Aging and the Aged in Contemporary Society

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The history of the human family is rich with the search to unravel the snarls of aging–to prolong life. Decline appears to characterize aging and the aged: loss of status and job; loss in family and societal roles; loss of friends, relatives, and, with many, loss of health. Evidence, particularly from longitudinal studies, is accumulating to separate aging from disease. Viewed in terms of what capacities remain, most older persons have more than sufficient capacity to cope with alternative life styles. Continued research of the long-lived peoples of the world provides the reality of normal aging that will deny the myths and the medical model of aging.

How old is the search for prolongation of life or everlasting youth? Although these two are not always the same, both reach far back into the longings of peoples.

In Greek mythology, the Goddess Aurora persuaded Zeus to bestow immortality upon her husband Tithonus. She did not consider what immortality could be like, however, and she failed to ask Zeus to also grant Tithonus eternal youth. Her loving husband grew more and more disabled and prayed for death to free him.

In Chapter I of "Kings," the story of King David's dying exemplifies the often heroic attempts today to hang on to life. He was old and ill, and a variety of ministrations had failed. As was common at that time, a young virgin was sought to comfort and cherish him, but "the King knew her not." It was too late. Today we have tested this idea in a laboratory with rats–the reverse of the more typical approach of finding clues in studies with rats, with extrapolations of results to human beings; aged male rats were found to respond favorably (more active generally, and specifically sexually) when a young female rat was placed among them.

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The *Old Testament* makes many references to age, specifically old age, but none perhaps so poignant as Isaiah's vision of new heaven and new earth "where men will live so long that one who dies at age of 100 will be considered a mere child."

The search goes on, the search for prolongation of life and everlasting youth. Some centenarians have never married, others have had several wives. Some have never smoked and have been teetotalers; others are smokers, and drink a bottle of wine or hard liquor each day. Balmy climate is probably not critical since many cold spots of the world have their share of old people. Some still look to peaches and apricots, symbols of longevity in China, assumed to be the reason for the 150-year life span of many of its inhabitants. Some look to the steady diet of yogurt of the herdsmen and peasants in Bulgaria and Romania as an answer.

Two recent independent studies concerning the identification of predictors for longevity, one in the United States,[1] the other in the Soviet Union,[2] demonstrate the necessity to question the thesis that genetic endowment determines longevity. The assumption has been that if parents had long lives, offspring would repeat the pattern. Both investigators found that age of death of mother or father showed almost no correlation with tendency in families, which underscored the importance of environ-

mental factors. When age is controlled, the four strongest predictors are related to work satisfaction, happiness, physical functions, and tobacco use. Palmore formulates these four into the following rules to increase the probability of longevity:

1. Maintain a useful and satisfying role in society.
2. Maintain a positive view of life.
3. Maintain good physical functioning (not necessarily an absence of disease).
4. Avoid smoking.[2]

Since, in most parts of the world, the average age of death is about seventy years, inheritance must have some significance. The genes are no doubt importantly related to the potential for life span. Investigators generally agree, however, that life-style and the environment modulate to shape the actual life span.

WHAT IS AGING?

Is aging the sum total of those symptoms of old age that the assorted remedies of the television commercials purport to correct: stiffened joints; stained, loose dentures; tired blood; lack of pep; constipation (masquerading as irregularity); loss of memory; and insomnia?

Is aging a second childhood characterized by little or no ability, by great dependency on others for decisions, by need for contact with relatives and friends, by little need for sensuality or sexuality? Does aging result in a group of people–*the aged*–who are all alike, generally living in institutions, invalided, or at best ill? Is aging what we think of when we see some old persons: grayhaired, wrinkled, stooped, sitting alone on a park bench clutching a paper bag, staring vaguely over glasses with clouded eyes, or maybe even dozing? Is aging a question of choosing your parents, a question of heredity, or is aging a function of how we live, a result of the environment?

