indirectly, it should be linked to God, on whom the inviolability of the person depends (cf. the reference "to whom the Creator has made the gift of life").

⁶ In this regard, we have the celebrated phrase of ST IRENAEUS: *Gloria Dei vivens homo* (cf. *Adversus Haereses*, IV, 20, 7)

⁷ Quia, sicut Damascenus dicit, homo factus est ad imaginem Dei dicitur, secundum quod per imaginem significatur intellectuale et arbitrio liberum et per se potestativum: *Summa Theologica*, I-II, Prol.

⁸ Inter cetera autem rationalis creatura excellentiori quodam modo divinae providentiae subiacet, in quantum et

ipsa fit providentiae particeps, sibi ipsi et aliis providens: *Summa Theologica*, I-II, 91, 2

⁹ JOHN PAUL II, Apostolic Letter *Mulieris Dignitatem* (August 15, 1988), no. 7.

¹⁰ *Gaudium et Spes*, no. 24

¹¹ *Ibid*

¹² JOHN PAUL II, "Discorso agli anziani," Monaco, Bavaria, November 19, 1980, in *Insegnamenti di Giovanni Paolo II*, vol. III/2 (1980), p. 1368

¹³ JOHN PAUL II, "Discorso in occasione del Giubileo degli Anziani," March 23, 1984, in *Insegnamenti di Giovanni Paolo II*, vol. III/1, p. 744.

¹⁴ U. VANNI, "La parola di Dio, illuminante tutta la vita dell'uomo, che messaggio gli dà quando questi diviene anziano?" in *Gli anziani nella comunità ecclesiale* (Rome: AVE, 1978), p. 72

¹⁵ CARDINAL GIOVANNI COLOMBO, *La pastorale della terza età* (Milan, 1973), pp. 23-24.

¹⁶ GIOVANNI PAOLO II, "Discorso agli anziani," in *op cit*, vol. III/2 (1980), p. 1366

¹⁷ *Gaudium et Spes*, no. 25

¹⁸ The text may be found in *Le Documentation Catholique* (1976), pp. 365-369

¹⁹ F. CONTI, *L'immagine dell'anziano nella società*. Summary of the report presented at the training course for volunteers for the elderly (February 24, 1956), organized by Caritas Ambrosiana (typed issue)

²⁰ JOHN PAUL II, "Discorso ad aderenti alla Federazione Nazionale degli Anziani del Commercio e del Turismo" (April 29, 1982), in *Insegnamenti*, vol. V/1 (1982), p. 1365. See also the Apostolic Exhortation *Familiaris Consortio*, no. 27.

²¹ *Charter of Family Rights*, Art. 9

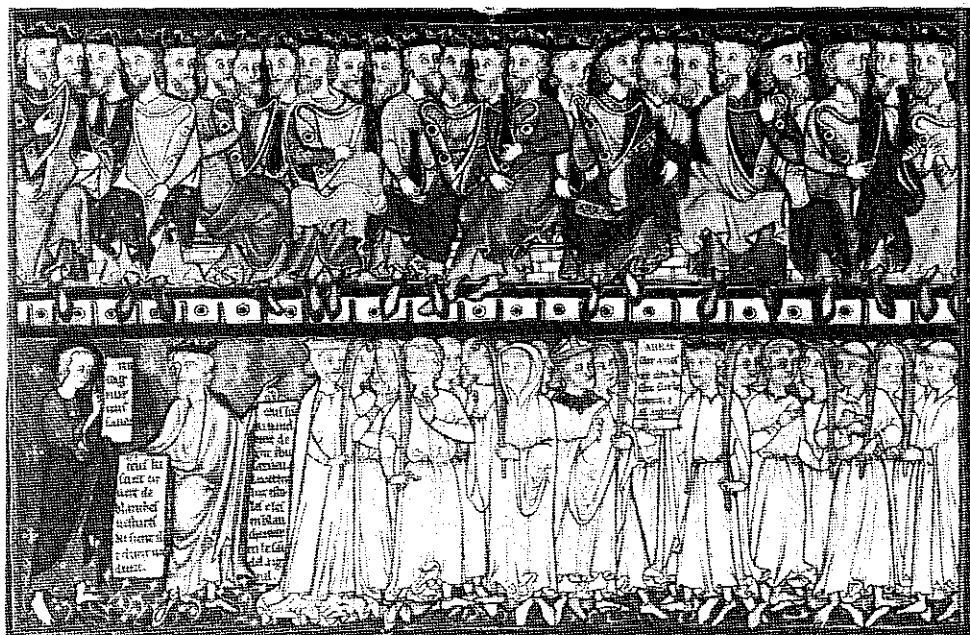
²² Cf. It 2:1-5

²³ Cardinal GIOVANNI COLOMBO writes, "It has already been observed that our century presents particular characteristics. At its outset, with Pius X's Decree on giving Communion to children, it saw the flowering of pastoral attention to youngsters; at its midpoint, through the impulse given by Pius XI and Pius XII to Catholic Action, it was marked by a vast, bold ministry directed to the young and adults. Is it an illusion to forecast that at its close it will be distinguished by intensive, well-coordinated pastoral action for the third age? I do not feel that it is a dream." *La pastorale della terza età* (Milan, 1973), p. 43.

²⁴ We refer the reader to D. Iettamanzi, *Nella vecchiaia daranno ancora frutti Per una spiritualità dell'anziano* (Milan: Ancora, 1988).

²⁵ L. CICCONE, *Anziani e handicappati Due sfide alla società civile e alla comunità cristiana* (Turin: LCD, Leumann, 1987), pp. 27-28

²⁶ L. CICCONE, *op cit*, p. 27



The Health of the Elderly in Developing Countries

Dr. HIROSHI NAKAJIMA

Director General, World Health Organization

By the year 2100 there will be 2.5 billion people over 60. Since women, as a rule, have a life expectancy about five years higher than men, they will make up a significant proportion of the elderly population. Today, the elderly make up 14% of the total population in the developed countries of Europe and North America. But this process has been relatively slow, evolving with the socio-economic changes of industrialization and urbanization over the last hundred years or so. In the developing countries the process will occur much more rapidly and we expect the number of elderly people to double in about 20 years.

In the history of man, society has traditionally given special attention to the elderly. The village elder has always been the repository of village wisdom and local custom. The wise old woman is the one who initiates young girls into the roles of wife and mother. At the same time the elderly themselves have been conscious that they should not become a burden to their community. We have all heard about the practice where the old one day suddenly walk away from the community to die.

Fortunately, we live in more enlightened times. And it is a testament to the success of medical science and the availability of care from infancy onwards that the elderly are today the subject of special concern. And in the developed countries we have come to expect that having worked for 40 or 50 years of one's life, one can expect to retire, with all basic creature comforts and needs assured and satisfied. In these countries many services have been developed to look after the special needs of the aged. Yet in spite of this, while their

medical needs may be catered to, the problem of their retention and integration into society remains.

But today I want to speak about the elderly in the developing countries because there the sadly and often dramatically limited resources have to satisfy many needs, and the problems of the elderly are causing an additional strain on the health budget.

In many developing countries, traditionally, as people become old they continue to work, but their duties become correspondingly lighter, with increasing support by members of their extended family.

However, today, 25 million people migrate each year to the cities. This raises a dilemma for the elderly. If they remain in their villages when the young have left for the cities, they must fend for themselves at a time when they are increasingly less able to do so. On the other hand, if they follow the young to the cities the chances are they must compete for living space, often in large urban slums, and, worse, must compete for scarce jobs in an environment where massive unemployment is a rule. This is one of the most urgent problems to be faced because by 2030 some 65% of the world will be living in cities. The prospects seem bleak no matter how we look at it.

But there are also many lesser issues which we have only begun to understand. The expansion of education has no doubt contributed to the erosion of the authority that was once accorded the elderly. Public housing, designed for the nuclear family, which tends to become ever smaller, combined with increasing physical infirmity and reduced mobility, have augmented the isolation

experienced by the old. Even if the elderly have time to spare, society has yet to find the means of usefully engaging them. All of this raises crucial issues concerning the quality of life of the elderly for which solutions are yet to be found.

As certain as we are born, it is the nature of man to die. But within the natural span of life that is allotted to each of us, we should ensure that it be active and satisfying and replete with good health. The quality of life, therefore, has become an increasingly important concern for us all. It is also related to the ability of medical science today to continue to sustain the vegetative functions of a human being for long periods. But can we justify the cost of doing so, knowing that it means that there will be that much less for some other activity? There are important ethical and moral issues that need to be resolved.

I am afraid that I seem to have raised only problems so far. The fact is we still know too little about the social dynamics of aging and the elderly. We need to know more about their specific health problems and needs. This has not been helped by the lack of standardization of definitions among those who work in the field. For example, the United Nations system uses 60 years as the age that divides the elderly from the rest of the population, while others use 62 or 65. These seem to be precisely the types of issues that WHO should address, and indeed we do have a program called Health of the Elderly which is already beginning to do so.

WHO's interest in health care of the elderly goes back to 1974, when the first Expert Committee report on the subject was published.

Then, in 1980, a meeting was convened in Mexico City to discuss the present and future state of the well-being of the elderly. The *Report* of this Conference served as the basis for the policy paper prepared by WHO for the 1982 World Assembly on Aging convened by the United Nations. The International Plan of Action on Aging, endorsed by that Assembly, became the framework for WHO activities for 1982-1987. A WHO Expert Committee on Health of the Elderly met in November 1987, and its recommendations are reflected in our activities proposed for the Program for the period 1990 to 1995.

The objective of the Program is to reduce functional dependency of the elderly due to deterioration of their health, social, and economic status, and thereby contribute to the well-being of aged persons.

In 1987, a WHO International Research Program on Aging was set up within the Global Program of Health of the Elderly. It is based at a WHO Collaborating Center for Research on Aging located at the National Institutes of Health in Bethesda, Maryland.

It will study such questions as:

1) Why do some people become disabled as they grow old while others do not? And how do the disabilities affect them and their families?

2) Why does immunity decrease in old people, leaving them vulnerable to infections?

3) What causes Alzheimer's disease and other dementias?

4) How are the social, economic, and health care systems of countries affected by an aging population? How can they plan for the future?

Until recently the Program of Health of the Elderly was based at the WHO Regional Office for Europe, but I have decided that it be transferred to Geneva in order to facilitate its development on a global level.

During this Conference you will no doubt hear about the role of nongovernmental organizations in initiating program for the elderly. NGOs are now playing a very significant role.

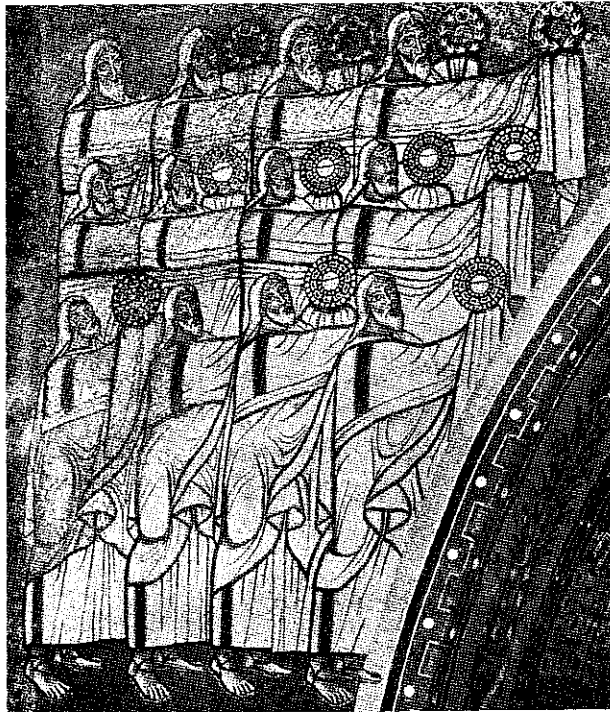
One important feature common to the NGO effort is that most of them actively involve the communities in which they operate. This is crucial if the efforts are to continue once outside support is withdrawn, as it inevitably will be one day. Equally important, most of them involve the elderly themselves as part of the community in which they live so that their special problems and needs can be properly understood and provided for.

Important as they may be, NGOs alone cannot solve the urgent and emergent problems of the elderly.

It is up to individual countries to accept their responsibility and take up the challenge of their elderly population. 166 Member States of WHO are committed to achieving the goal of Health For All by the Year 2000. This goal, I am convinced, cannot be achieved unless we also take into account the special health and related social needs of the elderly.



Round Table



*The Song
of Life*

Introductory Remarks

Sir MARTIN ROTH

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The disabilities of the aged which are causing health and welfare services to strain at seams everywhere are often attributed entirely to inherent biological factors largely of hereditary origin. But progress in the past few decades has shown that many forms of mental and physical disablement formerly attributed to "ageing" were due to specific diseases that could be mitigated or sometimes cured.

Some of the disabilities of the aged have arisen in work orientated societies, in particular from changes in attitudes which have deprived them of dignity, social role and status. A question is therefore posed: What is the function, meaning and purpose of the later years of life? Is it to be an empty interregnum between the ter-

mination of work and the ending of life? The aged are in fact capable of performing valuable functions as grandparents, as transmitters of cultural traditions and values, and sources of stability and integration within families, whose bonds are being everywhere severed by conflict, particularly in developed countries.

Conservation of the family is of fateful importance for the society as a whole as well as the aged, for even in serious forms of mental deterioration the majority continue to be cared for by their families. No health or welfare service in the world would be able to cope with the problems created were this precious resource of family support to be eroded.

The increasing proportion of aged elicits doom-laden attitudes. But scientific progress shows promise for dealing with some of the worst disabilities. Yet societies need also to draw more upon the positive qualities of the elderly.

They tend to be more wise and dispassionate, less doctrinaire and to have greater generosity of spirit than younger generations. Populations that age may move less slowly but they may provide us with a moratorium, a breathing space in which to deal with the threats posed by overpopulation, racial conflict, and dwindling energy resources, along with the dire threat posed to the very existence of the human race by future wars

Quality of Life of the Elderly in Japan

Dr. SHUKURO ARAKI

Professor and Chairman, The First Department of Internal Medicine, Kumamoto University Medical School, and Head, University Hospital, Kumamoto, Japan

Introduction

The Welfare Ministry recently reported that the average life expectancy in the Japanese is 75.61 years in males and 81.39 years in females (July 11, 1988). Comparison of these figures with those at the beginning of the 20th century (1901) shows increases by 32.8 years and 37.1 years, respectively. The Japanese have now the longest life expectancy in the world. The major reason for these marked increases seems

to be, in addition to advances in medicine, improvements in environment and nutrition resulting from economic growth in Japan.

