


The Role of Protein for Health


CSIRO Proteins for Food and Health Seminar Series
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 Dr Jane Bowen

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Dr Natalie Luscombe-Marsh, PhD | Research Scientist
CSIRO Nutrition & Health Program



Lessons from longevity hotspots



- Protein intakes vary 10-25% of energy requirements
- One size does not fit all regarding effective strategies for management of health and wellbeing
- There is a need for personalized solutions!



Key functions of dietary protein

- Adequate protein intake is vital for building and repairing structural component of cells and tissues
 - Bone
 - Muscle
 - Antibodies
 - Enzymes
 - Hormone messengers
 - Transport & storage
- Excess protein is stored as body fat



Current protein intakes

TABLE 3. AVERAGE MEAL TIME PROTEIN DISTRIBUTION OF AUSTRALIAN MEN AND WOMEN

| GENDER | AGE | BREAKFAST | LUNCH | DINNER | OTHER | TOTAL |
|---------|-------|-----------|-------|--------|-------|-------|
| Females | 14-18 | 11.5 | 18.3 | 32.1 | 14.6 | 76.5 |
| | 19-70 | 11.2 | 20.6 | 34.1 | 12.8 | 78.7 |
| | 71+ | 11.2 | 20.7 | 30.5 | 9.2 | 71.5 |
| Males | 14-18 | 13.1 | 23.7 | 43.1 | 21.3 | 101.2 |
| | 19-70 | 15.7 | 27.7 | 44.6 | 19.0 | 107.0 |
| | 71+ | 15.4 | 23.6 | 34.4 | 9.2 | 82.6 |

Noakes, M, (2018) Protein Balance: New Concepts for Protein in Weight Management; CSIRO, Australia.



Current daily protein recommendations

| Age | EAR | RDI |
|--------------|----------------------|----------------------|
| Men | | |
| 19-30 yr | 52 g/day (0.68 g/kg) | 64 g/day (0.84 g/kg) |
| 31-50 yr | 52 g/day (0.68 g/kg) | 64 g/day (0.84 g/kg) |
| 51-70 yr | 52 g/day (0.68 g/kg) | 64 g/day (0.84 g/kg) |
| >70 yr | 65 g/day (0.86 g/kg) | 81g/day (1.07 g/kg) |
| Women | | |
| 19-30 yr | 37 g/day (0.60 g/kg) | 46 g/day (0.75 g/kg) |
| 31-50 yr | 37 g/day (0.60 g/kg) | 46 g/day (0.75 g/kg) |
| 51-70 yr | 37 g/day (0.60 g/kg) | 46 g/day (0.75 g/kg) |
| >70 yr | 46 g/day (0.75 g/kg) | 57 g/day (0.94 g/kg) |



Guidelines may not optimal for many

Protein intakes need to be personalised:

- Age
- Gender
- Actual body weight
- Physical activity
- General health/medications
- Weight loss

Female

71 kg

85-114 g/protein/day

1.1-1.6 g/kg/day for weight loss

Male

86 kg

103-138 g/protein/day

1.2-1.6 g/kg/day for weight loss



Evidence of health benefits of increased protein



Who benefits most from > 0.8 g/kg/day

Overweight/Obese aiming to reduce weight, optimise body composition, maintain strength/function & reduce disease

For Healthy Ageing: Individuals fighting sarcopenia/age related muscle loss and/or hospitalisation

People choosing vegetarian and mainly plant based diets



Key physiological effects of higher protein intakes for weight loss

- **Reduces** body weight, particularly fat mass.
- **Retains** fat-free mass during weight loss/ promotes accretion of lean mass during weight maintenance
- **Retains** bone mass during weight loss
- **Increases** fullness and **reduces** hunger and energy intake, at least in people aged ~ < 65 years but not > 65 years
- **Curbs cravings** – namely at breakfast
- **Increases** thermogenesis and **blunts** the fall in resting energy expenditure during weight loss
- **Increases** strength when combined with resistance exercise

Wycherley T P et al. AJCN 2012; Leidey H et al. AJCN 2015; Paddon-Jones AJCN 2015; Geizenaar C et al.