Is aging a psychological process? One often hears that older persons are conforming, forgetful, easily depressed, paranoid, and unable to learn new skills. Is aging a social process? "The older years" is clearly a period of changing social relationships and pressures; contracting life space with loss of friends, loss of occupation, loss of prior role in family, loss of income, loss of status. Some elderly do appear asocial, withdrawing from activity, uninvolved with current issues or people.

Surely aging must be a biological/physiological process. Add to those obvious changes already mentioned, failing sight and hearing, slowed movements, and shortness of breath. The picture can be further filled out by details all too familiar. Further, the increasing years bring more bouts with chronic disease.

Another less frequently emphasized reality, which points up the nature of human growth, is the striking lack of homogeneity among the elderly which is contrary to a widespread myth about aging. In a sense, the older we become, the closer we come to an ultimate expression of individuality–the flowering of a life style. The aged are no more alike than all women or men or children of any age–indeed less so.

Fundamental to aging is variety. The rate of aging differs considerably from one individual to another. Abilities and functions do not decrease in the same way in any one person, and particular functions or abilities may age at different rates in different individuals. Most marked variations in rates are found in comparison of human populations in widely different ecological conditions: the Massai of Africa, Maabans of Africa, Abkhasians of Georgia in the Soviet Union,[3,4] the Japanese, and the Euro-American city dwellers.

Interrelatedness of all phases of life is highlighted when any one factor is severely altered in quantity or quality, a fact that has long been recognized both by authorities and lay persons in the study and care of children. The *whole child* philosophy has provided us with productive commitment for research and practice in education, medicine, sociology, psychology, and psychiatry. This approach has provided valuable information and a proliferation of institutions devoted to childhood and adolescence. For example, providing the physically handicapped child with appropriate braces that support locomotion is no longer adequate. Only by concern for the emotions, the intellect, the social and physical environment of home, school and community, and only by concern with food for thought and for fun, for growing as well as being, shall we be able to understand the dynamics of being human at five or ninety-five.

The reality of human growth and development does not cease with adolescence or young

adulthood, middle age, or even old age. We are what we have been, where we have been, with whom and how. We are our genes, our individual heredity, and all that has been bequeathed to the human family for the millions of years of its prehistory and history. We are our experiences, plus all the culture that has developed during the evolution of the human family and the culture that is. We are, as individuals, the crossroads of interaction of the genes and environment that find unique expression in each of us. Human aging is understandable only when we explore the interaction of all facets of the individual: physical, social, and psychological within the physical and human environment of the society.

Birren has said: "*Aging:* refers to regularities of transformation that occur over the life span in a number of species and result in differences between young and old organisms in both structure and function."[5] Chinn has said: "*Aging* is the deterioration of a mature organism resulting from the time dependent, essentially irreversible changes, intrinsic to all members of a species such that with passage of time becomes increasingly unable to cope with the stresses of the environment, thereby increasing the probability of death."[6] For others, aging includes the sum total of changes that occur throughout the life of an individual, not attributable to accident or disease.

When does aging begin? At conception? At birth? After maturation? Workers in the field could defend each of these stages as the initial time. Aging is, therefore, a relative concept still suffering from societal adoration to youth, obsolescence, and novelty. Aging, these changes with time, are not reserved for the magic sixty-five and over. They cover the gamut of being human, and are best examined as part of a continuum; a life style in a complex, rapidly evolving society that is morally and technologically in flux.

THE AGED TODAY: SOME STATISTICS

The 1970 census provided interesting up-to-date information about the age of the society.[7] A transformation has occurred in the age structure which is still going on: since 1950, the over sixty-five age group has increased 63.1 percent as compared with the under forty-five age group which increased 30.5 percent. Approximately 21 million people are over sixty-five years and, since 1900, this group has grown six and one-half times larger, while the under sixty-five age group grew only two and one-half times larger. The oldest part of the older population is increasing at an even greater rate; the median age of elderly today is seventy-three years. In 1971, approximately 29 million people were over sixty years.