The Japanese economy, after World War II, went through a recovery period to the prewar level (1945 - the first half of the 1950s), a high-growth period (latter half of the 1950s - the 1960s), and a transitional period to stable growth (after the 1960s) and was started along the lines of independent recovery in 1978. How-

ever, since 1980, under the influence of the world economy, the Japanese economy has followed a difficult path of stabilization with low growth while maintaining welfare at a high level.

At present, both the Japanese nation and people face aging of the society we never experienced before and are under pressure to take medical and social measures to cope with the problem of the quality of life in the elderly.

Do the elderly in present

Japan enjoy life with good quality? Comparisons between the elderly in Japan and those in the developed Western countries show that the quality of life in the elderly in Japan is not always higher in terms of medical services and welfare, considering the power of the Japanese economy.

We evaluated the quality of life in the elderly in Japan with respect to: 1) welfare problems, 2) health problems, and 3) living well during the senile period.

1. Welfare problems in the elderly in Japan

1. Health and medical service law for the aged

For a long period, the elderly in Japan had been in a situation far inferior to that in Western industrial countries in terms of welfare. Since 1983 when the law of health and medical service for the aged came into force, the life of the elderly has been stabilized by medical security. However, the individual burden of medical cost in this law presents problems

2. Changes in the family structure and solitude and anxiety of the elderly

With changes in the concept of the family after the war and an acute housing shortage, the size of the family has been reduced, resulting in increases in nuclear families consisting of parents and children. The mean family members are 3.2 per household (1982). Since we live with our grandfather or grandmother less frequently than before, though not so rarely as is in Western countries, the wisdom of the elderly for living is not handed on to their children or grandchildren.

Old communities have also been disorganized in Japan, resulting in decreased opportunities for social intercourse among the elderly. Especially in cities, aged solitary people

are increasing, and the problem of the elderly is becoming a major social problem. Anxiety tends to be more marked in the elderly, who do not live with their children.

3. Necessity of public nursing institutions and health institutions for the elderly

In Western countries, nursing homes were developed long ago. These homes are managed under the responsibility of nurses. On the other hand, in Japan, only doctors, in principle, can manage institutions for the elderly who require nursing.

In Japan, elderly people who cannot live with their children enter a nursing institution for the elderly to obtain stability. However, nursing institutions are not adequate in number and quality. Though expensive private institutions for the elderly have been gradually constructed, public institutions of low cost are rare. Without such places for living, the quality of life for the elderly cannot be discussed.

The Japanese Welfare Ministry attributed the rise of the national medical cost above 17 trillion in 1986, resulting from an annual increase of 1 trillion, primarily to expansion of the medical cost for the elderly due to aging in the population. They suggest that, among inpatients, elderly people who do not always need hospitalization or those who continue to stay at hospital after healing are included.

Based on these analyses, the Welfare Ministry considered that these elderly patients should be admitted to institutions that provide more care than medical services and has been preparing since 1987 on a full scale for nursing institutions for the elderly, care institutions of a new type. Spread of these institutions to a certain level may require 5-6 years, and, in addition, do not seem to inhibit the national medical cost directly

2. Health problems of the elderly

1. Present status of treatment of elderly inpatients

In Japan, both urban and rural districts, more than half of the elderly with disease or insenescence are hospitalized for treatment. Therefore, there are elderly inpatients even in most local hospitals.

At many hospitals, elderly patients receive excessive drugs. When food intake is slightly low, or fever or diarrhea develops, intravenous physiologic saline or high calory intravenous fluid is frequently administered. During infusion, elderly patients are told not to move their extremities or body and have to maintain a very restricted posture all day. When urinary frequency or occasional urinary incontinence is observed, catheterization is performed for continuous withdrawal of urine. When pneumonia develops, oxygen inhalation is initiated. Once endotracheal intubation is carried out, the tube is not removed for a long time. This interferes with speech of the patient. When blood pressure suddenly falls, and arrhythmia is detected, intravenous drip infusion is given. When the heart and respiration transiently stop, the elderly patient is transported by an ambulance to a hospital that allows admission, where the heart is resuscitated using a defibrillator, frequently without adequate evaluation to determine whether the patient is indicated for this method.

2. Terminal care for the elderly

During the terminal period, conventional, excessively noisy life-saving treatment is given in most hospitals. Elderly patients who have a home hope to go back home. However, if families work outside in the daytime and there is no one who cares for the aged patient, discharge is usually difficult. Elderly patients cannot die at

home in peace. Current terminal care for the elderly in Japan presents many problems. Death without peace may show that their quality of life is ignored. Isn't it better for doctors to permit aged patients to die at home if there is no hope for cure at a hospital? Warm words and kinship are the last present to dying patients.

3 Problems of bed-bound elderly people

The rapid increase of the elderly is associated with the rapid increase in the elderly with senile dementia or those confined to their beds. Bed-bound elderly people are expected to increase by about 50%, exceeding 1 million in 2000 A.D., and patients with senile dementia by about 50% to 100,000.

If 1,000,000 elderly bed-bound patients receive care at institutions, 10,000 institutions with 100 beds are needed. In addition, if half of patients with senile dementia receive care at institutions, an additional 5000 special nursing homes for the aged are necessary.

Since confinement to bed mostly results from falling due to cerebrovascular diseases, prevention of these diseases is most important. Nursing visits are often useful for treatment and prevention of bed sore and extension of ADL. There are at least 20,000 doctors treating the elderly. If cooperation between these doctors and about 50,000 private and public health nurses is obtained, and guidance is given to families, confinement to bed may be regarded as prevented. Responsibility, concern, and efforts of doctors are hoped.

Cafore plays a primary role in the management of the elderly. Since there is no special treatment method for dementia, individual help for families who directly care for the elderly patient at home is necessary.

4 Health management in daily life

The primary cause of death in the Japanese in 1988 is cancer, followed in order by heart disease and cerebrovascular disease. Pneumonia and insenscence are also frequent causes. Multiple diseases tend to develop simultaneously in the elderly.

One measure to prevent the elderly from diseases is health management. Moderate exercise, balanced meals, adequate rest, a well-regulated life, and periodical health examination are important.

The elderly, even if seemingly healthy, frequently show abnormalities in multiple organs in examinations such as hypertension, arrhythmia, glucose intolerance, anemia, obesity, cataract, prostatic hypertrophy, spinal and articular deformity, and osteoporosis. Japanese clinicians often evaluate the data of various examinations in the elderly according to the same criteria as those for the young and younger adults and restrict their behavior, meals, and living. This seems to be excessive. Medicine has been specialized and differentiated, and doctors who evaluate a person as a whole have decreased. To examine the elderly, doctors who comprehensively evaluate a person are needed.

5 The Japanese and religion

The major religions in Japan are Buddhism, Shinto, and Christianity. Of 86,000,000 adults in Japan, 20,000,000 profess a religion; 16,000,000 believe in Buddhism, 2,000,000 in Shinto, and 700,000 in Christianity. Freedom of religion is guaranteed by The Constitution of Japan and strictly practiced. Therefore, there is no national religion, and national events have no association with religion. In national or public schools, religious education is prohibited. Many Japanese are tolerant toward different religions. Since modern medicine also has limitations, ultimately inter-communication seems to be

necessary between medicine and religion, which deals with happiness in humans.

3. Living well during the senile period

Since we have only one life, it is precious. Happiness in humans may be produced by healthy and rhythmic life and a sense of fulfillment. We suggest the following criteria for living well during the senile period.

- 1) Do nothing to excess.
- 2) Receive mental stimuli (by doing certain work or a hobby or by contacting young people).
- 3) Exercise regularly and appropriately.
- 4) Pay attention to changes in weather.
- 5) Seek prompt medical care when the health condition is bad.
- 6) Do not worry about anything.
- 7) Maintain interest in people of the opposite sex.

There is a famous proverb of a Zen priest in China, "Every day is good day." If one can live every day as a good day that allows him to live fully but quietly in a serene state of mind, the end of his life may be wonderful.

We hope that the elderly live a life in which their presence at home or in society is significant in itself.

Conclusion

With marked economic growth in Japan, average life expectancy in the Japanese has become the longest. However, adaptation has been extremely delayed in terms of welfare policies and health management for an aging society.

The quality of life in the elderly differs depending on the individual, and a common goal cannot always be set. In the present study, several problems that should be socially coped with were evaluated, and personal opinions on how to live during the senile period were presented.

Social Understanding of Longevity in India

Professor P.M. DALAL, M.D., F.A.M.S.

Stroke Research Cell, Neurology Dept,
Sir H N Hospital and Medical Research Society, Bombay, India

Longevity and Indian Culture

There are numerous biomedical and philosophical views on "longevity," and definitions of "ageing" are also different in the developed and developing nations. In the West, the period from the 62nd to the 65th year of one's life is the most accepted one for pension and social security benefits. In Indian culture, the 60th year is taken, by convention, to mark entry into "Longevity," a status similar to "senior citizen."

The Hindu scriptures prescribe 100 years of "lifespan" in four stages (*ashramas*). The first phases of studentship to youth (*yuvashashrama*) lead to marital status as a house-holder (*grahashashram*), and by the 60th year he renounces the economic, materialistic and domestic aspects of his life for spiritual life (*sanyashashram*). He may visit various religious shrines and *ashramas* — an ancient religious spiritual and cultural heritage

Longevity and the Magnitude of Problems

In modern India, to-day, the average lifespan of our people is below 60 years of age, and the "old-old" segment of the population is not significant. Thus, the problems of longevity (social deprivation, cognitive disorders, senile dementias, etc) are not at the forefront.

On the other hand, Infant Survival and prevention of perinatal morbidity and mortality are the key areas of focus for health-related policies and programmes (eg. UNICEF Activities). Here, it is noteworthy that nearly one-seventh of the world's population resides in the Indian Subcontinent (700 mil-



lion people), and almost 40 million persons (6 percent) reach the age of 60 ("young-old"). By the turn of this century (2000 AD), 12 percent of India's population will survive the "young-old" geriatric age-group (60-70 years).

Thus, elderly people in India to-day constitute a "less-privileged" and "most-vulnerable" group deserving tender and loving care to fight the fight of loneliness, poverty and disease (impaired hearing and vision, chewing problems and locomotion disability from degenerative arthritic changes).

Longevity and the Joint-Family Tradition

In ancient India, there was a monolithic joint family system, where the "elder" enjoyed the status of power as a key person having rich experience and wisdom to guide and control the children and youth.

In modern India, rapid industrialization of towns and of villages (modern farming technologies and "green-revolution") has resulted in major economic and socio-cultural change with materialistic and "interest-oriented" outlooks adversely affecting the traditional cultural values or importance of the elderly.

This materialistic change in the emotional climate of the household offers the elderly "neutral tolerance"; and at times they are looked upon as persons without legitimate claims for their existence or importance. The psychosocial security of the "elderly" is in danger with slow dissolution of the traditional joint family system

Whether geriatric mental morbidity is related to the physical compactness of the joint family system is debatable. However, in urban India, the youth feel that the elderly will interfere with their individuality, independence and self-reliance, with detrimental effects on their interpersonal relationships. As there are no new "adaptive-attitudes" in the changing patterns of modern living in urban and rural India, the disintegration of the joint family system is a foregone conclusion.

Longevity and Health Care of the Elderly

ICMR Epidemiological Studies estimated the prevalence of mental morbidity in the Elderly at 89 per 1000; nearly 4 million Elderly subjects have mental-health related problems. Affective disorders, like depression,

paraphrenia and organic psychiatric syndromes, are more common.

For developing countries, the precise epidemiological data on organic dementia syndromes (multi-infarct dementia or Alzheimer's disease) are NOT available.

The Indian Council of Medical Research (ICMR) task force reports (1957-1988) indicate that only 20 per cent of hospitalized "aged" subjects have mental-morbidity. Here, physical disability from visual impairment (cataract), deafness, locomotor difficulty from degenerative joint diseases, dermatological and urinary problems and cardiorespiratory illness top the list of ailments.

Summary: Conclusions

A comprehensive care approach (psychosocial, economic, nutritional, vocational re-

training programs) for the able "young-old" subjects is a top-priority need. The existing Primary Health Care Center (PHC) should be upgraded with special geriatric clinics. Frequent personal contacts by Multipurpose Health Workers (MPHW), old-age pensions, or vocational rehabilitation will definitely restore the "song of life" to achieve the philosophical and spiritual goals (*sanyasashram*) of our elderly in India.

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The Social Understanding of Aging: An African View

Professor VICTOR ANOMAH NGU
Cancer Research Laboratory
Yaoundé, Cameroon

Introduction: Some definitions are in order

There are three Africas – Arab Africa, Black Africa and Southern Africa. Views expressed here concern only Black Africa, south of the Sahara and north of South Africa.

In Black Africa, there are also two distinct Africans – the Urban or City African and the Rural or Village African.

Attitudes to aging in urban areas of Africa are tending gradually towards those observed in most Third World cities and urban areas, where overcrowding, poverty, and the neglect of the aged are not infrequent. Only the rural or village Africa could claim to represent that which is authentic and unique to Africa. I hasten to add that the transistor radio, the satellite telecommunication system, and the mass media are in-

vading and eroding away this authentic rural Africa to the point that it may well disappear completely by the end of the 21st century, when the whole world will really be one large village.

The quality of life of elderly persons is determined partly by their physical or biological status, but to a greater extent by their psychosocial status.

As far as the physical or biological status of elderly persons in rural Africa is concerned, my colleague, Prof. B.O. Osuntokun, a specialist physician and neurologist, will no doubt give an authoritative account of this which I strongly recommend to you. It is well known, however, that rural Africans do not live a life of affluence and the sequelae of affluence as seen in the elderly of Europe, namely, cardiovascular diseases due to arteriosclerosis and cardiac infarcts, gan-

grene of feet, stroke, cerebral degeneration, and diabetes etc., are therefore relatively uncommon among elderly rural Africans. Such of them as reach old and very old ages do so in a relatively good physical condition – with clear, lucid minds and weak but relatively intact bodies.

