Postponement of aging-related disability

The authors discuss approaches to improving the functional capacities of older people through the prevention or postponement of disease and disability. Given suitable life-styles, environments and interventions, health and fitness can be maintained at satisfactory levels.

The aging process is influenced by life-style, environmental factors, health care, disease and genetic constitution. In general, life expectancy is greater in developed than in developing countries. Even in developing countries, however, some people reach advanced ages. The life expectancy of these survivors, say at age 65, may well be similar to that of people of the same age in developed countries (see table), because in many developing countries only the fittest survive. Older survivors in developing countries may prove to be even healthier and physically more vital than those in developed countries, where frail and sick persons have a chance to survive.

In populations with similar health programmes and disease prevalences, e.g., the Nordic countries, there may be marked differences in longevity, the implication being that people grow old in various ways. Clearly, a better understanding of the links between environmental factors and aging is desirable, so that societal planning can be enhanced (1, 2).

It has been observed that smokers and alcohol abusers grow old more rapidly in certain ways than nonsmokers and people who do not abuse alcohol. They also have lower muscle strength and lower skeletal density and stability (3–5). The menopause occurs earlier in smoking than in nonsmoking females (6). Smoking causes changes in lipid metabolism concomitant with an influence on aging-related changes in the balance between estrogenic and androgenic sex hormones (4). Age cohort differences in vitality (7) and state of health demonstrate the major influences of life-style and environment.

<table>
<thead>
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<th>Country</th>
<th>Year</th>
<th>Life expectancy (years)</th>
<th>at age:</th>
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<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
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<tr>
<td>Hungary</td>
<td>1990</td>
<td>65.1</td>
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<tr>
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<td>1989</td>
<td>76.2</td>
<td>75.5</td>
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<td>1985</td>
<td>63.6</td>
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<tr>
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<td>64.2</td>
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<tr>
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<td>1990</td>
<td>73.0</td>
<td>72.6</td>
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<tr>
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In addition to lifelong attempts to combat the negative consequences of aging, measures to prevent and postpone these effects merit the attention of people who are already old (8). The postponement of aging-related disability in older people depends on:

- avoidance of negative risk factors, such as smoking and alcohol abuse;
- slowing of aging-related decline in selected mental and physical functions, e.g., the rate of bone loss can be reduced through physical activity and adequate nutrition;
- maintenance of intellectual stimulation or physical activity, as well as physical retraining when necessary.

**Osteoporosis**

Osteoporosis increases the risk of compression fractures of the spine and of fractures caused by traumatic injuries, particularly in postmenopausal women. Fractures of the hip have also become common in males who have smoked over a long period. Many older people with long-lasting diabetes, diseases treated with cortisone derivatives, and endogenous or exogenous nutritional defects, are also at heightened risk of osteoporosis and lowered skeletal stability.

Estrogen replacement therapy, cyclically combined with the use of progesterone derivatives in doses individually adjusted to eliminate climacteric symptoms, slows down the loss of bone mass and so reduces the risk of fractures. Although the risk of side-effects, namely endocrine malignancy, thromboembolism and body water retention, has limited the use of this therapy, its overall effect, when the risk is properly handled, should be positive.

A calcium intake of up to 1500 mg per day in older people does not seem to have any unwarranted side-effects and produces a positive calcium balance.

Increased physical activity in older people slows the loss of bone mass and brings about a rise in the intake of nutrients, including calcium and vitamin D (9). It appears that daily walking gives skeletal stimulation without an obvious risk of skeletal injuries. Older people in developed countries may be at greater risk of osteoporosis than those in the developing world because of lower levels of activity (10).

Sedentary life-styles increase the importance of proper nutrition, particularly as too little exposure to sunlight limits the production of vitamin D by the skin. Clearly, in both developed and developing countries the abundant formation of skeletal tissue in the young provides a sound basis for countering bone loss at advanced ages.

