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Opinion

Dietary Protein for The Elderly: More Attention Needed?

DI Givens*

Professor, Institute for Food, Nutrition and Health, University of Reading, United Kingdom

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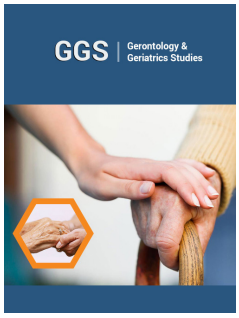

***Corresponding author:** DI Givens, Professor, Institute for Food, Nutrition and Health, University of Reading, United Kingdom

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Opinion

Sarcopenia is predominantly a geriatric condition characterised by a chronic loss of muscle mass and muscle strength with advancing age. Current estimates suggest that sarcopenia affects 10-16% of the elderly worldwide [1] with an increasing prevalence associated with the increasing age of populations. Sarcopenia can have far reaching consequences since, for example, it reduces physical bone protection increasing the risk of breakage in a fall leading to reduced mobility, disability and lower quality of life. Skeletal muscle has a critical role in maintaining a stable blood glucose concentration being responsible for metabolic disposal of 70-90% glucose postprandially [2]. Thus, reduced muscle mass especially if associated with reduced ability to exercise and/or sarcopenic obesity enhances insulin resistance and increases risk of type 2 diabetes [3].

Consumption of protein and resistance exercise are both known to provide an anabolic stimulus for skeletal muscle protein synthesis and there is ongoing debate about the amounts of dietary protein and exercise needed in the elderly. The recommended adult protein intake is 0.75 and 0.8g/kg body weight in the UK and the US respectively, but these take no account of specific age or health status. Lonnie et al. [4] reviewed studies which indicated that a protein intake higher than 0.8g protein/kg bodyweight may be valuable for reducing loss of muscle mass and function in the elderly and suggested an increase to >1.2g/kg body weight for ageing adults in line with the Nordic Council of Ministers proposal of 1.10-1.30g/kg body weight. It is notable that in the Republic of Ireland the protein recommendation for adults is 0.7g/kg body weight but it is now recommended that this is increased to 1.0-1.2g/kg body weight for older adults at risk of frailty and sarcopenia [5]. The subsequent nutrition policy paper for older adults in Ireland highlighted that consuming protein in several meals, with each one providing 0.4g protein/kg body weight will help to maximize muscle protein synthesis [6].

Whilst there is considerable agreement of the benefits from increasing protein intake by the elderly, there have been concerns that the considerable satiating effect of protein may reduce total food and energy intake. There have also been concerns that higher protein intake may be detrimental to people with Chronic Kidney Disease (CKD) which may be undiagnosed. A meta-analysis [7] compared the effect of low (mean 0.93g/kg body weight) vs high (mean 1.81g/kg body weight per day) protein diets and showed no effect on kidney function in subjects with normal function and in those with type 2 diabetes who may have a greater risk of CKD. Nonetheless, it seems wise for the elderly to have regular kidney function tests irrespective of diet.

Protein quality is equally important as amount. Overall quality is now generally assessed by the Digestible Indispensable Amino Acid Score (DIAAS) which accounts for Essential Amino Acid (EAA) content and protein digestibility. Broadly, proteins in animal-derived foods have a higher score than plant proteins which generally have a less balanced EAA content and

a lower protein digestibility. There has been considerable research examining the relative anabolic effects of specific protein types. Wall et al. [8] concluded that proteins such as whey protein which are rapidly digested and absorbed lead to greater muscle protein synthesis than from slower digested proteins like casein and those in soya beans. They also noted that even when casein is hydrolyzed to increase digestion rate, the muscle protein response is still smaller than from equivalent amounts of whey protein. This is primarily attributed to the higher leucine content of whey protein; the specific effect of leucine having also been seen in studies using leucine supplements [9]. The effect of leucine is complex. It is an important activator of the Mammalian Target of Rapamycin (MTOR), a nutrient-sensing signaling pathway in skeletal muscle. In addition, leucine is insulinotropic and the additional insulin enhances muscle protein synthesis [10].

A number of studies have compared the relative value of plant proteins compared with whey protein. The study of Yang et al. [11] compared the response in myofibrillar protein Fractional Synthetic Rate (FSR) in rested elderly males resulting from 0, 20 or 40g of either whey protein or soya protein. Myofibrillar FSR did not respond to consumption of 40g soya protein compared with 20g, whereas it responded linearly to increments of whey protein. A similar differential effect was seen when the protein supplements were given post-exercise. There have been suggestions that consuming larger quantities of plant protein may match the anabolic effects of whey protein, but this remains unclear. Also, as highlighted by van der Heijden et al. [12], consuming large qualities by the elderly may not be feasible due to decreased appetite and other health-related factors.

Overall, there seems little doubt that protein intakes above traditional recommendations can have benefits for the elderly, notably reducing skeletal muscle loss and reducing related insulin resistance. The types of protein that provide the greatest anabolic effect on muscle protein synthesis, predominantly by their leucine content, are known but it is likely that an increasing proportion of older people will prefer more plant protein and there is much less information on this. Clearly more attention is indeed needed.

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