As far as the psychosocial status of elderly persons in rural Africa is concerned, this is determined partly by the social attitudes of rural people themselves to their elderly parents. Are old people, because they can no longer contribute physically or materially to their own upkeep, considered a burden to be disposed of or are they respected for who they are? The second determining psychosocial factor is the way people approach or regard their own old age. Is old age the final end, a tragedy to be accepted resentfully, or is it

the natural transition to another and perhaps a happier life? These psychosocial questions will now be briefly explored.

What are the social attitudes of rural or village Africans to elderly persons? Answer: they are regarded with very great respect for the following reasons:

1) While life expectancy in Europe and North America is over 65 for men and over 70 for women, it is for Cameroon, for example, only 47 and that is considered good by African standards. But people of 70 or more exist. A few even reach 80 or 90 years, but there are many fewer than in Europe.

Consider, however, the physical environment in which these relatively few old people have lived and survived – tropical, parasitic, and other diseases, unhygienic housing, poor, unclean and inadequate water supply, inadequate, unbalanced, and insufficient nutrition bordering on famine farming in some areas, natural disasters from drought to floods, locusts and other pests, civil and tribal wars etc., etc. To be 60 or 70 under such conditions is no mean achievement, one which cannot fail to earn the admiration and respect of the rest of the village!

2) Culture in Black Africa has been, and still is, to a great extent, mostly oral. Old people have served as the only link between the past and the present. The old, by their songs and their tales, transmit the history, the literature, and the traditions of the people from kingship rites to birth, marriage, and funeral rites, etc. They have also transmitted moral and ethical values and codes which have contributed to social peace and the survival of the village society. This role of custodians of the culture and the conscience of a people is one that has earned respect for old people everywhere in the world and in every culture. That respect is understandably greatest in a culture that is entirely oral.

In health matters, old peo-

ple, by their personal experience and from knowledge received orally, have solutions, herbal formulae, and other rituals and taboos which contribute to maintaining relatively good health in the village society. The traditional healers are to be found among the older persons of the village. Since disease is a common and constant companion in a rural environment and their help much sought after, this confers on these old healers much greater respect than might be enjoyed by a western-type physician in a city.

3) Old people also play a very special role in the village as a link between the physical and the spiritual world. The reality of the spirit world is very strong among black Africans. Ancestors, parents, and loved ones who have died not only continue to “live” but can, and should be, consulted from time to time. They are “fed and given drinks” during village or family feasts as if they were still alive. When important decisions concerning the living are to be made, ancestral advice is sought. The old people who serve as the link and make contact with the ancestors may consult them, for example, on a proposed marriage, a business contract, or the outcome of political elections, etc. They often receive useful and categorical answers which are often followed strictly.

How does one explain these claims in some old persons to make contact with the spirit world? Western scientists and medical biologists would no doubt explain such claims as due to hallucination caused by dementia and the cerebral degeneration of old age! For the African, however, the explanation is quite simple. The body imprisons the spirit or the soul. In old age, the feebleness of the body weakens the prison and this allows the spirit or soul to escape from the body more easily, and it thus makes contact with other spirits or souls! (Two of my uncles who were very old by our standards – over 85 each

– on separate occasions told us at their impending death that their dead brothers had come to fetch them and they must prepare themselves to join them on the other side! They frequently held long, coherent conversations with their dead relatives on some unpaid family debts or some family quarrels that had to be settled, etc).

Mystics, hermits, and recluses, as Church historians will probably confirm, frequently weaken their bodies also by various acts of fasting, flagellation, etc., so as to free their souls for easy contact with God and other souls. In rural Africa, for those who have lived good, clean lives, this comes slowly and naturally with old age. It would be interesting to hear how the old in a western materialistic society perform in such matters. How many old past board Chairmen or Presidents of multinationals would have had an encounter with the spirit world?

4) To return to the physical world, the rural African lives in very close contact with nature. By day, he has the open savannah or the tropical forests with myriad life forms – animals, plants, insects, etc., and the interactions among them – to teach him something about life in its rude and natural form, something which visiting zoologists, botanists, or insectologists from the western world could never learn! By night, the open star-filled sky instinctively fills him with awe and respect for God, who created the universe! People who live so close to the earth, come to understand in their old age, as no city dweller could ever hope to, that life is more than matter and a struggle for existence, and that there are rules that regulate this apparent complex rhythm of life. Earthy proverbs which distil this deep understanding enrich and spice African languages and confirm that, in some instinctive way, these old men do understand the mechanisms of life.

For all these reasons, and as was stated above, old per-

sons are held in very high esteem indeed by the village society. This esteem is expressed in many ways. Older persons, especially if they have gray hair, take precedence on village occasions, whether public or family, over younger persons. They are seated first, with the exception of the chief, before younger and perhaps richer persons. Important events in the family are reported to them. A child who must go to the city to school or overseas to Europe to the University must obtain the blessing of the grandfather before he travels. The grandmother, in contrast, often helps to look after the baby and young children and when the boy is 2-3 years old, they often spend the following 2-3 years with the grandparents. This teaches him some of the family tradition and proper behavior, etc. Children who have had such early contact with their grandparents go through life slightly different from the other children. They are usually wiser and more mature for their age

and grow up to be stable and well integrated persons

As a mark of respect, old persons are frequently coopted into the traditional or chief's council, even when they have no traditional right to a place on the council. Their age and gray hair are qualification enough, and their presence gives respectability and authority, in the eyes of the village, to such councils.

Finally, how does the rural African approach or regard his own old age? With grace and confidence. With grace because he knows, from close contact with nature, that old age is a natural and inevitable event, one through which he must pass to rejoin his departed parents and relatives. After old age and death, life continues, and in that new life everything will perhaps be better still. A firm belief in a spirit world and in a life after death takes away the fear of aging, of old age, and of death.

He regards old age with confidence because he knows

that it is the sacred duty of children to support and care personally for their old parents. Confining old people to an old people's home (these do not exist in Black Africa) would be regarded with horror, were it possible to find such a home. As most rural Africans have many children and the extended family is fairly comprehensive, the elderly person can spend his remaining years shared among his many children and relatives. The children themselves accept this responsibility gratefully as a small return for the commitment, care, and love which their parents, in spite of the hardships of a rural environment, lavished on them in their childhood.

In conclusion, Africans must strive, as some of the Asiatic and eastern peoples, especially Japan, have done, to keep its present traditions and culture while improving on the physical and material conditions of the rural environment. This would give to the African years as well as life.

The Elderly in Peru

Dr. FERNANDO MONTESINOS AMPUERO

*Professor of Pharmacology
at San Marcos University, Lima, Peru*

Peru, my country, with its twenty-one million inhabitants and 1,300,000 square kilometers, is regarded as a developing country. There exist different cultures as well as races in Peru. Social stratum is clearly marked. The country is widely known thanks to Cuzco, capital of the Incan Empire centuries ago. Today large numbers of people from all over the world come to see these marvelous archeological remains and learn more about Incan culture.

A mountain range, the Andes, divides the country into three zones: the coast, the highlands, and the jungle.

The coast, overlooking the Pacific Ocean, is 3,000 kilome-

ters long, and 46% of Peru's population lives there. The highlands start at an altitude of 1600 meters above sea level and extend up to 4600 meters.

There are perennial mountains towering challengingly up to 6500 meters above sea level.

The Amazon Jungle, with its 73,000,000 acres of natural forests, is the largest and least populated one in the world, descending from 1200 meters nearly down to sea level. The confluence of several rivers constitutes the impressive Amazon, which flows into the Atlantic Ocean.

These three regions possess differing ethnic, cultural, demographic, environmental, and epidemiological character-

istics. The highlands are quite uneven, containing many towns and villages. About 85% of the natives, known as *indigenas* and incorrectly called "Indians," live there. The Indian's life expectancy has not been established statistically. Many, however, reach 100, though the highlanders cannot equal coastal life expectancy, for medicine, both therapeutic and preventive, is inadequate, and this insufficiency affects mortality rates. The old *indigena* is a healthy man—medical examinations have not disclosed cardiovascular, respiratory, or digestive disturbances. On the other hand, rheumatic and hepatic illnesses are common.

The *indigena* is an extraordinarily strong human being, though his basic nourishment consists of Indian corn, potatoes, quinoa (a domestic cereal), and so on. Rarely does he eat meat or eggs or drink milk.

He consumes a lot of *chicha*, the typical beverage made of germinated corn, which is boiled and fermented, and containing a minimum of alcohol and yeast, rich in proteins and the vitamin B complex.

Before work each day, *indigena* laborers eat a sort of thick soup made of corn or potatoes. At noon they eat again and once more after having finished work. They do not use spices—only salt.

We feel it is of prime importance to mention the *indigena's* habit of chewing the coca leaf from youth to old age. Alkaloids (the most important of which is cocaine) make up 1% of the coca leaf. The *indigena*, from the age of 14 till the end of his life, chews about fifty grams of coca daily along with an alkaline substance forming a coca lump, which is located between the interior part of the cheek and the gums, forming a noticeable promontory.

He chews throughout the day while working and resting. The substance extracted contains cocaine and flows through the gastrointestinal tract, gradually being broken down as a result of its instability.

The *indigena* is capable of working and living in good health at such altitudes thanks to the use of cocaine. He has a lot of resistance to hard work. The substance is broken down into its main chemical components: methanol, benzoic acid, and ecgonine.

Ralph Bolton has shown that there is a regular hypoglycemia in the *indigena*—around 70 mg. before breakfast—and Frombach has found that glycemia rises to 140 mg. during chewing and up to four hours afterwards.

He also explains that ecgonine, for some unknown reason, releases the glucogone of the liver, turning it into glucose and getting it into the bloodstream. This glucose pro-

vides the energy needed for muscular work.

The *indigena's* diet is rich in carbohydrates, and his liver thus accumulates glucogone. Natives between 50 and 70 are thereby enabled to work as hard as the young, with the help of coca leaves.

The *indigena* not only has a poor diet, but—especially in populated areas—drinks a great deal of cane alcohol, which has a lot of impurities.

Chewing coca leaves and drinking alcohol, then, degrade the *indigena*.

The elderly lead a normal life. They are not sociable, but live on their own. They are, however, very solidary and helpful. They take part in a remarkable way in community events—religious feasts, birthdays, harvests, baptisms, sowing, etc.—during which they consume coca leaves and alcohol as they dance and sing.

When ill, the old opt for traditional medicine, employing herbs; but they most often go to quacks who seek to relieve them through both herbs and mystical rituals.

The *indigena* knows about religion through priests and missionaries. He believes in and looks up to village saints such as Peter, Paul, and James and the Virgins invoked under the names of Mercedes, Carmen, and others. They are also acquainted with the Protestant religion.

There are many different ethnic groups in the jungle. They are far from both civilization and the central government's control. They speak several languages, and diverse missionaries reach them. There are also international organizations which teach them Spanish and up-to-date culture. Medical attention is limited, and there is a need for medicines for prevention and treatment of typical illnesses such as malaria, yellow fever, leishmaniasis, and internal parasitosis. Poisonous animals and their precarious way of life contribute as well to reducing the population.

For these reasons and for lack of population statistics, we have not been able to esti-

mate their life expectancy, which is surely the lowest in the country.

Their diet consists of river fish, a good source of proteins; meat from wild animals, which they hunt; and abundant yucca (domestic root), bananas, papayas, pineapples, and other pleasant-tasting native fruit. Their daily beverage is *mazato*, made of boiled and fermented yucca. It has a delicious taste and high alcoholic content.

The government uses fluvial launches to maintain a permanent medical service in all the places which can be reached.

Vaccines serve to prevent major diseases while antibiotics, chemotherapy, antihypertensives, and surgery are used to treat illness and thereby prolong life.

The "third age" in human life is said to begin at 60. Some gerontologists have established a fourth stage or age, for those who reach 80. Both are commonly known as senility, old age, or the third age. The factors associated with senility are genetic inheritance, stress, inadequate nourishment, mental and physical inactivity, excessive work, tobacco and alcohol, the fear of being alone, and dependence on others. This opens the way to thinking about death.

In old age there is a need for vigor and strength because our faculties cannot respond to our desires for work and service. But we should take advantage of this situation to give everything we know and to enjoy the beauty and harmony of nature.

Two factors come into play in the human life cycle: the hope of a long life and the fear of death.

It is estimated that by the year 2000 there will be about thirty million people in Peru, and the old will have reached about two million, or 6%.

While birth rates in our country have decreased, many people reach old age. Recent statistics indicate a life expectancy of 60.8 for the coastal region, superior to that of other Third World countries.

Amado Nervo interprets old age as follows:

"We get old only when we leave aside our ideals. People are as young as their faith and as old as their fears. One is as young as his trust in himself and as old as his doubt, as young as his hope and as old as his despair."

Nourishment for the Elderly

Elderly people can reduce the use of medicines if they lead a healthy life. This means they should avoid overeating and drinking alcohol, get adequate physical exercise and sufficient rest. The daily recommended protein intake is from forty to sixty grams, which may be obtained from fish, meat, and eggs. Vegetables, fruit, and milk may be consumed provided they prove beneficial.

The less the elderly eat carbohydrates, along with greasy, fried, and spicy food, the better off they will be. Daily food consumption should not exceed 2000 calories. Dehydration increases with age; it should thus be counterbalanced by drinking water and maté, an infusion of aromatic herbs. Vitamins are needed in the right amounts and may be taken as a supplement.

The Government and the Elderly

Public employees receive financial and welfare benefits from the government, whereas private workers receive benefits from the National Social Security Institute of Peru.

Public employees are obliged to retire—men at 70 and women at 65. The government provides them with a pension for life, and they have the option of retiring at an earlier age. If they have served from 25 to 30 years, in both cases they will permanently receive the wages of a worker in the same category. If they have worked for more than 20 and less than 30 years, they get a proportional pension.