**Physical strength and striated muscle function**

The later phases of aging are accompanied by a slow decline in the number of cells in striated muscle, as well as in its strength and speed of contraction (11). Yet, even at advanced ages, systematic training can result in improved strength and speed (12).

Because of their diminished reserve capacity, older persons should avoid life-styles that have negative consequences.

Meanwhile, a relative increase occurs in the amount of connective tissue in muscle. Tissue compliance, or distensibility, declines,
in part because of the aging of connective tissue also (13).

It is to be expected that a reasonable degree of physical activity will have clear positive effects on performance. Furthermore, even above the age of 70 there are good prospects for retraining after acute episodes that have a negative effect on vitality and functional

Adequate physical activity, intellectual performance, and social integration and engagement decrease the rate of functional decline.

performance. However, programmes aimed at the reactivation of older people have to be particularly carefully planned and systematically implemented because of the diminution of functional reserves.

Nutrition

The aging-related alterations in the gastrointestinal tract include atrophy of the gastric mucosa and reduced gastric secretion. Over most of the life span, aging-related alterations in the capacity to absorb nutrients are not pronounced. Constipation becomes more common as aging proceeds.

Factors other than aging dominate the nutritional problems encountered by older people, including decreased physical activity and emotional stimulation which influence gastrointestinal motility, drug effects, and diverticulosis of the colon. Isolation and depression may reduce appetite and increase the risk of nutrient deficiency, and age-associated changes in sensation and perception could influence food preferences. Obviously, the routine screening of nutrition in older people makes good sense.

Older persons should avoid excessive intake of saturated fats. A high triglyceride level is a risk factor for cardiovascular disease and mortality at ages over 70, but a high cholesterol level no longer seems to carry the same degree of threat.

With the exception of calcium and vitamin-D supplementation, there is little evidence suggesting that either the widespread use of general-purpose vitamins or the use of large doses of vitamin supplements is of value. On the other hand, the combination of aging-related disability and morbidity implies risks of specific dietary deficiencies. The generally lower levels of physical activity in developed countries may place older people at higher risk of inadequate nutrition, as the diet requires planning with particular care, especially if already low in calories. Comparatively high levels of physical activity in developing countries may help towards the attainment of adequate nutrition.

Oral health

Physical and psychological discomfort in eating may lead to reductions in social interaction, intellectual stimulation, appetite and physical mobility. Dental disease can limit the food choices and eating practices of older people and damage their self-image, social confidence, and mobility. The intake of starches and simple sugars exacerbates decay and increases the risk of tooth loss, as does tobacco smoking.

Older people with dentures often select soft foods, and this may increase the difficulty of attaining an adequate diet. Both the quality and quantity of food influence digestion: older people do not need teeth to obtain an adequate intake of calories and nutrients, but the absence of teeth may make it
difficult to ingest enough calories or fibre-rich foods to avoid constipation. This may be more problematic in developing countries where the prevalence of older persons without teeth is likely to be comparatively higher.

Some prescription drugs dry out the mouth and place older people at increased risk of caries, particularly in areas of teeth not covered by enamel. Aging itself does not markedly lower the production of saliva to the point of influencing chewing, but older people often complain about having a dry mouth, perhaps because of a lowered secretion of saliva between meals and, especially, during the night.

Infectious diseases and immunization

In developed and developing countries, influenza and pneumonia are leading causes of death among older people. In developing countries there is in addition a higher risk of tuberculosis and gastrointestinal infection. Older people in general are comparatively susceptible to infection, partly because of a decreased immune response and the presence of other conditions. Moreover, the response to vaccination may be less efficient in older than in younger people. Older people in institutions are typically at greater risk of exposure to infectious diseases compared to those living in the community. Of course, in many developing countries this may not be apparent, simply because of the relative scarcity of institutions for older people; and higher exposure at earlier ages in these countries may confer greater resistance to infectious diseases in older people.

Because pneumonia is frequently a sequela of influenza, efforts should be directed towards preventing influenza through vaccination, although vaccination against pneumococcal pneumonia may be more cost-effective in older people. In spite of poorer antibody responses to both types of vaccination in older as compared to younger people, they have been recommended for use in older populations.