For Overweight/Obese Adults (~20 – 62 years)

Nutrition, Metabolism & Cardiovascular Diseases (2014) 24, 224–235



Available online at www.sciencedirect.com

Nutrition, Metabolism & Cardiovascular Diseases

journal homepage: www.elsevier.com/locate/nmcd

SYSTEMATIC REVIEW AND META-ANALYSIS

Long term weight maintenance after advice to consume low carbohydrate, higher protein diets – A systematic review and meta analysis

P.M. Clifton ^{a,*}, D. Condo ^{a,b}, J.B. Keogh ^a

- **30% calorie restricted diets for > 1 yr**
- **~1.4 g of Protein/ kg/d vs ~1 g of Protein/kg/d**
 - 0.44 kg > reduction in fat mass
 - FFM preserved
 - 0.17 mmol/L > reduction in triglycerides
 - 0.22 mU/L > reduction in insulin
 - = improvements in lipids, blood pressure, glucose control, inflammation



Clifton PM et al. 2013

For Overweight/Obese Adults –European Diogenes Study

- Largest study comparing LP vs HP diets for weight-loss maintenance after 1 year of weight loss.
 - 938 adults.
 - the parents completed an initial 8-week energy restriction period.
- High protein low glycemic index vs Low protein diet
 - less weight regain (mean difference of -0.93 kg)
 - improved many metabolic risk factors

Larsen et al., 2010a; Larsen et al., 2010b; Damsgaard et al., 2013; Papadaki et al., 2014.



Adults > ~60 plus years need even more



JAMDA 14 (2013) 542–559



Special Article

Evidence-Based Recommendations for Optimal Dietary Protein Intake in Older People: A Position Paper From the PROT-AGE Study Group

Jürgen Bauer MD^{1,4}, Gianni Biolo MD, PhD⁵, Tommy Cederholm MD, PhD⁶, Matteo Cesari MD, PhD⁴, Alfonso J. Cruz-Jentoft MD⁷, John E. Morley MB, BCh⁸, Stuart Phillips PhD⁹, Cornel Sieber MD, PhD³, Peter Stehle MD, PhD¹, Daniel Teta MD, PhD¹, Rensha Viswanathan MBBS, PhD¹⁰, Elena Volpi MD, PhD¹¹, Yves Boirie MD, PhD¹²

¹University of Bamberg, Bamberg, Germany
²University of Texas, Austin, USA
³Uppsala University, Uppsala, Sweden
⁴Université de Toulouse III Paul Sabatier, FR20041, 31062, Toulouse, France
⁵Hospital Universitario Ramón y Cajal, Madrid, Spain
⁶Leeds University School of Medicine, St. Luke's, UK
⁷McMaster University, Hamilton, Ontario, Canada
⁸Frederick-McDonald-University, Elmhurst, Illinois, USA
⁹University of Bamberg, Bamberg, Germany
¹⁰Centre Hospitalier Universitaire Vaudois, Service de Néphrologie, Lausanne, Switzerland
¹¹University of Adelaide, Adelaide, Australia
¹²University of Paris Medical Branch, Garches, France
¹³Institute of Ageing, INRA, UMR, Centre Hospitalier Universitaire, Centre-Val de Loire, France

Key Recommendations

- ~1-1.4 g/kg of BW/ day for **healthy**
- ~1.2-1.6 g/kg BW/day **for pre-frail/frail**
- ~0.8 g/kg BW/day **for those with GFR < 30 ml/min**

Increased Protein Found to Prevent

- Preserve muscle protein synthesis after hospitalisation
- Increase lean mass, particularly when combined with resistance exercise
- Improve some aspects of physical function (i.e. namely grip and gait speed) & quality of life

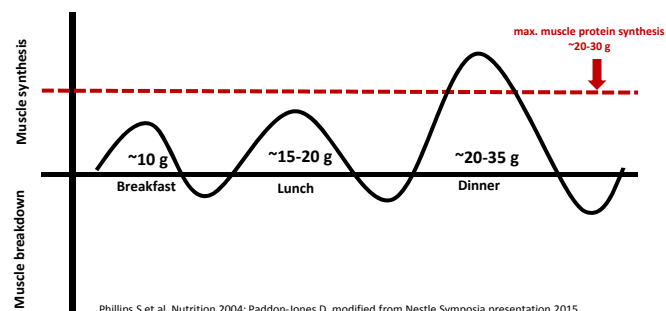


Does timing of protein matter?



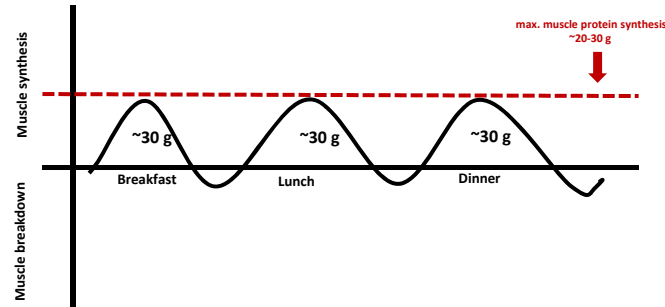
Protein distribution – does it matter?

