Effects of the Aging Process on the Nutritional Status of Elderly Persons

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Epidemiologic studies commonly demonstrate nutritional deficiencies in elderly populations (1,2). Surveys of independent community-dwelling elderly persons show that the consumption of minerals and vitamins are below the recommended daily allowance (RDA) for up to 50% of subjects, and that blood levels are subnormal in 10% to 30% (1). In nursing homes, 30% to 50% of the residents are substandard in body weight, midarm muscle circumference, and serum albumin concentration, indicating widespread protein-energy undernutrition (2). Blood levels are frequently low for both water-soluble and fat-soluble vitamins (2).

It is a major challenge to differentiate the effects of normal aging from manifestations of treatable disease. Since humans possess considerable reserve capacity beyond that necessary for ordinary needs, it is unlikely that aging per se causes malnutrition in the absence of associated disease or stressful events. Although social and behavioral causes are probably important, alterations in digestive and metabolic functions might also have an adverse impact on the maintenance of nutrition in elderly patients. Normal senescence causes a reduction in some physiological gastrointestinal functions. Recent studies have shown alterations in pancreatic and intestinal functions (3,4). Most of these studies have been conducted using animal models. Moreover, these changes still leave the average older person with a significant reserve capacity. In this chapter we will focus on three topics:

1. Is malnutrition inevitable in the elderly?
2. What are the patterns of malnutrition in the elderly?
3. What are the capacities of the elderly to adapt to starvation and refeeding?

IS MALNUTRITION INEVITABLE IN THE ELDERLY?

The Aging Process Study (APS) of New Mexico (5) provides unique information regarding the consequences of the aging process on the nutritional status of healthy elderly persons living at home by obtaining in-depth information about dietary habits
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and nutritional markers. The APS is a longitudinal study of the nutritional status of 304 free-living elderly persons. The methodology of this study has been described in previous publications (1). Nutritional intake is assessed during a 3-day period using a detailed diet record and subsequent computer analysis (1). Garry and associates found no important modifications between 1980 and 1989 in the nutritional status of the subjects from the APS (5,6).

Anthropometric and biochemical markers, as well as dietary intakes, remained relatively constant over the 9-year period in this healthy elderly population (5,6). Changes in energy intake could be accounted for by a reduction in basal energy expenditure due to the decrease in lean body mass, possibly associated with reduced physical activity with aging. Neither anthropometric nor biochemical nutritional markers showed significant alteration with age. The aging process alone had no important consequences on the nutritional status of healthy elderly people and the apparent requirements in this healthy elderly population seem to be near the requirements for young adults, with few modifications (7).

WHAT ARE THE PATTERNS OF MALNUTRITION IN THE ELDERLY?

Although the average older person will have an important nutritional reserve capacity, there will be considerable variation about the mean in any elderly population. With aging an increasing proportion of persons at the lower end of the distribution will pass beyond a threshold, possibly after periods of stress, at which time the reserve capacity will be depleted and may no longer satisfy the needs of that individual.

Patterns of Malnutrition in Independent Elderly People

Most of the important changes in nutritional status seen in elderly persons are secondary to one or more of many extrinsic factors such as diseases, medication, trauma, and living situation (8). One typical characteristic of older persons is the inability to recover completely weight lost due to a stress such as surgery. Progressive undernutrition often occurs without being diagnosed. Physicians need to look systematically at the nutritional status of the elderly patient. Periodic assessment of weight must be done. Incapacity and disability often cause anorexia. Forty percent of all patients receiving parenteral nutrition and 50% of all patients receiving tube feeding are over 65 years of age (9).

Patterns of Malnutrition in Nursing Homes

Although the high prevalence of both protein-energy and micronutrient deficiencies among elderly nursing home residents is generally acknowledged, there is no
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consensus on the relative contributions of the many possible causes for these conditions. Inadequate nutrient content in the diet (e.g., vitamin B₆) may play a role (10). A more important factor is decreased total intake, which may relate more to the underlying disease diagnosis of the patient than to his age per se (8). Some nursing home patients cannot eat unless someone feeds them, and there are frequently not enough staff to perform this service. Moreover, the struggle of nursing home patients to maintain their dietary intake is compounded by the catabolic effect of repeated infections.

ADAPTATION OF THE ELDERLY TO UNDERNUTRITION AND REFEEDING

Alterations in the adaptative response of intestinal and pancreatic function to starvation and refeeding might have an adverse impact on nutritional maintenance in elderly patients. Holt found that the proximal intestine responds to starvation and refeeding by abrupt variations in the numbers of villus epithelial cells and in enzyme secretion (3). We recently studied the exocrine pancreatic function of 15 older people with poor nutritional status in a geriatric medical service. We found an important alteration of the pancrealauryl test (4,11). These results are similar to those in a population of adults with chronic pancreatitis tested in the same laboratory. Similarly, we measured the plasma cholecystokinin (CCK) release after a liquid meal in healthy adult subjects and in two groups of aged people, one composed of undernourished subjects and the other of healthy, well nourished elderly persons. In the young adults CCK rose from 1 pM ± 0.4 (SD) to 3.5 pM ± 0.8. In the two distinct groups of aged subjects, there was no significant difference in basal CCK levels. However, the maximum CCK value was higher in the elderly group with undernutrition than in the healthy elderly group and the young adult group. These results suggest that the postprandial maximum level of CCK is not increased with aging but with undernutrition. Such alterations might have an adverse impact on nutritional maintenance in the elderly (4). Ciocon et al. (12) recently published an 11-month prospective study of 70 tube-fed patients age 65 to 95 years. Weight gain occurred in no more than 6% of the patients at any time in the study period. Only 5.9% showed increased albumin levels at the end of the study.

Although normal senescence seems not to have important consequences on the nutritional status of healthy elderly persons, the adaptation of pancreatic and intestinal function to starvation and refeeding can be disturbed. Unfortunately, there are only limited data available that are related specifically to the use of nutritional support therapy for elderly patients. Further research dealing with the many complex issues of providing nutritional support to the elderly is clearly needed.

CONCLUSION

In conclusion, the aging process is not a cause of malnutrition in a healthy elderly population. Active elderly and young controls are nutritionally not very different.
In contrast, the acutely ill, chronically ill, and dependent elderly people are notably less well nourished than either of the former groups. The requirements are different for these populations. Hence, RDAs based on age alone may be misleading and of little use to individual persons. An alternative approach may be to derive formulas for individualizing the adult RDA for each nutrient by including coefficients for such factors as age, the presence of specific diseases, and laboratory test results (7,13,14).

REFERENCES