One million people are over eighty-five years of age and about 13 thousand are centenarians. If the present low birth rate continues (almost zero population growth in 1971) and the current low death rate is maintained, the "guesstimate" is that between 29 and 33 million older Americans over sixty-five will be living by 2000 A.D. Equally important, if a major biomedical breakthrough occurs, and if persons working on problems of prolongation of life succeed, more spectacular age changes can be expected. By the elimination of the major killers of persons over sixty-five years, cardiovascular/renal disease and cancer, an additional fifteen to twenty-five years could be added to life expectation at age sixty-five and could extend the life span to eighty or ninety years.[8]

Contrary to myths, over 95 percent of older Americans live within the community and are not institutionalized. About one-fourth of the elderly live below poverty level, however, so the aged who make up 10 percent of the population compose 20 percent of the poor of the nation. In 1971, 25 percent of older Americans had an annual income of less than $1,500 a year, while 60 percent of persons over sixty-five years had less than $2,500 a year. In the late 1950s, the federal government estimated that a retired couple needed between $2,700 and $3,400 per year to live modestly. Today, over one-half of families of the aged have less than $3,000, and half of those aged who live alone have less than $1,000.[9,10]

Older families have a median income consistently less than half that of younger families. Median income of older people living alone or with nonrelatives (as of 1971) is $2,199 per year, and one must consider that median means that many exist with incomes far below that, and some with incomes considerably above.

Although low income is not always the culprit in disaster, often poor nutrition, poor

housing, and poor health follow, with critical effects on freedom, individuality, usefulness, and independence. Unfortunately, money frequently is one of the major determinants in the quality of life at any life stage. Perhaps its importance grows only more exaggerated during the last half of life. Other resources of life space are being depleted as well: relatives, friends, status, energy, opportunity, and self-image.

REALITIES OF AGING: SOCIAL, PSYCHOLOGICAL, AND PHYSIOLOGICAL

Can we develop a perspective about aging, one in which being old may be viewed not as the feared, diseased end of a human life, but a legitimate stage of human growth and development? Can being old be a period, as any other part of life, that may be filled with challenges, rewards, prospects for choice, and continued growth as a person? What do we know? What are the realities?

Reaching sixty-two or sixty-five years is a critical social event. It is surely not, in the first instance, a physiological or psychological landmark, but it has the potential for quickly becoming critical. The chronological fact, a birthday, spreads its influence into the emotional, social, and physical aspects of a person's life quickly and often dramatically. At times, from one day to the next, a number of expectations and roles have been suspended: occupational, familial, and community. The urgency for daily or long-range goals may change. Reduction in income may necessitate another change, a move to smaller, often strange living quarters. This change, coupled with less frequent visits to friends, church, physician, entertainment, and recreation, creates an even narrower slice of life.

Real or imagined differences may occur in attitudes from children, former colleagues, neighbors, and local shopkeepers. Even those with some measure of financial security develop anxiety about whether their money will last long enough, and so they restrict their daily living. Loneliness may follow; a lack of purpose pervades, so difficult in a society oriented to work. Time, the agent of change, hangs heavy. Inevitably, the kind of disadvantaged person so far described, with drastic income reduction and in social isolation, will be drained emotionally, and, no doubt, will exhibit a variety of coping or noncoping behaviors.

Signs of confusion, a lack of motivation, sensitivity to criticism, conforming behavior, and excessive demands on others may be evident. This last characteristic perhaps can be seen as a technique to make up for the lack of attention and apparent decrease in importance to others. With some decline in memory and learning efficiency, self-confidence falls and self-depreciation is not far behind. A whole lifetime no longer is available, as in childhood, to search for the changing identity, a new niche. Significantly, however, intellectual function—conceptualizing, judgment, verbal ability—decreases very little if frank disease of cerebral blood vessels is absent.[11]

What happens to the physical resources, the energy levels, the major body processes that provide the individual with the wherewithal to *be* (in the society) and to *feel*? Can we really measure the total physiological impact of a loss of status, or of spouse, and the depression that may follow? The resulting biochemical changes, compounded in the many organ systems, may lead to gross physical changes that then reinforce the failing self-image, and the alienation. "Why bother? No one cares, there is no *right place* for one such as me."

