EDITORIAL

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# Dietary protein content for an optimal diet: a clinical view

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## Abstract

The dietary protein role in different clinical nutritional conditions and some physio-pathological perspectives is a current and hot topic to discuss. Recent Proceedings of the Protein Summit 2, joining more than 60 nutrition scientists, health experts, and nutrition educators, suggest to increase plant but, in particular, animal protein intake because richer in leucine and consequently more effective to influence anabolic protein metabolism. The Panel conclusions are in apparent contradiction with the nutritional ecology statements, which strongly sustain the reduction of animal origin foods in the human diet and are currently concerned about the excessive, mainly animal protein intake in western and westernized Countries. In conclusion, it is time to carefully evaluate protein and aminoacid intake accurately considering quality, digestibility, daily distribution and individual characteristics.

**Keywords** dietary protein; animal proteins; essential aminoacids; leucine

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The American Journal of Clinical Nutrition (AJCN) recently published, as supplement,[1–6] the Proceedings of the Protein Summit 2 to evaluate the dietary protein role in various clinical nutritional conditions and some physio-pathological perspectives such as weight management, metabolic activity, healthy aging, and healthier diets within energy balance. The Summit, as well as AJCN supplement, joining more than 60 nutrition scientists, health experts, and nutrition educators, was supported also by several 'meat companies '.[1]

To summarize the conclusions, and starting from weight management (optimal weight loss) in obese patients, the Panel[1] showed a greater weight loss, fat mass loss, better preservation of lean body mass, a more significant reduction of blood pressure, serum tryglicerides, and waist circumference following higher protein vs. low protein restricted diets, both in the short and long term. A mild effect on satiety, but not on satiation, was also disclosed. Overall data suggest that protein content of restrictive diets should be in the range of 1.2–1.6 g protein kg/body weight (BW)/day with the general indication to take 20–30 g proteins at each main meal (breakfast, lunch, and dinner). These findings have been confirmed in a recent paper by Wejis and Wolfe[7] in a sample of obese older adults (over 55 yrs), showing that protein requirement during weight loss should be of at least 1.2 g/kg BW and 1.9 g/kg fat-free mass to obtain a satisfactory muscle mass accretion.

As far as the proteins' metabolic role, the panel states that recommended dietary allowances are based on nitrogen balance (NB) studies, which simply reflect overall nitrogen retention under conditions of energy balance in healthy young adults.[8] Furthermore, dietary protein intake is calculated on the minimum amount to reach NB and the minimum aminoacid (AA) requirements. On the other hand, a more accurate and realistic approach to protein balance is to evaluate the essential or indispensable AA requirements to obtain metabolic benefits, and not only maintenance, as improved glycemic regulation, recovery after trauma, improved lean body mass function, etc. The Panel suggests the Indicator Amino Acid Oxidation (IAAO) method, as an alternate approach to NB, IAAO method, emphasizes that if

indispensable AAs are deficient in the diet, all other AAs will be oxidized, according to the different physio-pathological conditions.[9,10] As a matter of the fact, the IAAO method suggests, once again, a protein requirement of 1.2 g kg/BW/day, well higher than the current recommendations of dietary guidelines.[8]

Other studies[3,11,12] identify AAs themselves as potential signals to activate protein synthesis and not only as substrates for protein metabolism. Among various signalling systems, the leucine-induced activation mammalian Target of Rapamycin Complex 1 (mTORC-1) pathway has a main role, in particular on muscle protein synthesis: the leucine-induced activation of mTORC1 leads to the stimulation of skeletal muscle synthesis, preferentially within 2 h after the ingestion of a meal containing at least 20–30 g leucine rich proteins.[13–15] This response, called 'meal threshold', reinforced by regular physical exercise, decreases by aging, thus suggesting to slightly increase protein intake in the elderly, a quite new nutritional education suggestion, besides the traditional indication to maintain a regular physical exercise to prevent sarcopenia[16] through a positive effect on mTORC1 pathway too.[17] Although an increase of both plant and animal protein intake is suggested,[18] the Panel remarks that animal proteins are richer in leucine and consequently more effective to influence anabolic protein metabolism. A warning is also risen on the current dietary recommendation to strongly reduce saturated and solid fat intake, which in dietary practice means to reduce animal proteins and related food groups. The chronic reduction in animal-based[19] food groups might have, as secondary effect, the reduced intake of some 'nutrients of concern' (i.e. nutrients with a daily intake generally lower than recommended) as Calcium, vitamin D, Potassium, Iron, Folate for animal-based protein foods[18,19] and Dietary Fiber, vitamin E, and Magnesium for plant-based protein foods.[18,20]

The Panel finally affords the topic of translating current scientific evidences in the clinical practice; in other words, do we need to revaluate the current dietary guidelines?