Moreover, when they retire, all public employees receive once a special payment for the

number of years they have worked (called "compensatory remuneration"). When husbands die, their wives get half their pension for life, but no one else is eligible after them. August 20th is National Elderly Day, though it is scarcely observed. At first we thought and hoped the government would give special attention to the old; however, nothing has yet been done. The old are in need of government assistance.

People over 60 without economic protection and the elderly experiencing psychological problems after ceasing work need many things, such as public transportation, cultural events, homes, and so on. But the aged still wait, with hope and patience

Social Assistance

Private institutions are now doing what the government has failed to do—organized social assistance programs. At the beginning of the year the Peruvian Association for the Recreation of the Retired and Senior Citizens, along with the Latin American Free Time Association, held the first National Congress on Recreation for the Retired, which recommended a special program to assist the old by giving them a minimum of economic and social security, medical care, occupations they are capable of handling, and information and advice on ways to improve their living conditions. This organization is sponsoring the creation of branches throughout the country by way of its public relations department and journal.

We may also mention the Gerontology and Geriatric Society of Peru, whose proceedings and conclusions are to be found in its journal *Geronto*.

I would like to point out the work the Peruvian Medical Association is doing in its Program for Attention to Elderly Members. It has constructed an attractive building on a large plot near Lima where it is always sunny and members can enjoy nature and a healthy life. They have

amusement, sports, and medical centers—something other professional associations will certainly imitate.

We also have private institutions, both religious and nonprofit, which offer shelter for the elderly in the capital and other large cities.

After many meetings the following conclusions have been reached. Government as well as private institutions should act to create opportunities for the old. They should regard the aged as permanent collaborators, not as individual beneficiaries. They should view them as helpers of the civilized world. In fact, attention to the old in Peru is just beginning.

Medical Care

Gerontology and particularly geriatrics have not been dealt with as they should. Until the present, for instance, these subjects, of great importance and current interest, have been developed at only a few universities. Not only are there few specialists, but few Geriatrics Departments in public and private health services.

As a result of chronic rheumatism and physical inactivity, the elderly cannot move freely in most cases.

Rehabilitation is obtained through physical medicine. This service is very limited, and few hospitals possess it. Such treatment improves their biological, psychological, and social condition, granting them increased well-being.

Doctors recommend a daily walk. It helps digestion and acts as a natural tranquilizer, preventing stress and insomnia, vitalizing, and ensuring contact with others as an antidote to nervous tension.

The use of vitamins containing procaine is being recommended. This practice commenced only a few years ago. People say it helps them re-establish and normalize their organic functions. They also say it enhances their psychic stability, activating cerebral functions such as concentration, attention, and memory. Nevertheless, as we all

know, procaine is a powerful stimulant, and if it is given before going to bed, it can cause insomnia and sometimes anxiety.

The World Health Organization states, "It is necessary to keep the old as long as possible in good health and absolutely happy in their own homes. There is no need to go to a special center." Only in difficult situations should they be taken to nursing homes to receive special attention, the price of which is very high.

Home care should be pro-

vided for by the government as well as health centers. It would turn out to be a lot cheaper than at hospitals. We also know such care is very helpful and gives the patient good sanitary and preventive conditions.

To conclude, I feel it is important to mention three things that bring shame on Peru: terrorism, drug traffic, and inflation—all three are seriously affecting Peru's social base while undermining the economic structure and thus attention to the old.

Thousands of people powerlessly watch their homes being destroyed and their property appropriated. Many people are losing their lives or living in extreme poverty, and the situation has not yet come to an end.

Inflation is an enormous problem in virtually every current society and, above all, in Third World countries like Peru, where its consequences are particularly pernicious for the elderly, whose pensions cannot withstand inflation rates.

Cross-Cultural Research on Aging in Asia and the Pacific

Professor CAM RUNGIE

*Professor of Social Research,
University of Adelaide, Australia*

1. Introduction

The implications of increased life expectancy for changes in the nature and function of communities are substantial. Most countries in the world are currently experiencing these changes. The effects on the developing world are as dramatic as in the developed world. The aging population in the developing countries is already numerically larger and is growing considerably faster.

In Asia and the Pacific region recently, there have been several research projects which have contributed to the development of the understanding of the situation of the aged. Cross-cultural research into aging has the potential to make substantial contributions to the understanding of these changes and the aging process itself. The projects have also helped develop valid cross-cultural research techniques.

2. Cross cultural studies of aging

The World Health Organization Study of Aging in the Western Pacific, published by

Andrews, Braunack-Mayer, Esterman and Rungie (1986), surveyed 800 to 1,000 aged respondents in each of the following four countries: Fiji; Republic of Korea; Malaysia; Philippines.

The study has since been repeated in China. The questionnaire was extensive, covering aspects of physical and mental health, use of health services and social and economic circumstances. The major areas covered by the questionnaire were demographic characteristics, economic resources, health and functional ability, use of health services, mental health, living conditions, living habits, social situation, housing, informant evaluation, and interviewer assessment.

There is substantial interest in cross-cultural research. Within the ASEAN group in Asia a valuable cross-cultural study of aging has been undertaken. The questionnaire instrument used varied from country to country. References include A.J. Chen (1987), Lita J. Domingo (1987), Hananto Sigit (1987), and Pualn Masitah Modh Yatim (1987).

In 1979-80 the regional office for Europe of the World Health Organization (EURO)

initiated an international population-based study of the elderly in fifteen centers in ten European countries. In addition, Kuwait, which is in another WHO region, joined the study. The study is presented in a book by Heikkinen et al (1983). Andrews et al (1986) presents a comparison of some of the basic results of the two studies. The comparisons again indicate the extent of the similarities in the pattern of results between the EURO and WPRO studies.

Jersey Liang and Nancy Whitelaw (1987) have presented a detailed comparison of the questionnaires used by the two WHO studies and three of the ASEAN studies. The comparison will certainly be of use to survey researchers in this field.

The United Nations' University Project on Social Support Systems for the Aged and related United Nations projects also involve aspects of cross-cultural studies. Research is being undertaken at community locations in seven countries.

The World Health Organization is involved in studies in other countries. Through their "Special Program for Re-

search on Aging" WHO (1987 a b c), they have established research objectives in the following areas:

- Developing human resources for aging research
- Epidemiological research
- Research on mental health and aging
- Research on dementias of old age
- Research on nutrition and aging
- Research on immune function

3. Methodology

3.1 Comparisons

Research which is across cultures and countries inevitably invites comparisons between populations. Be careful.

The differences in the results can be due to differences in:

- the implementation of the study
- translations
- sampling
- interpretation of questions
- culture and cultural responses
- economic circumstances
- climate and geographic factors
- attitudes, opinions, individual behavior
- physical characteristics, etc.

Figure 1 gives an example. It indicates the variation in results for Cognitive Function Score for women in Korea, Malaysia, and China by age group.

It is essential that results of this nature are not misused by drawing conclusions which are not a valid reflection of the data. While the graph shows respondents in one country consistently scoring higher than another, it is not an indication of overall differences in average cognitive function for the aging between the countries.

In the four country study, there were important, unavoidable sampling differences. The study surveyed only aging people who were living in the community and not those in institutions. Varia-

tions between countries in policies and availability of institutional care will directly affect the functional ability of those living in the community. It is generally better to support the aging in the community rather than in institutions where this is possible. Thus a higher quality of service for the aging could generate a lower score.

Establishing a sampling frame procedure is a crucial task for any community survey. The resources available to support sampling are different from country to country. In the Republic of Korea, there is a central list of all aged persons. This list represented an excellent sampling frame and provided access to an excellent sample. In Malaysia and the Philippines, the sample was selected by directly approaching homes. In Malaysia, the Statistics Bureau provided substantial assistance in setting specific quotas for target groups within each survey area. The results suggest that this approach may have led to the very frail elderly in the community being more highly represented in the samples in the Republic of Korea than elsewhere. Differences in sampling may generate variations in the absolute scores.

Thus it can be seen that direct comparisons of average scores for each country can be misleading as the results may well reflect other factors rather than underlying differences in the target populations.

The interesting result in the four country study is the amazing similarity in the results, not the differences. Across the quite dissimilar cultures, the measurable interaction of aging and cognitive function was quite consistent.

Similarly, sex differences were consistent. The interaction of age with cognitive function for men follows a different pattern than for women. There is still a decline but the shape of the curve is different. Varying mortality rates will of course be influencing these results.

Cross-cultural studies repeatedly generate results of this nature. While direct comparisons of absolute results be-

tween countries are unwise, the comparison of the pattern and relative results can be very productive.

3.2 Validity and Reliability

To date, validity and reliability evaluations of cross cultural survey instruments have generated mixed and encouraging results. In the Four Country Study, the majority of questions in the survey instrument showed reliability in the test re-test situation. In particular, it was interesting to note two of the mental health questions showed reliability. These were "touch the right ear with the left hand" and "name the year" (year named according to appropriate culture).

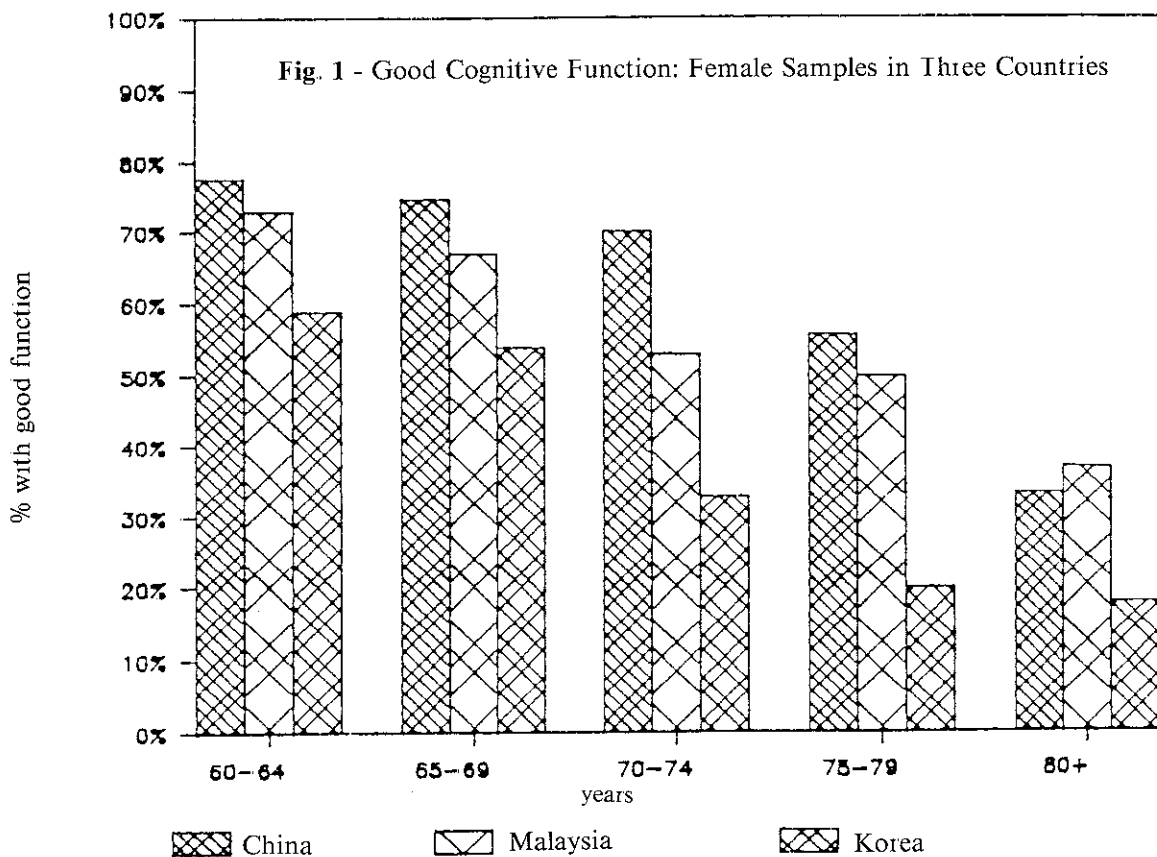
All the questions were evaluated prior to the survey by the multicultural team of principal investigators from each country. Case studies were also undertaken to provide further insights into the applicability of the data.

3.3 Physical and Mental Health

The aging process is still not fully understood. Increased life expectancies, which have resulted from increased understanding of one range of health issues, have simply brought into focus a newer range of issues and different physical health conditions. There is still a strong need for research examining incidence, prevalence, and risk factors. Some of this research should be comparative and cross-cultural.

It is quite common at conferences on aging for there to be a call for more longitudinal studies, such as the work being developed by Prof. G. Andrews in Australia. There is a limit to the type of analysis and conclusions which can be developed from studies involving data collection at any one point in time. There certainly are cross-cultural opportunities in the areas of developing methodologies and undertaking longitudinal studies.

In addition, there are opportunities for analyzing and developing models which investigate the multidimensional



components and interactions of physical and mental health. An interesting development in this area was presented by Jersey Liang of the University of Michigan's Institute of Gerontology, at the recent seminar in Singapore on aging in Asia and the Pacific. Jersey Liang and Nancy Whitelaw (1987) are examining the questionnaire used by the WHO and ASEAN studies for practicality, validity, reliability and cross-cultural comparability. They are building conceptual models with the help of multivariate techniques to delineate the underlying structure of components of physical and mental health. The work, by necessity, examines a large range of components. It has the potential to both define and quantify new, tighter concepts in cross-cultural research.

3.4 Economic Concepts

Economic measures and issues typically are not well represented in cross-cultural studies. This is due to the difficulty in collecting data which is suf-

ficiently complete to generate useful comparative analysis.

However, it is possible to view economic factors as the predominant issues evolving from increased life expectancies. As medical science solves the physical health problems of the world, new economic situations arise. There is a need for a strong conceptual base to the analysis of the potential economic role of the growing aging component of the population.

Practices vary greatly from country to country in relation to the involvement of the aging economically. The benefits to be derived from comparative cross-cultural studies will be substantial.

