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Editorial

Nutrition and Aging Successfully

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It is now clear that nutrition and physical activity play a major role in allowing persons to age successfully.[1–3] Although at the beginning of the 20th century single-nutrient diseases, such as pellagra, beriberi, Wernicke encephalopathy, scurvy, and xerophthalmia, were common, these are now rarely seen in the developed world.[4] In the modern world, overeating leading to obesity has become a major problem, resulting in a variety of chronic diseases and disability.[5,6] Persons with obesity and low muscle mass develop obese sarcopenia associated with disability.[7–10] However, in older persons the obesity paradox has shown that being somewhat overweight can be beneficial and that weight loss, even in persons with diabetes mellitus, can lead to increased mortality.[11–15] This is in contradistinction to younger persons and animals, where caloric restriction may extend life span.[16,17] Dietary restriction decreases mTOR activity and also the activation of the PI_3K/AKT insulin pathway.[18] However, in persons who are losing muscle mass, this accelerates the development of sarcopenia.[19] The best data for successful aging suggest that a diet including at least 5 helpings of fruit and vegetables a day or a Mediterranean diet increases longevity and protects against cognitive impairment.[20–22] Some of the effects of fruit and extra-virgin olive oil appear to be due to polyphenols that may protect against negative epigenetic changes.[23–25]

Diet, Frailty, and Disability

Recent studies have suggested that dairy, fruit, and vegetables coupled with moderate physical activity will reduce functional limitations and disability.[26,27] Frailty is a predisability state that puts the person at increased risk for developing disability.[28–33] Low nutrient intake is associated with frailty (especially when low in protein or having a low content of three or more nutrients).[34] A diet with a higher energy intake was shown to reduce frailty.[35] Intake of proteins and monounsaturated fatty acids leads to a lower incidence of frailty[36] as does an intake of 5 servings of fruits and vegetables a day.[37,38] Similarly, a Mediterranean diet is associated with a low risk of frailty.[39] These findings are in concert with the InCHIANTI study, which showed that high concentrations of urinary polyphenols was found in persons who were not frail compared with those who were frail.[40] In persons with a slow walking speed, a greater consumption of low-fat milk and yogurt was protective against frailty.[41]

Sarcopenia and Protein

Sarcopenia is defined as poor function due to the loss of protein.[42–46] It can be rapidly screened for using the SARC-F.[47–50] Sarcopenia now has its own ICD-10 code.[51] In this issue of the Journal, it has been shown to be highly predictive of muscle mass and function.[38] Resistance exercise represents the most important therapeutic modality for sarcopenia.[52–57]

Protein is the key nutrient for treating sarcopenia.[58–61] Both leucine-enriched essential amino acids and hydroxyl methyl butyrate (HMB) have been shown to improve muscle mass and function when given alone.[62,63] In addition, when protein intake is relatively low, protein may act synergistically with exercise.[64–66] Persons with a high diet quality index tend to be less likely to have sarcopenia.[67]

Anorexia and Weight Loss

In this issue of the Journal, the results from 507 nursing homes in 15 countries on nutritionDay demonstrated that poor intake at lunch and a weight loss of greater than 5 kg were highly predictive of mortality.[68] Previously weight loss has been shown to be the best measure of nutritional compromise in persons living in a nursing home.[69] Poor oral intake, depression and dysphagia have been reported to be the major factors associated with weight loss in the nursing home.[70]