'Westerners' have unbalanced protein distribution



Protein distribution – does it matter?

Aim for a balanced protein distribution and have protein after resistance training for maximal protein synthesis

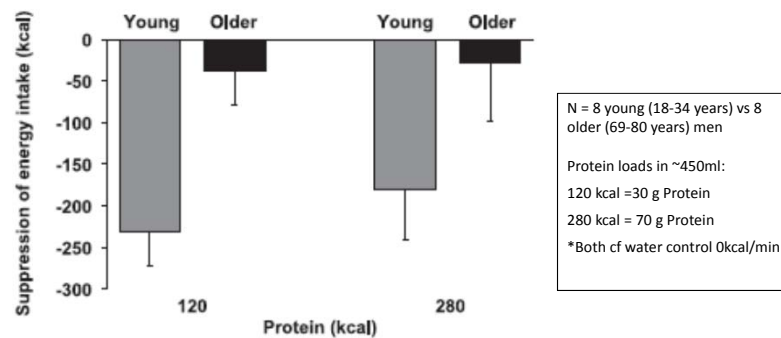


Phillips S et al. Nutrition 2004; Paddon-Jones D, modified from Nestle Symposia presentation 2015



Weaker suppression of energy intake with higher protein in healthy old compared to young men

Giezenaar C et al. *AJP-Regul Integr comp Physiol* 2015



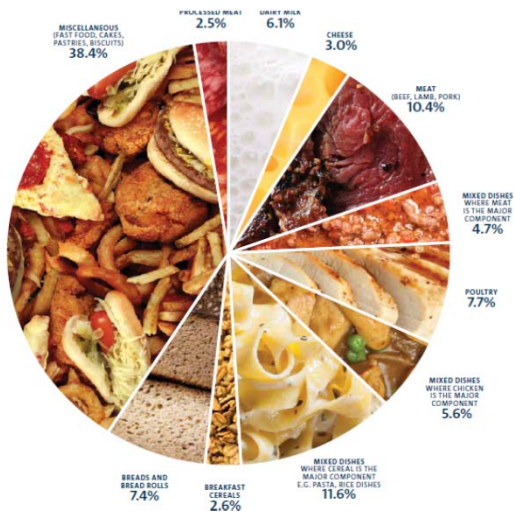
But in both groups ~30 g protein per meal is also optimal for appetite regulation



Does source of protein matter?



How Australians consume their protein – needs correction!!

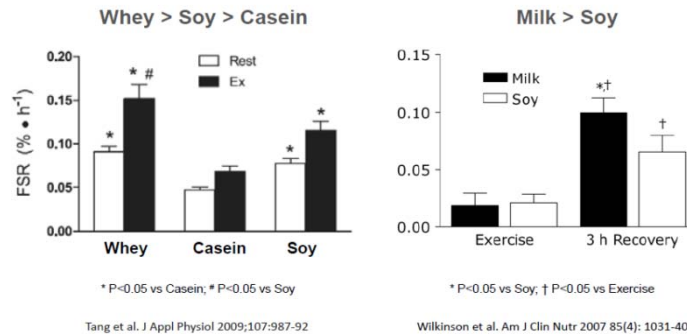


Opportunities

- Reduce indulgence foods
- Create healthier meats, cereals and grain based food
- Fortify some core foods with protein
- More plant based proteins



Anabolic effects of some proteins are better than others



Published randomised clinical trials are heavily biased to investigation of dairy proteins



Opportunities for the food industry

- Overweight/obese, elderly or hospitalised adults have great potential health benefits from increased protein intake.
- Evidence indicates need >1.1 to 1.6 g/kg/d for above populations
 - aim for ~30 g of protein at every eating occasion
 - protein intake at breakfast and lunch meals need most attention
- Timing of protein intake should be considered on an individual basis
- Variety of high-quality proteins
 - dairy, eggs, fish, lean meat, legumes and pulses
 - Fortified products including oral nutritional supplements may required
 - Dairy-based protein supplements appear most effective for enhancing muscle mass/strength



Opportunities for the food industry

- Protein-dense meals & snacks:
 - sustainable, ethical, affordable
 - appetising, convenient
 - increase variety plant- or flexitarian-protein foods
 - Provide array of other nutrients, vitamins, minerals, trace elements
- For frail/hospitalised older adults:
 - minimise the calories and volume of each meal/snack
 - protein + resistant starch + healthy fatty acids

Thank-you



Dr Jane Bowen
Senior Research Scientist, CSIRO
& Affiliate adjunct lecturer, The University
of Adelaide
T: +61 08 83050605
E: natalie.luscombe-marsh@csiro.au
E: jane.bowen@csiro.au