One such concept which should be further analyzed is the interrelations of economic and social roles. If the aging are to play a diminished economic role, and the need for this is not overly well established, then need this necessarily influence social roles? In those countries with firmly established extended concepts of employment and retirement, is the social involvement of the elderly with the family and community, and vice versa,

undermined? At the conference in Singapore, several papers were read examining the economic situation of the elderly and presenting excellent examples of the type of analysis which we are encouraged to incorporate into cross-cultural studies. Robert Clark (1987) explained the theoretical measurement issues indicating the required level of detail for questionnaires. It would be advisable to include an economist in any team setting up a survey of the aging.

On a different economic issue altogether, Naohiro Ogawa (1987) has clearly described the difficulties facing health insurance organizations in Japan. He has examined the cost of health services specific to age groups to identify the likely factors influencing financial viability for individual organizations. It is likely that the private insurance organization with older client populations will face serious difficulties in Japan and other countries.

Other contributors at the Singapore conference indicated the depth of analysis required to establish the economic well-being of the elder-

ly. Peggy G. Koopman-Boyden (1987) has used qualitative research techniques to investigate the attitudes towards and effects of retirement in New Zealand. John McCallum (1987) has presented a comprehensive analysis of the distribution of income levels and sources in Australia.

All these papers serve to demonstrate both the importance of economic factors for the well-being of the aged and the level of detailed analysis which will be required in cross-cultural studies. In addition, cross-culturally, it is necessary to examine the value of currencies and variations in the level and distribution of income for the whole community.

3.5 Social Relations

"Social gerontology covers the growing body of theory and knowledge concerning the aging individual as he is influenced by, and influences, society as it acts upon aging individuals and adapts itself to their presence and needs" (Skeet, 1983)

At the Singapore conference, Ross Harris (1987) reported that "From the social gerontology point of view, the survey should ensure that it is information on social change which is gathered, rather than a simple description of individuals growing older. Behind this principle is the assumption that aging is more a function of social change than of chronology. Researchers need to be keenly aware of the powerful selective effects which apply over time in determining the cohort which achieves old age. It is true that only the healthiest endure, but of central interest are the hard experiences that such people have come through and which interact within biological variables to produce a particular profile of aging in a particular population."

The evidence is that the least successful people in aging will be under-represented in an age specific survey. Longitudinal studies are required to fully explore the interrelation of social function and aging (Kendig, 1986).

The assessment of family and social relations should include structure and process. The structural focus should cover demography, family structure, etc. The process approach should involve the quality of relationships. This includes concepts such as "valued roles," developed by Wolfensberger, and "social exchange," developed by Sussmar (1975). The WHO four country study specifically examined this area.

The links between social relations, social functions, and economic role are important. All these areas interact directly with physical health, survival, life expectancy and the prevalence of social structures and functions. The contribution to be made by cross-cultural social gerontological studies is substantial, particularly in Asia and the Pacific, where there is such a diversity of cultures.

4. Results

The issues evolving from the studies relating to the aged can be grouped into three concepts; self, family, and community.

Self

The various surveys of the aged in Asia and the Pacific indicate relatively high prevalence of dysfunctioning in areas such as sight, hearing, walking, chewing, etc. Several strategies are applicable to the situation, including restructuring the environment, say, with better paths and closer facilities so that these dysfunctions do not become disabilities. Clearly, treatment and prevention programs are also beneficial.

Family

The research indicates the extent to which the aged are performing roles within the family. However, this is in an environment where the social and physical structure of the family itself is changing. Associated with the demographic

transition is increased life expectancy and reduced fertility. The proportion of each parent's adult life which is devoted to producing and rearing children is declining. This is evidenced by the increased involvement of women in many economies. It is natural that the role of the aged will alter in relation to this change in family function.

Discussions at the Singapore conference indicated that changes in the economic structure of the family may well be having an even greater impact on the role of the aged. Occurring simultaneously with the demographic transition in many countries is an economic transition which includes a decline in the role of the multi-generational family unit. This is in countries of varying political stance. In this transition, the predominant economic units are increasingly the state and the corporation. The aged no longer have a role of custodians and managers of the economic resources used to generate wealth for the whole family. Family structures change as the varying family members and generations work and live in disassociated locations. These changes are occurring in the developing countries now. It is clearly evidenced in factors such as rural-urban migration.

In parts of the developing world, the village or the extended family is still the predominant entity in the individual's social and economic interactions. The village can have an excellent capacity to provide and care for the aged. Fiji presents an interesting example. While there have been nursing home facilities there for several years, they were used by the Indian population, who are more urbanized and have more commercial economic structures. In recent years, the first Fijians have moved into the nursing home facilities. Supporting the aged in this type of society can mean supporting the village structure and the economic viability of the village. Further analysis is required. It would be unfortunate if the requirement for economic develop-

ment led to an unnecessary declining economic and social role for the village.

There are indications, however, that as these economic changes take place, the social role of the family may not be declining. Enrollments in homes for the aged cannot necessarily be taken as the result of disinterested families. The evidence does not suggest that the family is necessarily declining directly as a social unit (Wee 1983). In most countries surveyed, there were health levels of involvement of the aged in the family, but the families' social function is changing as a result of its changing economic function.

Community

The changing role of the multigenerational family or extended family unit has coincided with the increased prevalence of formal employment and retirement. Once again the valued role of the aged is under threat as retirement can be a separation or exclusion from many of the valued roles available in society. This is an issue which is more relevant in the more developed countries

The new economic structures place a higher priority on formal education and mobility of employment. Yet the average 60 year old today, in many countries, is less well educated than the next generation of 30 year olds. Furthermore, with new technology, an education obtained several decades before can be quite obsolete. For example, an average 60 year old today obtained whatever education he or she had as a child before the commercialization of the transistor. Research in western countries and in China indicates that with the exception of the old old, the middle aged and older populations only very slowly lose their ability to learn. What is lost is their working knowledge of learning techniques. Research shows that many will respond to training in the type of learning techniques which are often taught to the young in schools (Ku Shilian et al. 1987). The con-

clusion is that aging people perform fewer valued roles because their educations are inappropriate or have become obsolete and that their continuing contribution and involvement in the community is undermined by overly formal and structured employment and retirement.

Conclusion

The changing role of the aged is a result of many factors including increased survival, reduced fertility and the changing social and economic functioning of the family. There are many initiatives which will enhance the involvement of the aged, including:

- preventative and treatment programs to reduce the prevalence of dysfunctioning, such as problems with sight, hearing, walking, chewing, etc;
- changes in the physical environment to reduce the extent to which dysfunction becomes a handicap;
- attention to the location of the dwellings of the aged and the physical environment surrounding the dwellings to enhance the ability to participate in and contribute to the community;
- re-examination of alternatives and the social cost of inter-and intra-country migration to the aged and the young;
- analysis of the processes of economic change and development to ensure that the social and economic roles of the aged are not unnecessarily undermined;
- re-education for people in their forties and fifties to keep their education and training current and relevant;
- re-definition of concepts of employment and retirement to facilitate ongoing involvement of the aged in appropriate activities;
- re-definition of personal and community concepts relating to personal relationships, social interaction, and ethics, particularly within the family, to adapt to the changing social and economic role of the family.

The aging of the population

is one of the greatest triumphs of the twentieth century. It is a direct consequence of increased life expectancies. Many of the aged, particularly the young old, are relatively physically and mentally fit. The responsibility now is to develop and modify the concepts used by the individuals within the community and policy makers to ensure that aging is not a barrier to participation in the family and the community and to giving and receiving love.

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The Elderly and Quality of Life in Nigeria

Dr. B.O. OSUNTOKUN

*Professor of Medicine (Neurology), University of Ibadan
Chief Medical Director, University College Hospital, Ibadan, Nigeria*

Introduction

In the world today, there are some 290 million elderly persons (above the age of 65 years) and this population is growing at a rate of 2.4 per cent. Three quarters of the world's population currently live in developing areas although such areas presently contain only 54 per cent of the world's elderly. Yet aging in most developing countries has not yet emerged as a dominant or important social phenomenon, but the situation is likely to change dramatically in the not too distant future. In many developing countries epidemiological transition is taking place, with decline in birth rates and infant mortality, improvements in control of communicable diseases, nutrition and living standards resulting in increased life expectancy. The projected increase in the population aged 65 years and over, between 1980 and 2000 AD is about 138 million, with 100 million in the developing areas (32 million in China, 17 million in India) and 38 million in the developed countries (10 million in the USSR, and 7 million in the USA).¹ It has been pointed out that every month, the net balance of the world's population (over the age of 55 years) increases by 1.2 million persons and that of this increase 80 per cent occurs in developing countries. Besides, the estimated 370 million older persons (over the age of 55 years) who currently live in the developing world will increase to over 1 billion within the next 3 decades: the population growth rate for persons aged 55 and over in developing countries (at 3.1 per cent) is three times as high as in the developed world.² By the year 2025 it is estimated that the 60 year olds in the developing

countries will constitute 12 per cent of the world total population and 72 per cent of the elderly population in the world.³ According to a United Nations Estimate, 60 per cent of the persons aged 80 or over will live in developing countries by 2025 and eight of these developing countries will have over 1 million octogenarians.⁴ It is obvious that the rapid increase in the absolute and relative numbers of the elderly and of the proportion of the very old, particularly in the developing countries has considerable implications for public health and social policy. It is appropriate and apposite that in the last decade, both the United Nations and the World Health Organization (WHO) have shown special concern about the care of the elderly: the latter, on the advice of its Global Advisory Committee on Health Research and following a resolution by the World Health Assembly in 1987, has launched a Special Programme for Research on Aging.⁵ A WHO Global Program for the Health of the Elderly was launched over a decade ago. A United Nations World Assembly on Aging was held in Vienna in 1982. Even as far back as 1958 WHO convened a meeting in Norway of an Advisory Group which considered the public health implications of aging populations. It is most welcome that the Vatican is joining in arousing the conscience of the world on the need for special concern for the care of the elderly by organizing this conference on the quality of life of aging people in different parts of the world.

The Demographic Situation in Nigeria

Nigeria, with an estimated 100 million inhabitants and

occupying a surface area of 913,073 square kilometres, is the most heavily populated country on the African continent, whose total population is currently about 400 million. Nigeria also has the continent's biggest urban population, about 30 million (30%), the exodus from the rural areas having been precipitated by the oil boom of the last fifteen years. Two decades ago, only about 15 per cent of the population lived in the large cities: for 1975 the percentage was 21.

In spite of the oil boom, today Nigeria is a typical developing country with per capita income of about US\$500.00, and battling with problems of socio-economic development for her teeming masses against a background of a depressed economy, plummeting petroleum prices, and the bitter but essential economic structural readjustment program. Although no acceptable census has been conducted since 1963, available data show that about 6 per cent of the population are aged 65 years and over. The population growth rate of 3 per cent is unacceptably high. As in most other developing countries, the rural areas have a higher proportion of older people, because of migration of the younger adults to the cities. In both urban and rural areas, the proportion of women aged 65 years and more tends to be higher than that of men. Women outlive men. The average life expectancy at birth is 54 years, a sizeable increase over the 45 years of a decade ago.

Changing Pattern of Disease

The pattern of diseases is changing.⁶ Although the commonest causes of death and morbidity are infectious dis-

eases (acute respiratory infections, the diarrhoeas, malaria, tetanus, measles, etc.), nutritional deficiencies, especially malnutrition-related disorders in children, the noncommunicable disorders, and the so called diseases of affluence have begun to emerge. Circulatory disorders (including stroke) and cancer are common and ischaemic heart disease is becoming frequent. Accidents constitute the commonest cause of death in the third and fourth decades. In the elderly, for reasons as yet unknown, dementia of the Alzheimer type is virtually absent,⁷ but other age-related disorders, such as osteoporosis and fractures of the neck of the femur, are common. Some other age-related degenerations of the nervous system, such as Parkinson's disease, are somewhat less frequent among Nigerians as compared with USA Caucasians and Blacks.⁸ In Nigeria, with its 17,000 doctors, there is not a single specialist in geriatric medicine.

Health Care and Social Services

Health Services in Nigeria have undergone major development and improvement since Nigeria became independent in 1960. In precolonial days the main thrust of the health services was directed to maintaining the health of the civil servants, and the 80 per cent or more of the population who lived in rural areas depended mainly on traditional medicine. However, over the past decade the situation has changed for the better in that the government's policy is to provide modern health services for the total population based on primary health care (PHC). In the last three years, the tempo of implementation of the PHC scheme has quickened.

Health care services in Nigeria as of now have a pyramidal or thatched roof structure. (Nigeria is a Federation of twenty-one states and a Federal Capital, with

311 local councils). "Constitutionally," the local government councils assisted by the governments of the states, have responsibility for PHC, the development of which is the cornerstone of the Federal Government's health policy. The governments of the states are responsible for secondary health care, including implementation of active preventive health services and some rudimentary tertiary health care as well. The Federal Government maintains the 14 teaching and 6 specialist hospitals which provide the bulk of tertiary and specialized services, coordinates preventive health services and is responsible for international relations in health as well as control of drug importation and certain drug policies. A National Council of Health, presided over by the Federal Minister of Health, whose members include appropriate officials responsible for health matters at the level of the state governments, ensures integrated coordination of health policies. Prior to 1986, funding of health care services had generally been regarded as inadequate, although there might also have been problems due to faulty management, inappropriate prioritization of what was needed, and incorrect decisions on the application of what was known to what had to be done. In 1981, for example, only 1.7% of the budget of the Federal Government was allocated to the health services: at the levels of the state Governments the percentages ranged from 2% to 20%. In 1986, the share of the budget of the Federal Government allocated to health was a laudatory 6.3%, although this level has not been sustained for 1987 and 1988 (the developed countries spend between 6% to 12% of their GNP on health services). To increase spending on development of health services, it is planned to introduce a national health insurance scheme, details of which are being worked out. Although health care services are not free, they are heavily subsidized. There is a large

core of private health care service, mainly in the cities. Even now, perhaps up to 60% of the population rely only on traditional medicine. Some indicators of the health care services in Nigeria include the following: 1 doctor per 6,000; 1 dentist per 100,000; 1 Pharmacist per 24,000; 1 trained nurse per 2,000; 1 trained midwife per 2,400; 1 social health worker per 200,000; and one bed per 1,250.

