
Evaluating the Role of Protein in Public Health: A Research Summary

Protein Summit 2.0, a follow-up of the first Protein Summit in 2007, was held October 2-3, 2013, and provided an opportunity for more than 60 food and nutrition experts from several countries to review and discuss the latest research on the role of protein in human health.¹ Discussions also focused on identification of effective strategies to help health professionals translate protein science to optimize their clients' protein intake for health and combat misperceptions related to protein.

A supplement to the June 2015 edition of the American Journal of Clinical Nutrition contains five comprehensive reviews from presentations and discussions at Protein Summit 2.0. The protein-focused topics were identified by a scientific steering committee to further the understanding of the amount, timing of intake and quality of dietary protein to improve public health. The evidence presented in these reviews underscores the importance of optimal intakes of high-quality protein and timing of protein intake throughout the day to achieve and maintain a healthy body weight, improve metabolic function and support healthy aging.

Understanding Protein Recommendations: RDA and AMDR

Attendees at Protein Summit 2.0 discussed how healthcare practitioners can use both the Recommended Dietary Allowance (RDA) and the Acceptable Macronutrient Distribution Range (AMDR) as guides to help clients optimize protein intake for health. The RDA is defined as "...an estimate of the minimum daily average dietary intake level that meets the nutrient requirements of nearly all (97-98 percent) healthy individuals," which for protein is 0.8g/kg body weight/day (or 56g protein/day for men weighing 154 pounds and 46g protein/day for women weighing 125 pounds).²

The AMDR was established in the 2002/2005 Dietary Reference Intake report published by the Food and Nutrition Board of the Institute of Medicine. It expresses protein intakes as percentages of total calories, and provides a broader range of protein intake, from 10 to 35 percent of calories, or about 50g to 175g a day for people consuming 2,000 calories each day. This intake range is "associated with reduced risk of chronic diseases, while providing adequate intakes of essential nutrients."² Although many Americans consume protein at or above the RDA, an emerging body of research supports an approach that moderately enhances goals, using ranges within the AMDR, and balances protein intake throughout the day to improve many health outcomes.

Key Findings

While the AMDR expresses intakes as a percentage of calories, the RDA estimates protein needs based on absolute amounts calculated relative to body weight. Investigators have used both approaches to test hypotheses on the relationship between varying levels of protein intake on health outcomes, and either can be used by practitioners to estimate protein intakes for their clients. Recommendations based on body weight offer the advantage of setting a baseline or an absolute intake of protein needed to ensure adequate essential amino acids and simplify protein distribution among meals and snacks, while calculations based on a percentage of calories (AMDR) offer flexibility in determining protein targets based on individual health goals and dietary pattern preferences.

Scientific evidence presented at Protein Summit 2.0 supports enhancing high-quality protein intake to achieve positive health outcomes by:

- Consuming approximately 1.0 to 1.6g/kg/day,* which is above the RDA but well within the AMDR for protein (i.e., 11 to 18 percent of calories for women and 14 to 22 percent of calories for men based on 2,000 calorie diets); and,
- Evenly distributing protein intake throughout the day (i.e., 20 to 30g/meal).

** This amount is based on collective findings from the Supplement papers. Individual sections in this resource refer to slightly different amounts, within this range, reflecting the scientific evidence in that specific health benefit area.*

Weight Management

Considering the obesity epidemic, strategies to effectively achieve and maintain a healthy body weight are a public health priority. Shorter-term, tightly-controlled feeding studies reviewed in “The Role of Protein in Weight Loss and Maintenance”³ support the benefits of higher protein, weight loss diets compared to similar lower protein diets. Specifically, higher protein (i.e., 1.2 to 1.6g/kg/day), weight loss diets result in greater losses in body weight and body fat, preservation of lean body mass and reductions in triglycerides, blood pressure and waist circumference. Recent attention focuses on protein-induced satiety (feeling of fullness) as a potential mechanism to help explain protein’s weight management benefits, as evidence indicates higher protein meals enhance satiety. Whether this leads to subsequent reductions in food (caloric) over the course of a day or longer intake is under investigation.