We originally described the anorexia of the elderly in 1988.[71] To be fair, Cicero described this condition eons before this, but he never gets any credit for it! We pointed out that it involved physiological factors, such as gastric emptying, taste, gastrointestinal hormones, and central neurotransmitters.[72–77] Anorexia, which will lead to weight loss, can be detected with the Simplified Nutrition Assessment Questionnaire (SNAQ).[78–81] In addition, we stressed that there are a number of treatable conditions that cause anorexia and weight loss as recognized in the "Meals on Wheels" mnemonic (Table 1).[82,83] Depression[84,85] and polypharmacy[86–90] remain the most common pathologic causes of anorexia. Much of weight loss is caused by cachexia,[91,92] which is due to excess inflammatory cytokines causing anorexia as well as loss of fat and muscle.[93–95] The treatment of choice for weight loss is to provide increased calories either as calorie- or protein-enriched meals,[96,97] or as a liquid supplement.[98,99] Liquid supplements produce less satiety than do solid meals.[100] Drugs such as megestrol acetate[101] and dronabinol[102] or cannabis[103] improve appetite and food intake but there is limited evidence that they improve outcomes. Dronabinol and cannabis have some utility in end-of-life care.[104] Therapeutic diets should not be used in nursing homes.[105] Further,

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Table 1
The Meals on Wheels Mnemonic of Reversible Causes of Weight Loss

Medications
Emotional (depression)
Alcoholism, anorexia tardive, abuse (elder)
Late life paranoia
Swallowing problems
Oral problems
Nosocomial infections, no money (poverty)
Wandering/dementia
Hyperthyroidism, hypercalcemia, hypoadrenalism
Enteric problems (malabsorption)
Eating problems (eg, Tremor)
Low-salt, low-cholesterol diet
Shopping and meal preparation problems, stones (cholecystitis)

multivitamins are overused in nursing homes, and there is little evidence that they are useful unless the resident has a specific nutrient deficiency.[106]

Dehydration

For many older persons, the nursing home is a water desert. Others limit fluid intake to reduce periods of incontinence. Low blood pressure is the only reliable sign of dehydration in older persons.[107,108] An elevated potassium and an increased BUN/creatine level are the best markers of possible dehydration, along with decreased urinary flow.[109,110] When these are present, serum and urine osmolality should be measured. Increasing staff awareness is the best measure to prevent dehydration.[111] When dehydration is recognized in the nursing home, it can be corrected either by subcutaneous (hypodermaclysis) or intravenous infusion.[112,113]

Calcium, Vitamin D, and Bone

Although it is generally believed that calcium and vitamin D reduces fractures in older persons, recent data have called into question this belief in all except for older persons with very low vitamin D or calcium levels.[114–118] Vitamin D levels are often very low in nursing home residents, suggesting that they may benefit more from vitamin D than others.[119–121] Some data suggest that very low levels may be more responsive to vitamin D replacement both for bone and sarcopenia.[122–127] It is important to recognize that measuring vitamin D levels, particularly in African Americans, has limited value as there is wide ethnic variation in vitamin D–binding protein levels, making the measurement results of 25(OH) vitamin D questionable at best.[128]

The routine use of calcium and vitamin D is further questioned by evidence suggesting that calcium intakes greater than 1400 mg/d may increase cardiovascular disease.[129] How this is effected by calcium tablet intake is controversial.[130–132] There is also evidence that high normal calcium levels may be associated with an increase in dementia.[133]

Based on these recent findings, it is prudent to suggest a small increase in calcium intake at night, for example, a yogurt. In addition, vitamin D if given should be limited to 1000 IU, though 30 minutes a day sun exposure may be more useful. Vitamin D levels should not be measured.

Zinc

There is evidence that zinc deficiency is related to immunosenescence.[134–137] Older persons have a greater susceptibility to zinc deficiency.[138] Zinc deficiency is particularly common in persons with diabetes mellitus.[139–141] Zinc deficiency results in anorexia and plays a role in the pathophysiology of cancer anorexia.[142,143] In persons who are zinc deficient, vascular and pressure ulcers may heal more rapidly.[144] Further studies are needed to determine which older persons might respond to zinc.

Conclusion

Understanding nutrition and aging is beginning to emerge into the age of "Enlightenment." Until we learn more, however, we need to see that older people get a balanced diet with fruits and vegetables and extra-virgin olive oil. Dietary restriction needs to be avoided wherever possible.

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