There is little or no social security service in Nigeria in terms of government assistance for the unemployed or the destitute. About 5 per cent of the population who are employed in public service or the organized private sector earn a pension which is not index-linked to the rate of inflation. Most Nigerians are self-employed. In the public service, employees retire at 60 years of age or after 35 years of service, whichever comes first, although in the judiciary retirement age is 65 years and for others, on special dispensation, it can be extended by an annual contract till the age of 65 years. The pension can be up to 70 per cent of the last annual salary earned (for judges, the percentage is 100%). Pensioners, if over the age of 60 years, are entitled to free medical treatment.

There is no facility for institutionalized care for the elderly except as a long-term hospital patient. There are no provisions for nonclinical residential accommodation (such as geriatric or old people's homes, nursing homes, homes for the aged or dependent), as has been available for decades in some developed countries.

Social Care of the Elderly

Against the background of the information given on health care and social services in Nigeria it would be expected that social care for the elderly is completely the responsibility of the family. As of now, this in fact is the situation, in spite of the pro-

found effects on the structure of the communities and family life created by the rapid social change following industrialization, urbanization, and related processes. In Nigeria, as in other developing countries, sociocultural factors such as strong familial and kinship bonds and high respect for the elderly play a significant role in ensuring effective care of the elderly and the aged within the family. This is evident, even among the socially lower and poorer communities. In consequence older persons are not segregated from the family and the neighbourhood.

The elderly in Nigeria are held in great respect, veneration, and admiration for their wisdom and tact. Nigerian culture in its respect for the elderly is fully consonant with the view that a society's worth is judged by the manner in which it treats its old people. The elderly represent the apex of authority in the family and in the immediate community. While elderly males assume the additional roles of elder "statesmen," advisers and counsellors, elderly females play a significant role in the upbringing of grandchildren and the children of close relations and may also serve as counsellors in maternal and child health, and even as birth attendants. In the rural areas in particular, the elderly also serve as purveyors of traditional health care.

Even with the aculturation and deculturation of modern times, the exodus of youths to the city, most Nigerians have retained strong links to the extended family system. The elderly make periodic visits to the cities to the younger members of the family, particularly on the occasion of the birth of a baby, or a wedding, or to provide a welcome change from the traditional environment. The elderly are also assisted by the children of relations, and this is enhanced where available by an adequate and convenient transport system that encourages the children to regularly return to the villages to spend time joyously

with the parents. This dependency of the elderly on family support, especially from the children, is a basic tenet of the Nigerian (and African) culture. The hope of parents is to be survived by children; indeed, for those aged 50 or more, it is the goal of life. The death of a child or a young person is regarded as a disaster. To be buried by one's children, preferably in old age—is the ambition and prayer of the Nigerian, as it is the crowning glory and finale to a good life. The Yorubas of Nigeria say that only those who are buried by their children can claim to have had children and that otherwise children are nothing to rejoice about (especially since they could die before parents, causing them great misery and unlimited sorrow). In Nigeria, three main events are celebrated with pomp — birth, marriage and the death of an elderly person who is survived by children

The Future

Although in Nigeria, as in most developing countries, the family currently provides virtually all care and support for the elderly, everything should be done to encourage persistence and maintenance of this culture, which, of course, is not unique to the developing countries. For example, in some developed countries, such as Japan (and the Koreas), when the first male child marries, he and his bride must live with his parents. A developing country such as Nigeria should make every effort to prevent or halt the growing fragmentation of the traditional communities (in which everybody is his "brother's keeper") and the progressive disappearance of the extended family.

Nevertheless, it is certain that in the near future there will be a need for long-term care, especially for women, and for meeting the literacy and educational needs of the elderly. In all countries more people live longer than before. It is important that gov-

ernments of developing countries accept the need to extend social security and services to cover more than just a small minority of the elderly population, to pay special attention to the problems of the aged and to the organization and management of health systems devoted to their needs.

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A Tunisian View of Longevity

Professor *MONGI BEN HAMIDA*

Director of the National Institute
of Neurology, Tunis

The image of the old changes in relation to the kind of society, civilization, and mentality in each period. If it is true that in certain primitive societies the elderly were mercilessly sacrificed, in other Nordic and African societies, those of the North American Indians, the ancient Chinese, and classical Greece and Rome — along with that of our era — they have been the object of consideration, esteem, and privileged treatment. We should recall the stirring tribute to old age which Cicero is said to have rendered through the aged patrician Marcus Porticus, the depository of law, past collective experiences, and oral traditions. In Arab and Islamic societies devoted to war and commerce, the elderly have symbolized authority and wisdom and hence continuity.

Definition of the Arab Family

Many words have been used to designate the family in our Arab-Moslem societies: *AYLA* and *Ahl* are preferred terms in the Koran, along with *UÇRA*, which is reserved, above all, for the couple and their children. Interestingly, the popular terms *ED Dar* and *EL Bit*, meaning 'house' and 'roof', designate the family.

The Arab-Moslem family is agnatic and patriarchal, with a father as head of the household. There is a conjugal cell and a domestic group with relations at once broad and closed. The traditional family brings together all the individuals joined by kinship ties; they live in community under the authority of a male member. Within the group, filiation is patrilineal — the eponymous forebear is esteemed-but the female, and through her the uterine family, is kept in an inferior position. Daughters, regarded as a repro-

ductive force, marry within the group. Islam arose in this agnatic society, and its influence has served, in relative terms, to reinforce the conjugal bond within the group by sweetening the condition of women and valuing the uterine family. Relations within the group are characterized by authority and modesty. In effect, relations among individuals are governed by a general rule: respect for those of greater age and the elderly and modesty between the parents themselves and between parents and their children. Spouses thus do not call each other by name, and a woman will not speak of her husband except by referring to him as "the master of my house and of my roof" or the *Chibani*, or old one, whereas the husband will not utter the name of his wife, but use instead the term "wife," "daughter of others," or "daughter of the other." In more modern usage, spouses refer to each other as "my Lord" and "my Lady." The first-born are always designated by the term *Sidi*, and an aged father is sometimes referred to as "old Papa, Sidi."

Greatness of the Past

The presence of a grandfather or older person in a family helps to maintain a certain cohesion and moral authority in social decisions (marriages, divorces, division of inheritances, and so on). Literary descriptions of such grandfathers may be poetic or realistic. They are depicted as characters retreating into their past and the glories of by-gone times who are always disgusted over current generations, frequently regarded as lost and misguided.

Let us take a look at the writing of B. Ali and Louis (1947). Uncle Youssef represents one of these characters:

"Uncle Youssef lets his thoughts wander far and wide. He goes off to his day of glory, the cavalcades, the fiery blows sounding in the night. He remembers the days of his total power, when his name imposed silence on the children, when he was the pride of his children and the family: no one dared approach them; even if they had slept with the doors open, no one would have dared enter their olive grove or their fields...."

He evokes the days of his "indomitable strength." All of this presents a narcissistic, authoritarian image, or perhaps an affectionate, tender one.

Uncle Khemayes, this other experienced old man, the one found in all peoples and all times, set against a youth that is "thoughtless and daring" but still respectful. Uncle Khemayes represents tradition and the long-established wisdom which the men of the new generation, vigorous and enterprising, are sometimes tempted to forget, though life itself makes them feel an immense need for "faithfulness" and "balance." Let us listen to Ben Ali and Louis (1951) speaking about it: "Time has given him its lessons and nourished him. For him the world has not ceased to change.... His children have white hair, the children of his children have become men and have founded families. His house seethes with women and men. When he steps in, the noise stops, but once he has left, what a madhouse!" Wearing by the ways of the townspeople, who spend their time relying on others, unable to imagine a solution for themselves, all shouting in unison: "As long as you're to guide us, we won't abandon you. Who is more skillful than you in straightening out such a mess? One slip can cost the price of a camel."

Changes and Quality of Life of the Elderly

Many phenomena have contributed to social and cultural disorganization. Colonization at the end of the last century introduced a new kind of model for life. The most modern French culture has brought about a crisis latent in the Arab and Moslem Zitouna University, which is essentially theological and traditional. In this context the elderly remain the center of authority. If they lose their strength or health, they are cared for by the family, like orphans, widows, and the poor. They are usually taken in completely by the first-born son and sometimes by daughters. Then some difficulties arise in certain couples, in spite of the tacit moral contract which all men who marry cause their wives to enter into. But even in the midst of this family structure, in the case of a widower surviving the grandmother, a new marriage sometimes takes place to ensure a minimum of comfort in his personal life. These situations do not fail to create conflicts, especially when such a marriage involves a young wife who may have children. In addition to the conflicts brothers- or sisters-in-law may experience with their younger brothers or sisters, an unusual situation may present itself when the old person dies, leaving behind older children now married, on the one hand, and a young widow with little children, on the other.

In the case of illness, the family is not likely to consent to taking the grandfather to the public hospital and much prefers private hospitalization to ensure its care and presence close to him. The hospital is frequently regarded as a prison for the old or the place where they will die. As for asylums,

there are still just a few, and they remain not at all popular. Nevertheless, in the history of all Arab societies we find asylums and hospitals, above all in the large cities: Baghdad, Cairo, Kairouan, etc. In Tunis there was an asylum for the elderly in the heart of the city in a restored building, one of those lovely traditional homes; the abandoned and some beggars were sheltered there.

Taking someone to a nursing home represents a shock and for most people is a sign of decadence and abandonment, particularly when the subject is aware of the fact that he is "useless." This is perceived even more clearly by elderly women who are cast aside when no longer in a position to perform normal household tasks, especially the care of children while parents are at work.

In Tunis there is a Manouba asylum where men, generally younger and healthier, fit in better than women.

Different activities are proposed to them: carpentry, engraving, agriculture, etc. Culture sessions are organized, with films or religious meetings, excursions, and so forth. The retired people are free to come and go, leave the home, visit the café, see their friends, etc. They also receive mandatory visits from the family, which is obliged to make a material contribution by law. As we see, a certain decline in the elderly's quality of life is currently perceptible, particularly in the large cities. The elderly no longer find the traditional social and family fabric. They sometimes feel uncomfortable in a small lodging with children hardly sharing anything with them. Traditions weaken, and old age is no longer looked after in present-day society as it was in the past, with the obligation of community responsibility.

Current and Future Problems

The youthfulness of Tunisian society — 50% of its members are under twenty — is accompanied by relative aging on account of a drop in fertility and mortality. Those 60 or over represented 2.58% in 1946 and 6.67% in 1984. They will be more than 10% in 2005. The mortality rate for senior citizens is also dropping, and life expectancy, which was 47 in 1950, is now 62 and will be 70 in the year 2000.

In contemporary Tunis there are two ways of life, one traditional and more anchored in the south of the nation and in the countryside and another contaminated by progress and more frequently found in the capital and large cities. In the south and the countryside, the exodus of young couples to other places within the nation or elsewhere leaves the old in the villages. Nevertheless, in those rural areas of the south there are more parents and fathers- or mothers-in-law living in their children's homes (11%) — the national average was 8.5% in 1984. What is more, between 15% and 18% of married children live with their parents, whereas the national average was 7% in 1984. These facts may be explained by the greater frequency in such regions of traditional lodgings (84%) (in 1984 the figure was 41% in the capital). The elderly increasingly seek to have professional activity for as long as possible. The activity rate after age 65 is 26%, and after 70, 19%. Fishing and agriculture absorb the largest share (8.27%), whereas commerce represents only 4.5%. All of these elements contribute to the disintegration of the family. The older man is no longer a patriarch, but often spends his time in the home of the first-born or in a succession of his children's homes. In

many instances, where living standards are high, homes are linked by telephone and contact is thus maintained among all the family members, particularly those outside the country. The independence of all is thereby ensured, but how do the elderly experience these transformations? As long as health is satisfactory and economic resources are available, there are no serious problems, and by-gone glories are forgotten. But in the case of invalidity, illness, or the solitude of widowhood the dramas begin and prospects of many aged people grow dark. One would have hoped that the improvement in the quality of modern life would have been accompanied by an increase in the joy of living for the elderly, who are frequently closed within their past lives. Current organization offers Tunis eleven centers for protection of the elderly (six in the north, three in the center, and two in the south). There were thirteen only a few years ago. Material and psychological difficulties led to the closing of two facilities, in Gabes and Medenine, where traditional life is still in force. In any event, these eleven centers care for 905 people, amounting to 0.21% of the total elderly population. This is, of course, reassuring for the fortunes of the elderly in Tunis. It must be recalled that living conditions of young couples, employees, office workers, and government staff are so difficult that the elderly's quality of life makes itself felt considerably. Many young people seek employment together with their aged fathers. In this regard, farmers, merchants, and some in liberal professions generally offer their elderly parents better living conditions, taking them under their protection or remaining close to them.

Consequently, we are now experiencing a transition period in Tunis in which the elderly still maintain a certain prestige in rural or well-to-do environments evolving towards decline and the possibility of a place in a protection center for the aged. Whatever the case may be, well-placed elderly people are still quite

limited in number, but the number of those who are neither well-placed nor integrated into their environment tends to increase. A new awareness will enable us to avoid a harsh conclusion to life for our elderly.

Summary

In traditional Tunis the elderly maintain traditions and watch over the application of society's rules for life. They remain an authority in the event of conflict and a reference point for wisdom and enlightened counsel. Respected and venerated, they are taken under the protection of the family community. After coloniza-

tion this image became disfigured, especially in the wake of World War II, independence, and the weakening of the Zitouna traditional Tunisian University. Social change, the movement of young couples from rural areas to cities, the reduced space of city dwellings in comparison to family lodgings in the countryside, and the precipitation of psychosocial transformations make it increasingly difficult to receive an aged person into one's care in the current lifestyle. Families continue to bear the brunt of the burden as regards this responsibility. For the time being, filial love constitutes good protection against placing the elderly in specialized facilities.



Health, Happiness, and Longevity

Dr. ALEXANDER LEAF

*Department of Preventive Medicine,
Harvard Medical School*

Good health is the most important ingredient in the recipe for attaining longevity and a high quality of life. Though life expectancy is not an ideal index of the health of a society, it is generally the yardstick by which health of populations is evaluated. There has been a remarkable change in life expectancy for men and women since the beginning of this century. In 1900 life expectancy at birth was 47 years; today it is over 70 in the United States and still higher in several other countries. This has resulted in a much larger proportion of the population attaining the status of senior citizen. A short while ago I would have told you that the age group over 85 is the most rapidly growing segment of the United States population; today I must correct that statement and indicate that it is the over 100 year old age group that is increasing most rapidly.