- Emerging research indicates that evenly distributing daily protein intake at meals and snacks throughout the day (~20 to 30g/eating occasion) may potentially contribute to benefits for body weight management and appetite control.
- The long-term (≥ one year) effects of higher protein diets on weight loss and prevention of weight regain are inconsistent. This may be explained in part by the difficulty in adhering to higher protein diets over the long term.

Calculating Protein Needs: Examples Using the RDA and AMDR as Guides

Both the RDA and AMDR can be used to assess protein needs. Determining someone’s protein needs with the RDA relies solely on an individual’s body weight and results in a recommendation of a single amount of protein, while the AMDR provides an acceptable protein intake range as a percentage of total energy intake and can be customized based on an individual’s activity level, health status and goals. Consequently, practitioners should be aware that protein needs determined using the RDA are limited compared to those generated using the AMDR. For example, when assessing an individual’s protein needs using the RDA alone, care should be taken to ensure that protein intake as a percentage of total energy intake falls within the AMDR and protein intake is customized to the individual.

Consider the following examples:

- The elderly mother will need to consume a higher percentage of her calories (i.e., 13 percent) as protein than her middle-aged daughter (i.e., 10 percent) to meet the RDA for protein. Considering the substantial evidence suggesting that older adults can benefit from higher protein intakes (i.e., 1.0 to 1.5g/kg/day), the elderly mother may benefit from consuming 16 to 24 percent of her calories from protein, combined with regular physical activity, to achieve benefits such as improved lean muscle preservation and muscle strength.
- An overweight woman weighing 150 pounds would need to consume 55g protein/day to meet the RDA of 0.8g/kg/day (or 11 percent of her calories from protein on a 2,000 calorie diet). Based on research suggesting the benefits of higher protein (1.2 to 1.6g/kg/day), reduced calorie diets for weight loss, she would need to target 82 to 109g protein/day, or 18 to 23 percent of her calories (1,500) from protein to optimize intake.

Optimal Metabolic Health

“Defining Meal Requirements for Protein to Optimize Metabolic Roles of Amino Acids”⁴ discusses the importance of consuming high-quality protein with optimum ratios of essential amino acids at multiple meals each day to support metabolic health. Individual essential amino acids act as metabolic signals influencing protein synthesis, inflammation responses and satiety, among other metabolic functions. Leucine, an essential amino acid found in higher amounts in animal than plant proteins, has a unique role in stimulating skeletal muscle protein synthesis and may improve satiety and insulin sensitivity. Physical inactivity (e.g., short-term bed rest due to hospitalization or illness) and advancing age reduce the efficiency of essential amino acids for muscle protein synthesis, thereby increasing the minimum amount of protein needed per meal.

- Researchers suggest that the metabolic roles of individual essential amino acids should be considered in determining dietary protein goals for optimal health, therefore food sources should be evaluated for their amino acid profiles.
- Consuming 20 to 30g of protein per meal optimizes skeletal muscle synthesis, and at three meals per day results in intakes well below current estimates for safe upper levels for protein or essential amino acids for healthy persons.

Healthy Aging

Research findings reported in “Protein and Healthy Aging”⁵ support moderating and optimizing protein intake to help reduce older adults’ risk of sarcopenia. Sarcopenia describes the gradual loss of muscle mass and function beginning in the middle years that can lead to frailty, increased risk of falls and difficulty performing daily activities. A blunted responsiveness of muscle protein synthesis to dietary protein may contribute to older adults’ need for increased protein intake.

- Consuming a moderate amount of high-quality protein (1.0-1.5g/kg/day) evenly distributed at each meal/eating occasion throughout the day (i.e., ~20 to 30g/meal), combined with physical activity, is suggested as an effective strategy to help slow the progression or prevent sarcopenia in older adults.
- A new perspective to help reduce risk of sarcopenia is to increase high-quality dietary protein beginning in the middle years (~40 to 60 years) to maximize lean body mass before its decline and preserve muscle strength.

Quality Matters

Not all proteins are created equal. High-quality or “complete” proteins found in animal-based foods such as lean meats, poultry, fish, eggs and low-fat milk/dairy products contain all the essential amino acids in the ratio needed by the body and are easily digestible. Most plant-based proteins found in vegetables and grains are considered lower quality or “incomplete” proteins because they lack one or more essential amino acids and are less digestible.

