Nutritional considerations for dietitians

Protein

A more sustainable diet does not necessarily have to exclude red meat or dairy altogether – therefore meat and dairy nutrient intakes need not be compromised.

This information sheet provides some additional information on nutritional considerations which dietitians may take into account. References and information sources are available as a separate download from www.bda.uk.com/onebluedot.

Protein is essential for the growth, maintenance and repair of all body cells.[1] In the UK, overconsumption of protein is common across all age groups and sexes,[1,2] therefore advice to reduce meat and dairy whilst increasing plant food sources of protein will have little if any impact on overall protein intakes.

Current intakes of protein[2]

- 2-10 year olds are consuming 2-3 times more than recommended.
- Teens (11-18 year olds) are consuming 29-70% excess protein.
- 19-74 year olds exceed recommendations by 38-57% whilst over 75 year olds are consuming 22% and 33% above recommendations for females and males respectively.

Protein quality

Protein quality is dependent on the ability of a diet to provide all essential (indispensable) amino acids (EAAs) in the correct quantity to meet human needs.[3] The protein quality of individual foods can be assessed by the established scoring systems Protein Digestibility-Corrected Amino Acid Score (PDCAAS)[4] and the more recently proposed Digestibility Indispensable Amino Acid Score (DIAAS).[5] Both systems assess the protein digestibility and quantity of EAAs in relation to a reference protein which meets all human needs. The latter scoring system is thought to be more accurate as it takes into consideration the presence of inhibitory factors such as phytates and trypsin when assessing digestibility. Although these measurements are useful, they do not reflect the ability of the overall diet to meet EAAs needs, and they have led to a number of misunderstandings about the quality of plant proteins and how they should be consumed.

On a weight by weight basis, plant foods compared to animal foods do contain less protein but this is due to their more rounded macronutrient content: low in saturated fat, lower energy density, provide complex carbohydrates and are an excellent source of fibre.[6] Research has repeatedly demonstrated that even if individuals decide to exclude meat and fish from the diet altogether

(vegan and vegetarian diets), they still exceed their protein needs.[7-12] Plant proteins are neither 'incomplete' or of 'low in biological value' and such terms should be used with care. Additionally, there is no need to 'combine' plant foods at each meal in order to 'complement the different EAA' profiles.

Plants do in fact contain all EAAs be it some at very low levels e.g. cereals and lysine content, but they do not lack any.[13-16] It has been repeatedly demonstrated that human EAA needs do not need to be met at each meal time and it is the overall consumption of EAAs over the course of a day that is important.[15-18]

The body holds a pool of EAAs which it can call upon to complement dietary intakes.[19,20]
It is important to note that the PDCAAS[4] and DIAAS[5] scoring systems only assess a single food protein's ability to meet all EAAs at levels needed to meet human requirements. They do not reflect the ability of the overall diet through the course of a day to meet all EAAs.[3,13,16]

Various metabolic studies have demonstrated nitrogen balance to be met irrespective of protein source and that diets based solely on plants and which meet energy requirements, will also meet all EAAs needs.[3,16,18-20]

Spread protein load evenly throughout the day:[21-25] it is now well established that protein loads should be spread throughout the day to optimise muscle protein synthesis. Protein uptake and utilisation plateaus at around 20g of animal protein – for plant proteins this will be higher at around 30g and for elderly even higher.

The One Blue Dot 'Practical guide for dietitians: other source of protein' sheet gives information on DRV for protein and key sources.

References

1. EFSA. EU Register on Nutrition and Health Claims [Internet]. 2016 [cited 9/14/2018]. Available from: http://ec.europa.eu/food/safety/labelling_nutrition/claims/register/public/?event=search

2. PHE. Results of the National Diet and Nutrition Survey (NDNS) rolling programme for 2014 to 2015 and 2015 to 2016 [Internet]. 2018 [cited 5/11/2018]. Available from: https://www.gov.uk/government/statistics/ndns-results-from-years-7-and-8-combined

3. Craig W, Mangels A. Position of the American Dietetic Association: vegetarian diets. J Am Diet Assoc. 2009;109(7):1266-82.