Most functional processes show a general but gradual decrease. Among the earliest progressive changes with time, and clearly dominant, are those of the locomotor system with a decrease in muscle strength, speed of motion, and skeletal flexibility. Coordination suffers and the reserve for maximal performance is jeopardized. Perhaps the most common change with age is a decrease in the capacity to readjust to change, a decrease in capacity to return to equilibrium after any kind of stress.

The passage of time results in altered structure and function of most of the organ systems, leading to a slowing down of many responses.[6,12,13]

1. Decrease in speed of conduction of the nerve impulse, probably at the synapse.
2. Decrease in renal blood flow and filtration rate. The kidney evidences one of the more regular and general involutionary changes.
3. Decrease in cardiac output and stroke index.

4. Increase in peripheral resistance, related to the narrowing blood vessel diameters; increase in circulation time and systolic blood pressure.
5. Less air breathed per unit time and a reduction in basal metabolism with less oxygen available for energy production and synthetic reactions.
6. Increase in the average number of decayed, missing, and filled teeth in both sexes. Men and women between forty-five and seventy-nine years of age have more severe periodontal problems than the average for all ages between eighteen and seventy-nine years.
7. Less efficient stress response of the organism, e.g., a decrease in adrenal steroids in the urine, one measure of adrenal gland response to stimulation from pituitary ACTH.
8. Fall in the ability to ward off disease with a reduction of the stimulating thyrotropic hormone from the pituitary and less thyroid and thymus activity. On the other hand, the autoimmune response increases, so that, for example, cancer cells, which are recognized in the earlier years as foreign invaders and regularly eliminated by a variety of immune responses, are permitted to flourish more often with increasing age. Immune bodies or antibodies, or the cells that produce them, appear defective and often mistakenly destroy healthy tissue, leading to self-destructive or autoimmune processes.
9. Changes in digestion. Some familiar foods may become indigestible or at least productive of discomfort. The amount and activity of digestive enzymes decrease with age even in healthy adults. The flow of saliva decreases anywhere from the fifties through the eighties and nineties, and may present particular difficulty in the maintenance of adequate nutrition, prosthetic appliances, and healthy oral tissue.
10. Considerable change in absorption and utilization of essential minerals–Ca^{++}, Mg^{++}, K^{+}, and Na^{+}. Some researchers and clinicians have found decreased K^{+} in large numbers of elderly. Potassium (K^{+}) is a trace mineral crucial to normal nerve and heart muscle activity. Changes in dietary calcium (Ca^{++}) intake or absorption may be importantly related to the leaching out of Ca^{++} from the skeleton resulting in osteoporosis. Whether age alone is responsible for problems with nutrition, particularly with minerals, is difficult to evaluate. The difficulties could be the result of a life-long pattern of poor eating habits.
11. Aging of the sense organs throughout the course of adult life. Vision, taste, touch, audition, all evidence particular changes, e.g., the eye changes (dark adaptation, critical flicker frequency, and speed of pupillary contraction) are measurable. Changes in audition noticeable at adolescence, continue steadily thereafter with decreases in the highest frequency sounds between the ages of forty and fifty years.
12. Diminution in gonadal secretions; changes in elasticity, tone, and lubrication of genital tissue. All of these may lead to some discomfort or even dysfunction as a sexual partner, more frequently correctable than not. Interest in sexuality does not necessarily decrease. Masters and Johnson have noted that all that was really needed for healthy, satisfactory sexual activity even through the eighth decade of life was "a good state of health and an interested and interesting partner."[14]

Just as with many other physiological measures, as we age, changes occur in the sexual performance, in frequency, and in specifics of the act. No physiological or life rule requires either physical strength or sexual performance to remain at the twenty- to thirty-year-old level, and, conceivably, such earlier levels could be detrimental to the rest of the body economy.

