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Consideration of a New Form of Hydrolysed Beef Powder as a Source of High-Quality Protein for Elderly

Consideraciones sobre un nuevo hidrolizado en polvo extraído desde la carne de vacuno como fuente de proteínas de alta calidad para los ancianos

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Abstract

An active lifestyle together with optimal nutrition is essential for preserving independent living and quality of life as people ageing. The minimum recommended daily intake for protein (0.8 g/kg) has been considered insufficient for supporting muscle growth and development in young and maintaining muscle mass in adults. Particularly older adults need a higher amount of daily protein intake (~1.0 to 1.2 g/kg or higher in more active elderly people) for maintaining muscle health because of the "anabolic resistance condition" in aged muscle. The quality of protein is essential to promoting muscle mass accretion and health. Beef is a high-quality protein source rich in essential amino acids, essential, fatty acid and micronutrients that is now available as a hydrolysed powder. Recent studies suggested the potential benefits of integrating this novelty form of beef into a regular diet for improving nutrition in athletes or elderly affected by the anabolic resistance condition or those suffering from difficulties in chewing or swallowing.

Key words: Supplements; micronutrients; anabolic resistance; meat, older adults.

Resumen

Un estilo de vida activo acompañado de una nutrición adecuada es esencial para preservar la independencia funcional y la calidad con el envejecimiento. La cantidad mínima diaria recomendada de proteínas (0.8 g/kg) ha sido considerada insuficiente para apoyar el crecimiento y desarrollo muscular en personas jóvenes, así como para mantener la masa muscular en los adultos. Particularmente, los adultos mayores necesitan cantidades diarias mas altas de proteínas (~1.2 a 1.2 g/kg o mas en personas mayores activas) para mantener la integridad muscular debido a la "situación de resistencia al anabolismo" del musculo envejecido. La carne de vacuno es una fuente de proteínas de alta calidad, rica en aminoácidos esenciales, ácidos grasos y micronutrientes que hoy en día esta disponible en un formato de polvo hidrolizado. Estudios recientes, sugieren que la integración de esta nueva forma de carne de vacuno en la dieta puede ser beneficioso para mejorar la nutrición en deportistas o en personas mayores afectadas por la condición de resistencia anabólica o en aquellas personas que sufren de dificultadas para masticar y tragar alimentos.

Palabras clave: Suplementos; micronutrientes; situación de resistencia al anabolismo; carne; adultos mayores.

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Functional capacity and protein intake in elderly

Older adults lose approximately 1% of muscle mass, 2% of muscle strength, and 3% of muscle power annually (McGregor et al. 2014). Reduction in muscle mass is significantly associated with a higher risk to develop sarcopenia, leading to an impaired functional independence, increasing episodes of falling and higher levels of mortality (Landi et al. 2016). Therefore, the prevention of age-related loss in muscle mass and physical conditioning is essential for preserving independent living and quality of life with aging. Muscle loss in elderly has been associated with a sedentary lifestyle and inadequate nutritional intake (Morton et al. 2015). These situations are aggravated by the *anabolic resistance* condition expressed as a blunted muscle anabolic response to the availability of nutrients, particularly essential amino acids (Breen and Phillips 2011).

Considering that loss of muscle mass and functional capacity are age-related dysfunctions associated with impairment of the amino acids metabolism, the current recommended dietary allowance (RDA) for protein (0.8 g/kg/day) is recognized as insufficient (Thomas et al. 2016). Furthermore, as the ageing muscle is less sensitive to the amino acids driven anabolic stimulus than the young, to accrue muscle proteins, higher amino acids concentrations may be required to stimulate equivalent muscle protein synthesis above rest (Breen and Phillips 2011). Moreover, current recommendations for dietary protein intake in elderly have been raised to a minimum average daily intake of 1.0 to 1.2 g/kg (Bauer et al. 2013) and perhaps 1.4 g/kg in more active older population (Phillips 2017). Indeed, recent evidence suggests a frequent per meal protein intake of ~250 mg/kg administered evenly spaced throughout the day is the best feeding strategy to achieve optimal muscle protein synthesis stimulation in young and middle-aged adults (Jager et al. 2017; Kerksick et al. 2017). In older adults, to overcome the anabolic resistance condition and reach the optimal level of muscle protein synthesis (Moore et al. 2015), higher doses (up to 400 mg/kg) of protein per meal, have been suggested (Churchward-Venne et al. 2016). Concerns regarding the impact of dietary protein on renal function, particularly in older persons are not supported by evidence (Bauer et al. 2013; Phillips 2017). As indicated by Phillips (2017, pp 6, 7) *both the WHO and the US Institute of Medicine in setting the requirements for protein have stated, "…that the protein content of the diet is not responsible for the progressive decline in kidney function with age" and, "…protein restriction lowers glomerular filtration rate, suggesting that the decline of glomerular filtration rate with age is a natural consequence of the decline in protein intake as age progresses, and is unrelated to deterioration of renal function"*, In this context combining feeding and exercise intervention may assist the elderly in producing a 'youthful' muscle protein synthetic response, provided sufficient protein is ingested following exercise (Breen and Phillips 2011).

