Higher Protein Diets for Metabolic Health

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**Protein Foods** – More than protein
Consider Nutrients per 100g

**Foods High in Protein**

- **chickpeas**
- **lean beef**
- **chicken**
- **white fish**
- **oily fish**
- **tofu**
- **cheese**
- **legumes**
- **milk**
- **eggs**

**Protein is Important for Muscle**

- There is a constant flux between making new muscle protein and breaking down old muscle protein.
- Known as "protein turnover"
- Goal for increasing muscle size is for muscle protein synthesis to exceed breakdown.

**ILSI SEA Region Seminar on Re-assessing Macronutrient Needs – Requirement, Quality and Health Impact, May 3-4, 2017, Bangkok, Thailand**
Muscle Loss is Related to Poor Health

Nutrient Reference Values for Protein: Underestimates?

- Assumes lean mass is adequate which is unlikely in sedentary populations
- Assumes reference body weights ie 56kg for women and 75kg for men.
- Protein for nitrogen balance alone may not meet functional benefits of protein such as appetite regulation and muscle functionality

Better Estimates of Protein Requirements Based on Kilograms Body Weight

**Recommended Dietary Intake (RDI)**

- 0.83 grams/kg/day *good quality protein*

Adjusting for Protein Quality

- 1.03 grams/kg/day

Protein and Aging - PROT-AGE Study Group Recommendations for >65y

- Age-related decline in anabolic responses to ingested protein.
- More protein needed to offset inflammatory and catabolic conditions.
- Inadequate lean mass due to inactivity and low protein intake.

- 1.0 to 1.2 g protein per kg BW/d
- 1.2–1.5 g protein/kg BW/d if have acute or chronic diseases
- People with severe illness or injury or with marked malnutrition may need up to 2.0 g/kg BW/d.
Aging-related Causes of Protein Shortfall

- Inadequate intake of protein (e.g., anorexia of aging)
- Reduced ability to use available protein (e.g., insulin resistance, protein accretion resistance, gut splanchnic extraction, immobility)
- Greater need for protein (e.g., inflammatory disease, oxidative modification of proteins)

Loss of functionality
- Muscle, bone, immune systems

Protein deficits have adverse consequences, including impairment of muscular, skeletal, and immune function.

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

Acute Effects of Protein sources vs glucose- insulin & glucose responses

- 50g in liquid preload


- Glucose
- Soy
- Whey
- Gluten

n = 38, time x treatment P < 0.0001

Cholecystokinin After Glucose Or Protein

- Glucose
- Soy
- Whey
- Gluten

Bowen et al JCEM (2006)

n = 38, time x treatment P < 0.001

n = 38, time x treatment P < 0.05
Acute effect of proteins vs glucose-Ghrelin response

![Ghrelin response graph](image)

Time (min)

- Glucose
- Soy
- Whey
- Gluten

n = 38, time x treatment P < 0.001

Composition of CSIRO Higher Protein Diet

<table>
<thead>
<tr>
<th>PROTEIN FOODS</th>
<th>WHOLEGRAIN BREAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAIRY FOODS,</td>
<td>2 slices per day</td>
</tr>
<tr>
<td>• 3 serves per day</td>
<td>HIGH-FIBRE CEREAL</td>
</tr>
<tr>
<td>MEAT/CHICKEN/FISH</td>
<td>1 serve per day</td>
</tr>
<tr>
<td>• 200g dinner</td>
<td>FRESH FRUIT</td>
</tr>
<tr>
<td>CHICKEN/FISH/EGGS</td>
<td>2 serves per day</td>
</tr>
<tr>
<td>• up to 100g/day at lunch</td>
<td>VEGETABLES</td>
</tr>
<tr>
<td></td>
<td>at least 2.5 cups per day</td>
</tr>
<tr>
<td></td>
<td>OIL/MARG</td>
</tr>
<tr>
<td></td>
<td>3 teaspoons per day</td>
</tr>
<tr>
<td></td>
<td>INDULGENCE FOODS eg alcohol</td>
</tr>
<tr>
<td></td>
<td>2-4 times per week</td>
</tr>
</tbody>
</table>