Human longevity is not, however, open-ended. There has been no increase in the maximal attainable lifespan; more of us, however, are living longer within the limits of biological survival. Few responsible gerontologists today are making predictions of a breakthrough in the human lifespan. There appears to be a limit to life that is not set by disease, but rather seems inherent in life, as aging brings a gradual loss of our abilities to respond adequately to environmental stresses. What, then, is the limit of human life? Like other natural and biological phenomena the answer must be given statistically. Assessment of the facts by Dr. James Fries (1,2) leads him to conclude that the normal human lifespan is some 85 ± 7 years. One in about 100 individuals aged 65 will live to be 100, but at age 85, only one

in 10,000 will reach the age of 110, and the odds of living to be 115 are probably one in 5 billion! The claims of unusual longevity in certain parts of the world are undoubtedly exaggerated, as I have learned from personal experience (3).

These demographic changes have been associated with marked changes in the major causes of death. In 1900 pneumonia and influenza were the leading causes of death in the US, and infections accounted for five of the top ten killers. Diseases of the heart and strokes ranked fourth and fifth, respectively, among the top ten causes of death at that time. Today, of infectious diseases, only pneumonia and influenza remain among the top ten leading causes of death, whereas heart disease, cancer, and stroke are now the major killers. These are all diseases associated with aging and they are the products of our affluent living.

Despite these remarkable changes in life expectancy there are still some 12 million years of life lost per year in the United States due to premature deaths before the age of 65, and two-thirds of these unnecessary deaths are potentially preventable by what we know today. Use of tobacco leads the list. There are some 5000 funerals daily in the United States and tobacco use contributes to 1700 of these — one third of premature deaths are estimated to be attributable to tobacco! Alcohol abuse, injuries, and unintended pregnancies are also high on this list. These are causes of premature death which strike early in life whereas one out of every five males in the United States will develop coronary heart disease by age 60, and one-half of heart attacks in males, the leading cause of

preventable death, occurs before the age of 65.

With cardiovascular diseases, especially with coronary heart disease (CHD) and strokes, remarkable progress has been made in preventing these conditions and the mortality from them. Although we do not yet completely understand the atherosclerotic process at the cellular and molecular level, a wealth of epidemiologic evidence has identified risk factors associated with heart attacks. Some of these are not modifiable because they are genetic factors, including family history of atherosclerotic disease, male sex, and aging, but a large part of the risk seems to be associated with modifiable risk factors for most of us. These modifiable risk factors include elevated plasma cholesterol levels (high low density lipoprotein cholesterol and low high density lipoprotein cholesterol), arterial hypertension, cigarette smoking, type 2 diabetes (that which comes on with obesity in middle age), obesity, physical inactivity, and some form(s) of stress.

Awareness of these risk factors by the public has had a salutary effect on mortality from CHD and strokes in the United States. Since 1968 there has been a 40 percent reduction in CHD mortality and a 50 percent reduction in mortality from strokes. These changes have not occurred uniformly throughout the industrial developed world, unfortunately. Some countries, like the US, have experienced a decline, whereas others have suffered increased CHD mortality over the same period.

There has been much debate as to who deserves the credit for this salubrious outcome in the United States. It now seems clear, however, that only minor credit for the reduced

CHD mortality in the US goes to improved medical care, despite the introduction of much expensive high technology and invasive procedures into the routine management of coronary heart disease. Major credit goes to behavioral changes adopted by the public (4,5). There has been a reduction in cigarette smoking among adults from 53% among males in 1964 to 33% in 1985 and a reduction among female adult smokers from 34% to 28% during the same period. A considerable reduction in consumption of dairy fat, eggs, and animal fats and oils has occurred while fish and vegetable fats and oils have increased in the American diet see Table 1 (6). There has been a national increase in physical activity (7). Hypertension control has improved in some segments of our population. Associated with these behavior changes the National Health and Nutrition Examination Survey, 1960 to 1980, documented a significant decrease in the mean total serum cholesterol levels among US adults of ages 20 to 74 years (8).

As I mentioned earlier, good health is the most important ingredient in a high quality of life. This may be particularly true as we age, since the maladies all too frequently associated with aging are chronic, uncomfortable, or painful, and unrelenting, such as arthritis, angina, congestive heart failure, kidney failure, claudication, strokes, and cancer. They sap the joy of living. There has, therefore, been a chronic worry that any extension of life expectancy will be associated with an increased period of agonal misery. That is why I stated earlier that an increase in life expectancy may not be a satisfactory index of the quality of life. Several observations, however, provide reassurance that such need not be the case. First, as Fries has emphasized (1,2), with a biological limit to the lifespan which has not increased, any prevention of illness will increase the years of good health and, of necessity, thereby compress the duration of morbidity. As more of the population in developed countries

are now living longer and approaching the biological limits of the lifespan, increases in life expectancy at birth become a decreasingly sensitive index of the health of the population. We need to measure morbidity, as well as mortality, in order to document the state of health of a population and thereby the effect of good health on the quality of life. Preventive measures will proclaim their contribution to health through a reduction in morbidity even more emphatically than through an extension of life. Second, the dogma that disease prevented early in life will only be postponed to some later age is not necessarily true. Aging and disease are not synonymous. Although it must be true that the longer the lifespan, the greater the possibility of some affliction occurring, it does not mean that a disease prevented is merely a disease delayed. Contrary to this assumption, which seems to be accepted by policy makers, the recent, overall 30 percent reduction in coronary heart disease mortality in the United States affected nearly equally all age groups, including those age 85 and above.

In the course of travels made for the NATIONAL GEOGRAPHIC magazine (9), I had the opportunity to visit some remote areas where people were alleged to live to extraordinary ages. I was having growing concerns, as the beds in my hospital, one of the most technologically sophisticated and expensive in the world, were filling up with dying elderly patients who often had advanced heart disease, cancers, strokes, and dementia and for whom we had little to offer medically. I visited the then kingdom of Hunza, which is hidden in a remote valley among the towering mountains of the Hindu Kush where Sinkiang Province of China and Afganistan abut, the low Caucasus Mountains of Russian Georgia, and the Andean village of Vilcabamba in southern Ecuador. The hope that I might learn something from aging populations who preserved their health and vigor into extreme old age

that would be applicable to matters at home, motivated my travels. I saw many interesting and vigorous elderly people, although there was no possibility on these visits to document objectively the ages claimed or the uniqueness of the age distributions. Later I learned from the careful documentation by Mazess and Forman (10) that stated ages in Vilcabamba were grossly exaggerated. The oldest citizen I met there died after my visit at the respectable old age of 93, but not at 134, the age claimed for him during my visit. No centenarians existed in the community of 819 persons, contrary to claims for nine centenarians made by the Ecuador Bureau of the Census.

What I saw in these travels was a monotonous litany of similar lifestyles. All three places have stable agrarian cultures where the old people had labored hard, eking a bare living out of the thin soil on the mountainous slopes of their small farms. Vigorous physical activity began at an early age and never stopped. Diets, as shown in Table 2, were largely vegetarian, by necessity rather than by choice. In Hunza, where the land was too precious to permit animal husbandry, meat was essentially restricted to festive occasions during the long winters when the Mir (king) would slaughter a few yaks and every Hunzakut would share a morsel of the resulting barbecue. Fat intake was very low by our standards even in the more affluent Caucasus. The social structure of these agrarian communities provided strong psychological support for the elderly. No one retired or "was put on the shelf" to feel redundant and useless. Chores changed, but the elderly continued to do tasks that, though less vigorous, continued a useful role for them in the community and supported their self-esteem. Old age was greeted with respect rather than derision, and the elders were valued for their wisdom. These are not conditions likely to endure in our mobile, "educated," industrialized cultures.

Table I - Change in Per Capita Consumption of Various Products, 1963 to 1980^a

Product	Percent Change
Cigarette tobacco	- 27.1
Milk and cream	- 24.1
Butter	- 33.3
Eggs	- 12.3
Animal fats and oils	- 38.8
Vegetable fats and oils	+ 57.6
Fish	+ 22.6

^a Figures for calculating percentage changes were obtained from the US Department of Agriculture and compiled by WJ Walker ⁶

Table II - Daily Diets of the Elderly

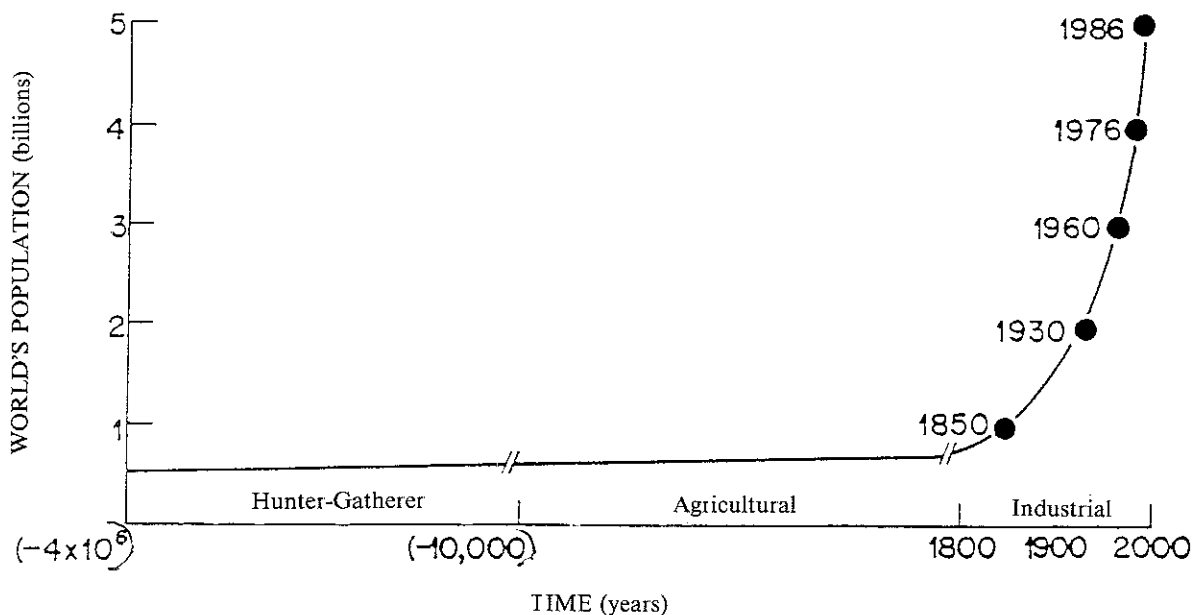
Reference	Energy (kcal)	Protein (g)	Fat	Carbohydrate (g)
Vilcabamba ¹	1,200 to 1,360	35 to 38 ^a	12 to 19	200 to 360
Caucasus ²	1,700 to 1,900	70 to 90	40 to 60	150 to 300
Hunza ³	1923	50 ^b	35	354

Data are from Dr Guillermo Vela,¹ Professor GZ Pitzhelauri,² and Dr Maqsood Ali³

^a g of protein from animal sources

^b Meat and dairy products provide < 10 percent of total.

FIGURE: THE WORLD'S POPULATION GROWTH



In later travels I was struck by the apparent concentration of centenarians in the coastal villages of Japan, especially in Okinawa (11). Subsequently, a story has unfolded that perhaps is relevant to the phenomenon. The story began with the careful epidemiologic observations of Bang and Dyerberg (12) of the Greenland Eskimos. They noted that despite a diet as high in fat as that consumed in Denmark and the United States, the age adjusted mortality from CHD among the Eskimos was only one-eighth that of Danes or Americans. The lipid composition of the Danish and Eskimo diets revealed striking differences in their fatty acid composition. The Danes consumed twice as much saturated fats as the Eskimos, but most striking was the large proportion of n-3 compared to the n-6 fatty acids in the Eskimo diets. The long chain, polyunsaturated, n-3 fatty acids are derived largely from marine sources: fish and mammals which consume fish, such as seal, walrus and whale. There is increasing evidence that these n-3 fatty acids when ingested are incorporated into the phospholipids of our cell membranes and exert strong antiatherogenic actions. In experimental animals, both swine and monkeys, the n-3 fatty acids have been shown to prevent coronary heart disease (13,14) and there is considerable epidemiologic evidence that they may exert the same beneficial and protective effects in humans (reviewed in 15). There are also a number of demonstrated biochemical and physiological actions of n-3 fatty acids which should have antiatherosclerotic effects (reviewed in 15). It is now appreciated that these n-3 fatty acids are essential fatty acids, which we cannot synthesize, and we are dependent upon our diets to provide them.

One may speculate on who is "normal." Is it the average Westerner with essentially zero levels of these n-3 fatty acids in plasma phospholipids or the Greenland Eskimo with these fatty acids well represented in plasma phospholipids? Eaton and Konner (16) have reported a thought-provoking study on



paleolithic nutrition. According to them the paleolithic diet, consumed during a period of some 4 million years, during which time our genetic patterns were established, was that of hunters and gatherers. The diet of our forebears, thus, was high in protein and cholesterol but low in total fat, approximately 20 percent of calories, with a high ratio of polyunsaturated to saturated fatty acids. Much of the polyunsaturated fatty acids were the n-3 alpha-linolenic, eicosapentaenoic, and docosahexaenoic acids resulting from the ingestion of meat of range-fed animals. Green leaves and grasses synthesize n-3 fatty acids in their chloroplasts and mosses and ferns contain the long chain n-3 fatty acids, eicosapentaenoic and docosahexaenoic acids. About 10,000 years ago, agriculture was introduced and with it came human dependence on grains, which led to an increase in total saturated fatty acids and n-6 polyunsaturated fatty acids, linoleic and arachidonic acids. In the last two hundred years, the Industrial Revolution and the emergence of agribusiness with processed foods, grain-fattened livestock, and hydrogenation of vegetable and fish fats have further reduced the content of n-3 fatty acids and increased n-6 fatty acids and saturated fats in Western diets. These changes in diet, together with smoking, arterial hypertension, indolence, obesity, diabetes, and some forms of stress, have conspired to create the present epidemic of cardiovascular disease that accounts for approximately one-half of all deaths and huge health costs in affluent Western industrialized countries.