Smoking

Smoking among older people has to be viewed in relation to diminished respiratory capacity, limitations on physical performance, increased osteoporosis and exacerbated tooth loss.

Smoking is associated with heart disease, stroke, hypertension, lung cancer and certain other cancers, emphysema and chronic bronchitis. Substantial benefits can be gained through smoking cessation at whatever age, many of them, such as improved respiratory function, being experienced immediately, and the risks of heart disease, emphysema and chronic bronchitis declining fairly rapidly. The trend towards mass advertising of tobacco in developing countries is particularly undesirable. Increasing rates of smoking in these countries are likely to heighten the risks of osteoporosis and hip fracture among older persons.

Early diagnosis and intervention are crucial.

Falls

Falls, frequently resulting in fractures, are a significant problem for older people, especially women. A reduction in their incidence, besides diminishing mortality and disability, would clearly produce financial savings in respect of treatment and care.
Most falls in older people result from the interplay of health-related, pharmacological, environmental, behavioural and activity-related causes. Some falls are caused by environmental factors, such as poor illumination and wet or icy surfaces.

Older people who are lonely feel more tired, have a lower opinion of their own health, visit health providers more often and consume more drugs than those who do not experience loneliness.

Attention to risk factors in the home, and the correction of impaired vision, should reduce the incidence of falls among older people.

Many falls are attributed to impaired balance. Certain factors, for instance a lowered efficiency of the cochlear organ, seem to be aging-related and presumably, therefore, not preventable. Particularly in developed countries, inappropriate or excessive medication, especially with sedatives, hypnotics, psychotropics, anticonvulsives and antihypertensives, often increases the risk of falling and is, of course, preventable.

The amplitude with which people sway from side to side when they think they are standing absolutely still increases at ages above 60–70. This decline in the ability to realign to the midline may be an important reason for falls. A generally poor physical condition, an orthostatic reaction due to drugs or dehydration, fatigue, and sensory deprivation may all tend to produce falls in older people. When examining older persons, health providers should find out to what extent balance has declined and whether the home environment needs adjustment so as to reduce the risk of falling. Improved illumination often makes an important difference. Sometimes fear of imbalance and falling causes greatly reduced physical activity, leading to accentuated frailty and therefore to a heightened risk of falls. The possibility of systematic balance training should be carefully considered. The generally greater physical activity and fitness of older people in developing countries may confer a trainability advantage that could result in a lower risk of falling.

Cancer

Although cancer is recognized as one of the main causes of death among older people, it may not be aging itself that leads to cancer, but lifetime exposure to carcinogenic compounds. The avoidance of such compounds throughout life can be expected to be of major consequence for the vitality of older persons. In general the most common cancers among older people are those of the lung, breast, prostate, colorectal region and pancreas.

Unlike many programmes for the prevention of stroke and heart disease, focused on risk reduction, cancer prevention also involves early detection and intervention. There is a need for simple, inexpensive and widely applicable screening tests for prostatic and certain other cancers. Unfortunately, many older people are not regularly screened. In developed countries, diverse explanations have been given as to why so few avail themselves of opportunities for cancer screening: fear of a positive result, lack of knowledge about treatment alternatives, false beliefs, unpleasantness of screening procedures, poor access to care, and so on. In developing countries, poor access to care may be the most potent factor.
Social risk factors

Social isolation, or the absence of social interactions, contacts and relationships, is recognized as a risk factor for disease and disability. The absence of social support is clearly linked to increased mortality rates. There is also a noteworthy connection between stress levels and susceptibility to disease. Thus bereavement is associated with immune suppression and elevated morbidity and mortality. In developed countries, early retirement, if it leads to social isolation and inactivity, may well have adverse effects on health. In developing countries, older people in rural areas are most likely to live with their families, but as urbanization takes place this becomes less common. The social integration of older people is undoubtedly influenced by family structure, the degree of social and cultural continuity, and the spatial organization of society.