The Panel[1] speculates that the current recommended dietary allowances of 0.8 g Proteins/kg BW/day are based on Estimated Average Requirement of 0.66 g/kg BW/day, the 'average daily nutrient intake level estimated to meet the requirement of half the healthy individuals in a particular life stage and gender group'.[20,21] In conclusion, 0.8 g proteins/kg BW/day seem to be too low, at least in some clinical conditions and the NB method inaccurate to properly monitor individual protein requirements. Consequently, the Panel proposes 'flexibility' also for protein intake in order to create a variety of eating planes for single individuals.

In nutritional terms, the Panel supports the recommendation of Acceptable Macronutrient Distribution Ranges (AMDR), which aims to maintain adequate macronutrient (and micronutrient) intakes against the backdrop of adequate energy intake. According to the Institute of Medicine,[21] the AMDR for Carbohydrates ranges between 45% and 65%, Fat 20% and 35%, and Protein 10% and 35% of total energy intake.

A convincing statement by the Panel, at least in our opinion, is the timing of protein intake to be equally distributed at a minimum quantity of 20–30 g/meal during the three main courses.

Emphasis is also given to proteins' AA composition; strong recommendation is finally given to increase the recommended protein intake from 0.8 to 1.0–1.2 g/kg/day, at least in the elderly and in some other physio-pathological conditions.

These conclusions reached after reading the AJCN supplement are in apparent contradiction with the nutritional ecology statements, which (actually since more than 10 years) strongly sustain the reduction of animal origin foods in the human diet and are currently concerned about the excessive (mainly animal) protein intake in western and westernized Countries.[22,23] Recent observations support the suspect that high dietary protein intake (when protein replace carbohydrates) is associated, in the general population, to a greater risk of weight gain.[24]

The amount (and quality) of protein intake is still a 'hot' nutritional topic, to widely debate and clarify.

It is out of the interest of this paper to discuss on dietary protein quality; nevertheless, Food and Agriculture Organization (FAO) has recently reconsidered the use of a new score to quantify dietary protein quality: the Digestible, Indispensable (or Essential) Aminoacid score, and DIAAS.[25]

This score highlights IAA content and protein digestibility as indicator of protein biological value, a factor of valuable clinical and physiological interest.[26,27]

As a preliminary observation, it appears necessary a large consensus on what does g protein/kg BW/day mean. What do we intend for BW: actual, ideal BW, or what else? How to treat severely underweight or overweight, young or elderly, sarcopenic or body builder individuals? The suggestion of 0.8 or 1.2 or other amounts of dietary protein/kg BW weight has a marked bias because of the variability in body composition, clearly not identifiable by the simple measurement of BW and body mass index! We would suggest, and actually we do, at least in the current clinical practice but not in the critically ill patient, to adopt as reference BW, the 'desirable BW', calculated from the mean value of body mass index between 18.5 and 25 kg/m$^2$. Nevertheless, we ask a discussion on this question. Furthermore, adequate protein intake requires a specific evaluation for critically ill patients, in particular when undergoing artificial nutrition. We also consider that, still confirming for the general population the current dietary recommendation of 0.8 g protein/kg 'desirable' BW/day, AMDR could be the reasonable dietetic approach in the clinical practice but also a rationale for dietary guidelines. It allows some flexibility in the dietary prescription, given the extreme heterogeneity of populations with large ethnic, cultural, social, economic inter-individual differences and peculiarities, wider age range with a marked


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increase of elderly, over 65 yrs, people, a significant decrease in physical activity at all ages, etc. General recommendations to pursue a more vegetarian, Mediterranean style, ecologically compatible diet should remain, provided that a variety in consumption of high nutritional value, plant and animal, foods is assured. A more accurate protein-rich food distribution at the main three meals (in particular by increasing protein intake at breakfast, at least in the Mediterranean Countries with a simultaneous reduction at dinner time) could improve protein balance and consequently reduce protein intake. A protein sparing effect will be also obtained by a regular physical exercise. A higher intake of mixed plant and animal proteins than the current 0.8 g/kg BW/day may be suggested, associated to regular physical exercise, in restrictive diets for obese patients and in (otherwise healthy) sarcopenic elderly individuals.

In our opinion, the topic of protein intake recommendations has not been exhaustively examined so far at least in the clinical nutritional practice: it is now time to carefully evaluate protein and AAs intake as usually carried out for fat and CHO intakes accurately considering quantity but also quality, digestibility, timing of daily distribution, composition of the meal, individual fat-free mass characteristics, total daily energy intake, concomitant diseases, etc.

A special attention is also to pay to 'nutrients of concern' whose assumption may be easily affected by the composition of the prescribed diets, including protein rich foods.

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The authors certify that they comply with the ethical guidelines for publishing in the Journal of Cachexia, Sarcopenia, and Muscle: update 2015.[28]

## Conflict of interest statement

None declared.

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