Data from three independent studies over the past twenty-five years have indeed corroborated that although sexual interest and activity decrease, individual differences are great among men and women as well as between them. Further, interest in sexual activity is considerably greater than we have been lead to believe. Sexual life of the earlier years has much to do with the potential and reality of sexuality after sixty-five years.[14] The level and frequency of activity have psychological and social antecedents as well as physiological changes.

Why do these changes occur? We have clues and theories, but no definitive answers. Studies have been much more successful in exposing the changes rather than suggesting possible mechanisms. Three points about the nature and kinds of cells in growth and development may be helpful in understanding the mechanisms of change:

1. Some cells of the human body lose the capacity to divide or regenerate very soon after birth: cells of the central nervous system, muscle cells of heart, and cells of the skeleton and kidney. When these irreplaceable cells die, the available functional units may be reduced to a critical level in some instances. Those cells that remain may show the weathering signs of time with accumulated debris, such as aging pigments or even genetic error. These nondividing cells may become dysfunctional, contributing to such possibilities as forgetfulness, slowing down, heart failure, and decreased muscle strength.
2. Some cells maintain the capacity to divide throughout life, but do so at a continually reduced rate, e.g., skin, lining of the gut, blood cells, and liver. Even these cells may not be immune to accumulated damage or the effects of reduced body resources which could lead to excessive cell death or dysfunction.
3. Finally, collagen and elastin fibers, the connective substance between cells, change with age to become less soluble collagen and less elastic elastin, and may contribute to the inhibition of rapid and free exchange among cells. Diminished exchange conceivably could lead to cell starvation or toxic accumulations.

AGING AND DISEASE

Up to this point, disease has not been mentioned, only decrement in function. This decrement is particularly apparent in the homeostatic, integrative mechanisms that involve a number of links among the endocrine, nervous, and circulatory systems. The decrease may be reflected in a decline of speed and power, a decrease in rate of return to pretest levels after exercise or stress, but not pathology. Then, why is aging so often seen as disease? In contemporary society, with increased age, susceptibility to a variety of diseases does increase, and the rate of mortality also increases. How well then, how mobile is the older population?

While 67 percent of older persons outside institutions have one or more chronic conditions, 14 percent do not. Chronic conditions range from the mild and correctable, such as visual difficulty, to disabling arthritis, and include high blood pressure, diabetes, rupture, rheumatism, atherosclerosis, and broken bones. Approximately 81 percent of the aged in the community have no limitations on their mobility, 8 percent have trouble getting around, 6 percent need the help of another person, and 5 percent are homebound. Approximately 4 to 5 percent of persons in the sixty-five and over age groups are in nursing homes, homes for the aged, hospitals, mental institutions, and they suffer from many of the typical chronic and acute diseases: cancer, coronary dysfunctions, and organic brain damage. In comparison with those in the twenty to twenty-five year age group, persons over sixty years of age require six to ten times the number of hospital days (per 1,000 patients).[9,10]

In 1967, the three leading causes of death for the American population were the same as the three leading causes of death for those over forty-four years: heart disease, cancer, and stroke. The important point of difference is that the percentage of deaths from these three diseases increases with age.

In contemporary society, then, disease is often the companion of time, exaggerated by the social and emotional losses of increasing age; however, no causal relationship has ever been demonstrated between age and disease. Admittedly, we live in a culture whose progress has stimulated disease through pollution of water, soil, and air. Large numbers of vigorous, functional elderly, however, are everywhere. The functional level that remains in each of the systems of the body is more than enough to enable constructive living. A comparison of the seventy-five-year-old to the twenty-year-old is unreal. The requirements of living for older people do not include running to catch a bus or train, lifting or carrying huge packages, or necessarily playing a game of tennis, although a considerable number of elderly could match their younger counterparts in one or more of these tasks!

Preliminary results from recent research suggest that change alone, in almost any aspect of life, whether positive or negative, is a significant factor in heightened incidence of illness.[15] Since change from the middle to the later years in income, housing, capacities, roles, needs, opportunities, and human relations is widespread, change may come to be identified as a major environmental factor in the rate of aging.