4. Hughes GJ, Ryan DJ, Mukherjea R *et al*. Protein digestibility-corrected amino acid scores (PDCAAS) for soy protein isolates and concentrate: criteria for evaluation. J Agric Food Chem. 2011;59(23):12707-12.

5. Mathai J, Liu Y, Stein H. Values for digestible indispensable amino acid scores (DIAAS) for some dairy and plant proteins may better describe protein quality than values calculated using the concept for protein digestibility-corrected amino acid scores (PDCAAS). Br J Nutr. 2017;117(4):490-9.

6. Forestfield Software Ltd.. Diet Plan7. McCance & Widdowson 7th summary edition of the composition of foods plus the revised composition of food integrated data set (CoFids). Patent Diet Plan7. 2018.

7. Scarborough P, Appleby P, Mizdrak A *et al*. Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. Clim Change.. 2014;125(2):179-92.

8. Castane S, Asssumpcio A. Assessment of the nutritional quality and environmental impact of two food diets: A Mediterranean and a vegan diet. J Clean Prod. 2017;167:929-37.

9. Clarys P, Deliens T, Huybrechts I *et al*. Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet. Nutrients.. 2014;6(3):1318-32.

10. Sobiecki J, Appleby P, Bradbury K *et al*. High compliance with dietary recommendations in a cohort of meat eaters, fish eaters, vegetarians, and vegans: results from the European Prospective Investigation into Cancer and Nutrition-Oxford study. Nutr Res.. 2016;36(5):464-77.

11. González-García S, Esteve-Llorens X, Moreira M *et al*. Carbon footprint and nutritional quality of different human dietary choices. Sci Total Environ.. 2018;644:77-94.

12. Rizzo N, Jaceldo-Siegl K, Sabate J *et al*. Nutrient profiles of vegetarian and nonvegetarian dietary patterns. J Acad Nutr Diet.. 2013;113(12):1610-9.

13. Young V, Pellett P. Plant proteins in relation to human protein and amino acid nutrition. Am J Clin Nutr.. 1994;59(5 Suppl):1203S-12S.

14. McDougall J. Comment: Plant foods have a complete amino acid composition. Circulation.. 2002;105(25):e197.

15. Novick J. The Myth of Complementary Protein [Internet]. 2013 [cited 9/17/2018]. Available from: https://www.forksoverknives.com/the-myth-of-complementary-protein/#gs.Y_DzcDA

16. Rand W, Pellett P, Young V. Meta-analysis of nitrogen balance studies for estimating protein requirements in healthy adults. Am J Clin Nutr.. 2003;77(1):109-27.

17. Marsh K, Munn E, Baines S. Protein and vegetarian diets. Med J Aust. 2012;1(2):7-10.

18. Palmer S. Plant proteins. Today’s Dietitian. 2017;19(2):26.

19. Millward D, Forrester T, Ah-Sing E *et al*. The transfer of 15N from urea to lysine in the human infant. Br J Nutr.. 2000;83(5):505-12.

20. Fuller M, Reeds P. Nitrogen cycling in the gut. Annu Rev Nutr.. 1998;18:385-411.

21. Wolfe R. The underappreciated role of muscle in health and disease. Am J Clin Nutr.. 2006;84(3):475-82.

22. Witard O, Wardle S, Macnaughton L *et al*. Protein Considerations for Optimising Skeletal Muscle Mass in Healthy Young and Older Adults. Nutrients.. 2016;8(4):181.

23. Macnaughton L, Wardle S, Witard O *et al*. The response of muscle protein synthesis following whole-body resistance exercise is greater following 40 g than 20 g of ingested whey protein. Physiol Rep.. 2016;:10.

24. Cardon-Thomas D, Riviere T, Tieges Z *et al*. Dietary Protein in Older Adults: Adequate Daily Intake but Potential for Improved Distribution. Nutrients.. 2017;:10.

25. van Vliet S, Burd N, van Loon L. The Skeletal Muscle Anabolic Response to Plant- versus Animal-Based Protein Consumption. J Nutr.. 2015;145(9):1981-91.