Interestingly, when provided with some affluence and offered the fatty meats, refined sugar drinks and junk foods, as well as the indolence of affluent societies, there is no hesitation in accepting these presumed benefits of modern living and discarding habits which for ages have provided protection from atherosclerosis. Apparently one can only dream of a society which possesses the blessings of modern sanitation and medical care but

in which the citizens preserve the dietary practices and physical activity of their forebears in a smoke and pollution-free environment!

Vigilance in the quest to prevent disease and foster good health requires constant effort. The risks to good health are not static, for we are now creating new risks at an unprecedented rate. During the past millennia, many species have become extinct because they could not maintain successful reproduction in the face of a changing and hostile environment. Other species better adapted to survive and to reproduce have replaced them. Finally, evolution has produced us, *Homo Sapiens*, who are not physically impressive but whose brain has made our proliferation incredibly more efficient than it is in any other species, as Daniel Koshland has recently stated (17). As a result, the population of the globe has lost proportion, and the number of human beings threatens many other species and may soon exceed in numbers the capabilities of the earth's resources for its needs — see Figure, "The World's Population Growth." But even before that limit is reached, humans are consuming the earth's resources and despoiling its bounty at an unprecedented and accelerated rate.

Deforestation threatens a green house effect from accumulating carbon dioxide in the atmosphere; desertification brings drought and famines; chemicals released already have created an ozone hole in the stratosphere; garbage disposal and toxic wastes pollute our lands and waters; nuclear weapons threaten our very survival. Overpopulation and rapacity are the forces driving these environmental and ecologic threats, and the quality of life and health in the near future is very dependent on the ability of all people to stem this population explosion. The larger the population, the more difficult it becomes to curtail this exponential growth in numbers. Our biological success may be our social disaster.

On a more cheerful note, let me conclude that a healthy, vigorous, long life should be the future for the elderly pro-

vided that people take responsibility to adhere to healthy lifestyles and protect a salubrious social and physical environment.

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The Challenge of the Problems of Aging in China

Professor SHEN YUCAN
Beijing Medical University

16 It is well known that China is in the critical process of modernization and industrialization. Along with progress in medical care and the economy in this country, the population and family structure are undergoing a remarkable change. The life expectancy of the Chinese population was 67.88 years in 1981 and 68.92 in 1985, twice as high as that of about 30 years, before the founding of the People's Republic of China (*Health Paper*, Feb. 24, 1987).

The proportion of the elderly in the population is steadily increasing nationwide, especially in major cities. In Shanghai, for instance, the proportion of those aged 65 and over was 7.43% in 1982 and 8.50 in 1987, according to the population sampling survey in 1987 (Jie Fang Ri Bao, Nov. 13, 1987). It is expected to reach 14% by the year 2000. In Beijing those aged 60 and over were 9.2% in 1986 and are expected to reach 15% by the year 2000 (*People's Daily*, Overseas Edition, Jan. 21, 1987). As the aging process in our country will be even more accelerated in the next century, the 65 and over population is expected to reach 15% by the year 2025.

The causes of death in the Chinese population have also changed. According to statistical data from several major cities in China in 1985, the first three causes were cerebral vascular disease, cardiovascular disease, and cancer.

Family structure has changed very quickly as well in recent decades: extended families have diminished while nuclear families have increased. Data from the national census survey in 1982 showed that the average household had 4.4 members, whereas this figure dropped to 4.2, according to the national

population sampling survey in 1987.

Since the government still emphasizes the importance of maintaining oriental culture's traditional respect for elderly family members, the Chinese Constitution states that it is an obligation for those young couples who are working to take care of their aged parents.

For the time being there are still close ties among the members of Chinese families, particularly in rural areas; they support each other emotionally and economically, and in the two or three generations now observable live in the same village or share the same land.

Yet the capacity of the family to care for older parents has decreased. If it is very difficult for couples today to take care of their elderly parents at home, it will be even more difficult for those of the next generation to take care of their four parents, especially if they both come from one-child families. Along with these profound social changes, we are facing the challenge of serious problems in the social, economic, and medical fields.

How to enable the aged to enjoy life, how to go on using their rich experience and knowledge so they may contribute to society, how to provide them with a place for their daily activities and adequate medical care — these have all become critical issues in my country in recent years.

The State Committee for the Elderly in China decided that the responsibility for care of the aged would be taken on not only by the family, but also by their previous employers and related government bodies.

A series of clubs, associations, and centers for the elderly were thus organized by the authorities at different lev-

els in the major cities: fishing clubs, chess clubs, sports associations, and so on to enrich their social life.

Some maladies, such as severe cognitive impairment and age-related dementia, appear to involve the gravest handicaps and sufferings. An epidemiological study on age-related dementia in an urban area of Beijing was performed in 1984 by a team from my Institute, Beijing Medical University, with door-to-door screening of those 60 and over using the MMSE cognitive test. Each person suspected of severe cognitive impairment was carefully interviewed with GMS by two psychiatrists using DSM-III diagnostic criteria with a few modifications.

The rate of moderate and severe dementia was 1.52% in the 65 and over age group, but increased with age. The rate in females was much higher than that in males, as has been reported as well in developed countries. If our population were standardized with that of the U.S. in 1984, the dementia rate would be 3.2%. But it seems the real figure was not so low in China. Furthermore, all those suffering from severe cognitive impairment were cared for by family members at home — no one maintained contact with a medical facility. It thus appears to be important to disseminate information on severe cognitive impairment and how it may be treated at home among primary health workers and family members in order to distribute the burden of care more equitably.

In October 1987 an international conference on age-related dementia was held at my Institute, with the support of the Neurosciences Division of the St. John of God Brothers' International Foundation. Nine experts from seven countries were invited, and the

most up-to-date information was exchanged. With the enthusiastic encouragement of this conference, a team of collaborators for the study of Alzheimer's disease in Beijing was organized, and it is now spreading throughout the country to promote research on and care for older patients.

Alzheimer's disease is only one example which clearly indicates the urgent need to improve health care for and the quality of life of the elderly in China, to promote their mental health in particular.



Quality of Life of the Elderly in West Germany

Professor A.G. HILDEBRANDT

Director of the Institute for Drugs, Federal Health Office, Berlin

Allow me to express my sincere gratitude for the honor of being invited to contribute to the round-table discussion. It is a difficult task to discuss in ten minutes, as requested, a view of the beauty of life and how to reach old age in the best conditions.

1. The Situation in West Germany

As a result of the high standard of living and medical developments, the number of people over 65 will double from the current 14.4% to about 28% in the year 2030 (Table 1). In the same period it is expected that the population will decrease from 61.2 to 44.7 million inhabitants.

The number of incapacitated people will increase from today's 2 million to 2.4 in the year 2000, and to 2.9 in 2030. Today about 80% of those over 65 are cared for at home. Nursing homes and hospitals take care of about 20%, the incapacitated.

There are about 7300 nursing homes in the Federal Re-

public of Germany, including West Berlin, with about 560,000 places available offering various kinds of care to meet diversified needs in view of the highly individual process of aging with regard to mental, behavioral, and social outcome variables (2).

Of course, most of those over 65, some 80%, enjoy a normal life, endowed with the "freedom of age" and capable of meeting the challenge of successful aging.

In the light of these developments and more or less foreseeable eventualities, it is appropriate to ask what successful aging is and how pharmacology, particularly regulatory pharmacology, can contribute to its success.

2. The Role of Pharmacology

Pharmacology is the science of man considered as the target of medical treatment using drugs.

To reach this goal it needs a knowledge of the nature of man — i.e., aging man — a theory or at least a hypothesis on the possible benefits of

the interaction of a compound with a target tissue or organ, and means to judge efficacy, a tolerable risk, and indicators to measure success and side effects.

If one follows modern discussions on aging (3), one must consider, for a pharmacological intervention strategy, an aging body with its reduced reserves and vulnerability to illness. Aside from these two aspects, pathological aging, normal aging, and optimal aging must be distinguished, along with other attributes of the process. Starting from the premise that any process of successful individual development includes three components — selection, optimization, and compensation, i.e., adaptability — Baltes (3) has proposed a psychological concept of successful aging the realization of which depends on the specific personal and societal circumstances which individuals face and produce as they age. This concept visualizes success as a participation in aging which aims at longevity, but even more on quality of life.

The lack of suitable

parameters of medical intervention to measure the quality of life — i.e., both subjective and objective parameters — is a paramount problem. If the primary goal of drug treatment in successful aging is to reach longevity and quality of life, these end-points must be measured. So far, however, no life-prolonging drugs are available, nor are sufficient parameters known to measure effects on the quality of life. Certainly there is a need for new quality of life measures differing from known ones insofar as they are based on explicit conceptual models of health and are evaluated for their reliability and validity. It seems that current predictive science is coming to an assessment of the quality of life (4)

Regulatory pharmacology must provide support for these methodological aspects while also watching carefully to ensure that no ineffective drugs are provided by industry.

Until now neither selection nor optimization as premises of successful aging can be supported pharmacologically for lack of drugs and/or methodology

3. Drug Influence on Adaptability

If one starts from the loss of reserve capacity and an increase in vulnerability to illness — i.e., decreased adaptability — then it is pathology that primarily produces a qualitatively different organism in old age, and not aging itself (3).

The basic problem thus appears to be how to compensate for reduced reserve capacity and increased vulnerability.

Are there means to restore adaptability — i.e., increase activation of reserve capacities while diminishing or postponing vulnerability towards illness? And do we have means to measure reduced reserve capacity and its activation?

Means are as yet very limited and difficult to test. Improvement of basic functions needed for adaptability, such as vigilance, is of the utmost importance. To support vigilance pharmacologically, an expression of the body's capacity to regulate different states of activity, as well as mobilization and utilization of reserves, is highly significant (5)

Vigilance and its loss are intimately connected with dementia. Since in Germany (Table 2) the percentage of patients with severe dementia reaches 10% to 30% of the respective age groups, increased research and care are urgently needed to develop efficient drugs and, even more, tests enabling us to predict or verify improvement under conditions of limited brain function (sclerotic vessels, infarction, degenerative processes with altered tissue)

Thus far geriatric therapy aims at:

- * avoidance of aging (e.g., antioxidants);
- * regeneration or revitalization (e.g., Procain);
- * substitutions to compensate for age-dependent deficiencies (vitamins, trace elements, and hormones);
- * mitigation of age-dependent complaints (6).

All existing drugs achieve only limited results at best, for various reasons. We may cite some of them:

- * overlooking the fact that the etiology and pathogenesis of brain function disturbances are heterogeneous and difficult to detect; they are of different origin, though often following a common terminal path;
- * sticking to outdated explanations;
- * neglect of pharmacokinetic principles

4. Misuse of Drugs

A further problem which pharmacology has to face is the use and misuse of narcotics, neuroleptics, and tranquilizers in hospitals, nursing facilities, and home care. The

difficulty is not self-administration by health staff, but the use of these drugs on the elderly to maintain calm; independent behavior is suppressed, so that what Baltes sees as necessary compensation for the loss of former abilities cannot be achieved (a situation sometimes rudely but precisely named "Grannyfarming" in the U.K.).

5. Conclusion

The limited success of pharmacological treatment until now in improving age and particularly in promoting successful aging derives from the fact that longevity and quality of life are more or less matters of lifestyle and standard of living; as a result, a joint consideration of all means is essential for improved or successful aging

Individual and societal efforts are thus a prime requirement to compensate for deficits, in addition to restoration or support of basic functions by drugs.

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Increasing number of charges (1)

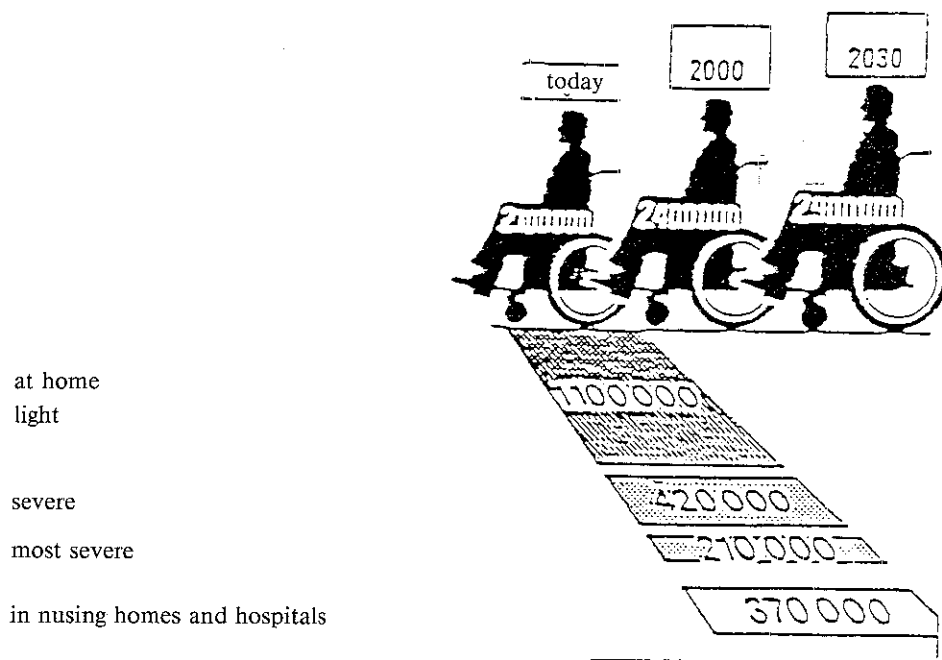


Table 1

Population in the Federal Republic of Germany

<i>Estimated Inhabitants year</i>	<i>total</i>	<i>65 and older total</i>	<i>%</i>
1984	61.2	8.8	14.4
2000	58.3	10.3	17.6
2010	54.7	11.5	21.0
2020	50.1	11.5	23.0
2030	44.7	12.5	28.0

(in millions)

Table 2

Percentage of severely demented persons (1)

<i>years</i>	<i>percentage</i>
65 - 69	2.4 - 5.1
70 - 74	5.3 - 9.1
75 - 79	10 - 12
80 - 90	20 - 24
90 and above	above 30

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