Much data concerning the aged have been accumulated in the past by cross-sectional studies comparing the institutionalized, ill elderly with active college youth. Normative data about well-functioning elderly are sorely lacking; however, a beginning has been made. Longitudinal studies are providing much needed data from such programs as 1) Duke University Center for Study of Aging and Human Development, 2) The Gerontological Research Center, Baltimore, 3) The Fels Research Institute for Study of Human Development at Antioch, and 4) the Normative Aging Study, Veterans Outpatient Clinic, Boston. With the help of these data, normal values may be developed for coronary, kidney, glandular, and brain function for each decade of life. Health, then, will be viewed more readily as the capacity to cope with the changing demands of a life span, different needs being served by decreasing but adequate remaining levels of function. We may even learn to prevent or restore some of the decrement in function. Promise for this comes from the work of Dr. deVries who has been able to improve muscle strength, tone, and stamina with an exercise regime for seventy- to ninety-year-old men.[16,17]

Numerous experimental approaches include diet changes, vitamin therapy, and exercise. A variety of chemotherapeutic and dietary approaches include vitamin E and vitamin E-like compounds, reduced caloric intake, and more esoteric chemicals that are being evaluated for their effects on the rate of aging.[18]

The experts in aging, as well as society in general, emphasize loss, socially, psychologically, and physiologically. Perhaps the best scientific approach for now would be to evaluate remaining levels of functional capacities and seek to bring about changes in the society to better fit the human needs. When we look at society first, we deny the person and consider him a misfit. When functional levels, however, are viewed in terms of health, seen as not an absence of disease, but as a state of physical, social, and psychological well-being, the majority of the elderly are not found wanting. Attitudes of acceptance and support would lead to a satisfying role for the individual in society, and, in older persons, could bring about an improved self image, and an effort to maintain physical health and contribute to the society.

Normal aging, conceivably, could be more like the aging of the Abkhasian peasants from the Caucasus mountains of the Soviet Union.[3,4] These are long-lived peoples who appear to have an average life span closer to 100 years than to 70, who have no cardiovascular disease, cancer, or reported cases of mental illness. Many have maintained good posture, walk great distances, and even swim in mountain streams. Hospitalization is rare and is primarily for stomach disorders or childbirth. The peasants have no phrase for aging and those over 100 are called long-lived people. They expect to live long and healthy lives and so conserve energies, traditionally putting off sex relations until 30 years of age for the men. Many men retain sexual potency beyond 70 years. At least one man fathered nine children after 70, the last one born after 100, and he still had viable sperm when he was 119 in 1963. Work begins in childhood and goes on until death. The work load is reduced with the advancing years; some work four hours a day on a collective farm even after reaching 100 years of age. The 1970 Soviet Union census found more than 50 thousand persons over 80 years in Azerbaijan (borders on Iran and Turkey) and eighty-four persons over 100 for every 100 thousand persons, the highest such ratio in the world.

The existence of entire communities of such older persons must create serious doubt about the assumption that aging is disease. These people do, indeed, look old; their hair is gray, their faces are lined, many move slowly. Yet, those who have visited with them cannot say exactly how old they are—sixty-five, seventy, ninety or one hundred.

The fact that old persons are living in whom changes in appearance and function have not been accompanied by pathology gives credence to the probability of normal aging. The existence in western societies of large numbers of healthy, functioning elderly persons over 65

years–not vigorous youths, but competent, involved, independent human beings–rejects the "aging equals pathology" thesis. Medical advances, fed by the biological and technological revolutions, should result in significant reduction of chronic disease. The number of healthy older people will, therefore, increase even beyond today's proportion.

The elderly of the future will surely have different specific and general needs from the elderly of today. They will have profited from the continued advances in biology, medicine, and technology; from changed educational attitudes and opportunities; from the solutions to the acute economic restraints for all age groups in the nation; and from increased world-wide cooperation and exchange of information.

René Dubos, biologist and humanist, has said "one of the hopeful aspects of our times is the widespread acknowledgment that if things are in the saddle, it is because we put them there. The situation, however, is not irreversible–'Trend is not destiny.' "[19]

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