Beef protein: A high-density nutrient source

Beef is a high-quality protein source rich in micronutrients (vitamins and minerals), with a very similar an amino acid profile to the human skeletal muscle. Although the consumption of different forms of beef (steak or mince) promotes muscle protein synthesis and supports muscle mass accretion in humans (Phillips 2012), food processing methods including cooking temperature or meat texture like minced beef (Pennings et al. 2013) affect nutritional values and the efficiency of protein digestion (Salles et al. 2017). High cooking temperatures slow down the digestion rate (Bax et al. 2013) and can negatively impact on the amino acid profile reducing the percentages of essential amino acids including in the soluble fraction. Most of the decreases in nutritional composition of meat are evident after 15 min of heat exposure beyond which changes are minimal (Deb-Choudhury et al. 2014). On the other hand, the form of meat also impacts on the digestive processes. For example, minced beef is more rapidly digested and absorbed than beef steak, however, the rate of absorption of

minced form of beef is still significantly slower than the observed for isolate intact or hydrolysed protein extracts from milk, beef or vegetable sources (Naclerio et al. 2017b).

Effect of hydrolysed beef protein on exercise performance, body composition and health

The hydrolysed beef protein powder-supplement is a relatively new form of protein concentrate obtained from a special biochemical process. After butchering, the raw meat of the cow is exposed to less than 10 min of high temperature (<150°C). The resulted dehydrated raw beef powder represents a high nutritional density food providing about 82% of high-quality protein, including more than 40% of essential amino acid and with 6.6 g of leucine per 100 g of product, essential fatty acids and other important micronutrients for supporting muscular function, e.g. heme-iron (17 mg/100g), zinc (19.9 mg/100g), potassium (1260 mg/100 g) vitamin B12 (3.41 µg/100g) or vitamin D (1.6 µg/100 g) (Naclerio et al. 2017a; Mehta et al. 2018). This new beef protein extract in liquid form is easy to consume and it has a significantly faster absorption rate compared to steak or mincemeat (Phillips 2012). Resents studies reported that ingesting 20 g of beef protein extract mixing with orange juice immediately after exercise or at breakfast during non-training days over 8 weeks maximised muscle mass gain (Naclerio et al. 2017b) and improved immunological responses (Naclerio et al. 2017a) in young active individuals compared to the ingestion of only carbohydrates. Additionally, the ingestion of a post workout beverage providing 20 g of hydrolysed beef protein with no carbohydrate during 10 weeks, maintained lower limb muscle mass and ameliorated iron profile in master (>60 years old) male (Naclerio et al. 2017c) and (Mehta et al. 2018) triathletes.

In summary, the new hydrolysed form of beef should be considered as an alternative high-quality food for supporting adaptations in athletes. Nonetheless, further studies are needed to analyse the feasibility of integrating this novelty form of beef into a regular diet for the elderly population suffering from an increasing anabolic resistance condition which decreases the bioavailability of amino acids contained in animals' sources. Moreover, its use for feeding individuals with difficulties in chewing or swallowing needs special consideration. Finally, the synergistic combinations to produce high quality blend protein extracts integrating beef with other animal or vegetable protein sources such as whey, casein, soy, pea or brown rice need to be explored.

Conflict of interest

The author declares no conflicts of interest relevant to the content of this manuscript.

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