Social isolation in older persons is evidently associated with increases in tiredness, visits to health providers, drug prescribing, and physical and psychological symptoms. Furthermore, just as the absence of social support tends to increase disease and disability, its presence may hasten recovery and help to maintain health.

Health providers should be able to identify older people who are at high risk, intervene to increase their activity, and offer advice on the obtainment of social support. Attention should be drawn to the resources that exist, assistance should be given with the building of networks, and relatives and friends should be educated and informed about the needs of older people. Moreover, all sections of society, including community groups and organizations, should be brought into the picture, with the aim of improving support activities.

Strategies for prevention

There is a lack of guidelines for judging the efficacy of interventions, and sound epidemiological data in developing countries are scarce. Consequently, uncertainties exist about the use of high-risk, as opposed to general-population, screening. Moreover, the absence of widely accepted criteria for determining what evidence is necessary for the formulation and implementation of preventive interventions remains a serious barrier to progress.

Preventive programmes for older people should be based on the following principles.

- Adequate physical activity, intellectual performance, and social integration and engagement decrease the rate of functional decline. Efforts to preserve autonomy may be vital in this connection.
- The capacities of the individual may well be developed and reactivated through social interaction and productivity in the widest sense.

Interventions aimed at promoting health and preventing disability should never be dismissed as too late.

- Personal life-styles affect functional performance and health. Because of their diminished reserve capacity, it is even more critical for older persons to avoid life-styles that have negative consequences.
- Early diagnosis and intervention are crucial since losses may be sudden and may accelerate without prompt attention.
Preventive interventions for older people should focus on the lonely, the tired and the bereaved, and on persons recovering from episodes of acute disease.

Older people who are lonely feel more tired, have a lower opinion of their own health, visit health providers more often, and consume more drugs than those who do not experience loneliness. Frequently, these manifestations are not caused by definable morbidity but are secondary to inactivity and social isolation. Preventive interventions should aim at improving physical strength, psychomotor speed, balance, social networks, and diagnostic and treatment criteria.

For older persons who are just tired, without obvious medical reasons, stimulation is possible through psychosocial interactions. Much can be done even without resorting to drugs. Patients may be influenced by negative stereotypical views of aging held by themselves, their families and/or health professionals. Thus, it may be necessary to communicate a high expectation for participation and contribution.

Too many older people, after episodes of curable disease, lose so much of their functional ability that they cannot regain previous performance levels. There is a need for careful and systematic help with reactivation which is often longer-lasting than that currently available.

Life-style, environment and genetic factors clearly influence the rate and functional consequences of aging. The precise reasons for differences in functional aging and in the prevalence of aging-related diseases between countries should be investigated and taken into account in societal planning.

Interventions aimed at promoting health and preventing disability should never be dismissed as too late. Older people undoubtedly have an interest in and need for such interventions. Just as risk factors have multiple negative consequences, intervention may have multiple positive consequences. It is generally accepted that negative life-styles in younger people should be avoided, and this is even more desirable in older people, who may be more fragile and have a reduced functional reserve capacity. The careful planning of health-promoting and disability-preventing interventions is essential for older people.

As reserve capacity declines, preventive measures become increasingly important. A better understanding of the causation of disease and disability is needed, and research is essential on the extent to which outcomes would be different if broadly based preventive interventions were conducted. Finally, the benefits of preventive interventions should be quantified: to what degree and for how long are they effective?

References


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**Diet and disease**

The type of diet prevailing in the industrialized countries is characterized by an excess of energy-dense foods rich in fat and free sugars, but a deficiency of complex carbohydrate foods (the main source of dietary fibre). Epidemiological research has demonstrated a close and consistent relationship between the establishment of this type of diet and the emergence of a range of chronic noncommunicable diseases, including, particularly, coronary heart disease, cerebrovascular disease, various cancers, diabetes mellitus, gallstones, dental caries, gastrointestinal disorders, and various bone and joint diseases.