Nutrient Adequacy

Food sources of protein not only differ in their protein content, but also in providing other essential nutrients, according to research reviewed in “Commonly Consumed Protein Foods Contribute to Nutrient Intake, Diet Quality, and Nutrient Adequacy.”⁶ Experts recommend consuming a variety of nutrient-dense protein foods, both animal- and plant-based, within calorie needs to help meet recommendations for protein and other essential nutrients. Although plant-based, lacto-ovo vegetarian and vegan USDA food patterns generally meet all goals for nutrient adequacy, increasing plant products in these food patterns reduces overall protein levels.

- Failure to consume nutrient-dense foods, in particular nutrient-dense protein sources, makes it difficult to meet recommended dietary goals for various nutrients.
- While it is important to consume protein from a variety of animal- and plant-based protein sources, animal proteins provide more and higher quality protein than plant foods. Also, fewer calories are needed to achieve adequate protein intake from animal-based compared to plant-based protein foods.

Translation and Application of Dietary Protein Guidance

“Effective Translation of Current Dietary Guidance: Understanding and Communicating the Concepts of Minimal and Optimal Levels of Dietary Protein”⁷ encourages registered dietitian nutritionists and other healthcare practitioners to help combat misperceptions related to protein such as the widely communicated message that “Americans eat too much protein” and to facilitate the effective interpretation and application of dietary protein guidance. In certain cases, some persons may benefit from protein intakes greater than the RDA, but within the AMDR. This has been demonstrated in individuals struggling to achieve and maintain a healthy body weight, in athletes and physically active individuals to improve performance, in middle-aged and older adults to help offset age-related losses in muscle mass and bone, and in others seeking to reduce risk of chronic diseases such as cardiovascular disease and hypertension. Protein quality, specifically selecting high-quality protein foods providing essential amino acids, is an important consideration in designing diets for health and well-being.

Implications for Practice

- Identify people who may benefit from protein intakes in excess of the RDA but within the AMDR for protein, such as those on calorie-restricted diets and middle-aged and older adults aiming to maximize lean body mass.
- Spread protein intake evenly throughout the day at meals (~20 to 30g/eating occasion) to increase the body’s use of protein and optimize protein’s health benefits. Start with increasing protein intake at breakfast, a meal typically lower in protein than other meals.
- Consume a variety of protein foods, but focus on high-quality sources of protein from nutrient-rich foods such as lean meats, poultry, fish, eggs and low-fat milk/dairy products to help meet needs for protein, essential amino acids, and other nutrients.
- Use the AMDR (10-35 percent of calories) and/or absolute amounts of protein ranging from 0.8 to 1.6g/kg/day to design flexible, practical diets to optimize protein intake based on health outcome goals.

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1 Rodriguez NR. Introduction to Protein Summit 2.0: Continued exploration of the impact of high-quality protein on optimal health. *American Journal of Clinical Nutrition*. 2015.

2 Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fatty Acids, Cholesterol, Protein and Amino Acids. Washington, DC: The National Academies Press, 2002/2005.

3 Leidy HJ, Clifton PM, Astrup A, Wycherley TP, Westterp-Plantenga MS, Luscombe-Marsh ND, Woods SC, Mattes RD. The role of protein in weight loss and maintenance. *American Journal of Clinical Nutrition*. 2015.

4 Layman DK, Anthony TG, Rasmussen BB, Adams SH, Lynch CJ, Brinkworth GD, Davis TA. Defining meal requirements for protein to optimize metabolic roles of amino acids. *American Journal of Clinical Nutrition*. 2015.

5 Paddon-Jones D, Campbell WW, Jacques PF, Kritchevsky SB, Moore L, Rodriguez N, Van Loon LJC. Protein and healthy aging. *American Journal of Clinical Nutrition*. 2015.

6 Phillips SM, Fulgoni III VL, Heaney RP, Nicklas TA, Slavin JL, Weaver CM. Commonly consumed protein foods contribute to nutrient intake, diet quality, and nutrient adequacy. *American Journal of Clinical Nutrition*. 2015.

7 Rodriguez NR, Miller SL. Effective translation of current dietary guidance: Understanding and communicating the concepts of minimal and optimal levels of dietary protein. *American Journal of Clinical Nutrition*. 2015.