Cardiometabolic effects of higher protein vs high carbohydrate diets: meta-analysis of RCTs


Higher Protein was more favourable in:
- body weight (-0.79 kg)
- fat mass loss (FM; -0.87 kg)
- triglyceride reduction (-0.23 mmol/L)
- mitigation in lean mass loss (+0.43 kg)
- increased resting energy expenditure (REE +595.5 kJ/d)
- Greater satiety with HP in 3 of 5 studies

Higher protein moderate carb low GI diet - most effective in maintenance of weight loss

Energy Intake After Glucose Or Proteins

![Bar chart showing energy intake after glucose, soy, whey, and gluten.](chart)

<table>
<thead>
<tr>
<th>Food</th>
<th>Energy Intake (MJ)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>4</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Soy</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Whey</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Gluten</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Bowen et al JCEM (2006)

Higher Protein Breakfast Reduces Food Cravings

![Graph showing changes in food cravings and homovanillic acid concentrations.](chart)

Breakfast led to reductions in food cravings which were accompanied by increases in homovanillic acid concentrations – an index of central dopamine release – with improvements on higher vs. normal protein meals. Daily addition of a high protein breakfast may be an optimal strategy to reduce food cravings and modulate food reward in overweight/obesity.


Renal effects of high-protein versus high carbohydrate weight loss diets


307 obese adults without serious medical illnesses were randomly assigned to a low-carbohydrate high-protein or a high carbohydrate weight-loss diet for 24 months. Main outcomes – markers of renal function.

**CONCLUSIONS:**
In healthy obese individuals, a low-carbohydrate high-protein weight-loss diet over 2 years was not associated with noticeably harmful effects on GFR, albuminuria, or fluid and electrolyte balance compared with a low-fat diet.

No adverse effect of higher protein diet in type 2 diabetes with early renal disease

Cliffton et al Am J Clin Nut. 2013

Impact high protein vs high carb diets on renal function over 12 mo in 45 people with type 2 diabetes and early renal disease.

**CONCLUSIONS:**
After adjustment for weight loss, the baseline GFR remained a significant predictor of outcomes with no effect of dietary treatment. Weight loss improved renal function, but differences in dietary protein had no effect.
Protein "requirements" beyond the RDA: implications for optimizing health

- Because of anabolic resistance, sedentary lifestyles, and common illnesses, older adults need higher protein intakes (≥1.2 g/(kg·day)) to help prevent age-related sarcopenia.

- Including a high-quality protein source at breakfast, the meal generally containing the least protein, is a simple and pragmatic approach to increase intakes in older adults, and has also been shown to reduce unhealthy snacking behaviour in younger individuals.

- The consumption of higher protein diets (~1.2–1.6 g/(kg·day)), including ~30 g protein per eating occasion, improves appetite control, satiety, and weight management.

- Athletes appear to benefit from protein intakes as much as 2 × the RDA, with a per-meal dose of about 0.4 g/(kg·meal) consumed 3 to 4 times per day. Meal planning should be centred around postexercise protein provision to amplify the protein synthetic response.

- High-quality protein from animal-based sources (e.g., milk, meat, poultry, and eggs) provide a concentrated source of essential amino acids, including leucine, to maximize muscle protein synthesis, with relatively few calories compared with plant-based protein sources.


Summary Points

Protein requirements are often underestimated. Protein requirements may be higher in obesity and older people, for restoring lean mass loss and function. Dietary patterns higher in protein and low GI are nutrient dense, and benefit appetite control and food craving, body composition and lipid profiles.

Some Unanswered Questions?

- Protein requirements in non-Caucasian populations?
- Can amino acid formulations replace the need for higher protein foods?
- How to achieve higher protein intakes in vegan/vegetarian populations?
- Is it net protein or protein to carbohydrate ratio that is important to achieve metabolic outcomes?

Come to the 10th Asia Pacific Conference on Clinical Nutrition!

26 – 29 November 2017, Adelaide Convention Centre, ADELAIDE, Australia

- Call for Abstracts Close: 30 June 2017
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