Dietetic Webinar

Why Protein Quality Matters in Clinical Practice

30th April

7:30pm

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Dietetic Webinar

Why Protein Quality Matters in Clinical Practice

Host & presenter introduction

- Initial poll

This webinar will explore why and where protein quality matters in clinical practice.

Hosted by Dr Anne Holdoway

with expert guest speaker
Hannah Nahorniak

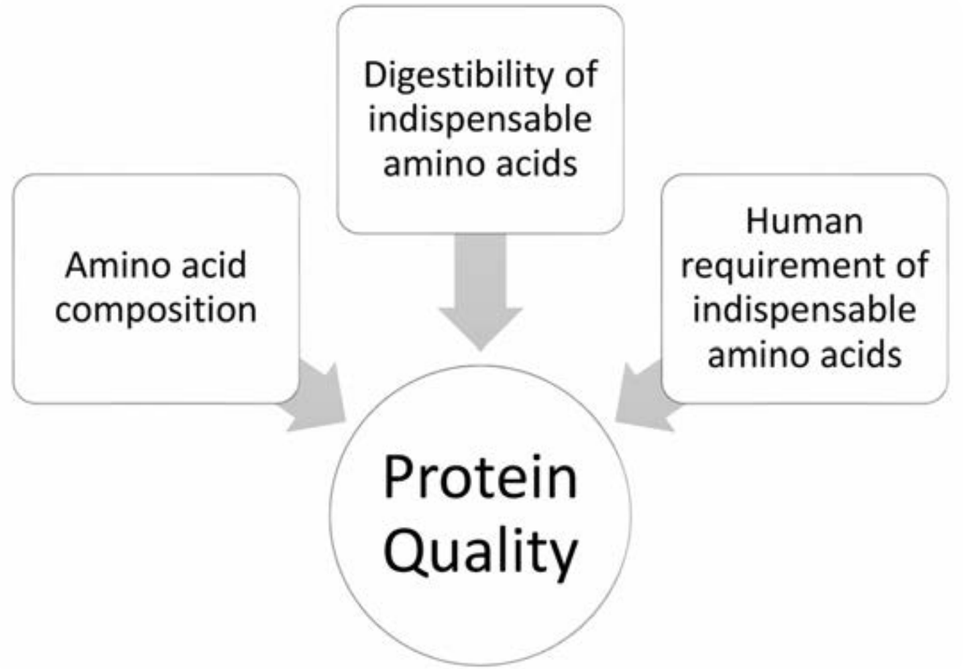
Part 1
What is Protein Quality & How is it measured?

Protein quality

- Ability of a protein source to meet amino acid needs for metabolism.
  (WHO 2013, FAO 2013)

Evaluation methods include

- Protein Digestibility Corrected Amino Acid Score (PDCAAS)
- Digestible Indispensable Amino Acid Score (DIAAS)
- Biological value
- Protein efficiency ratio

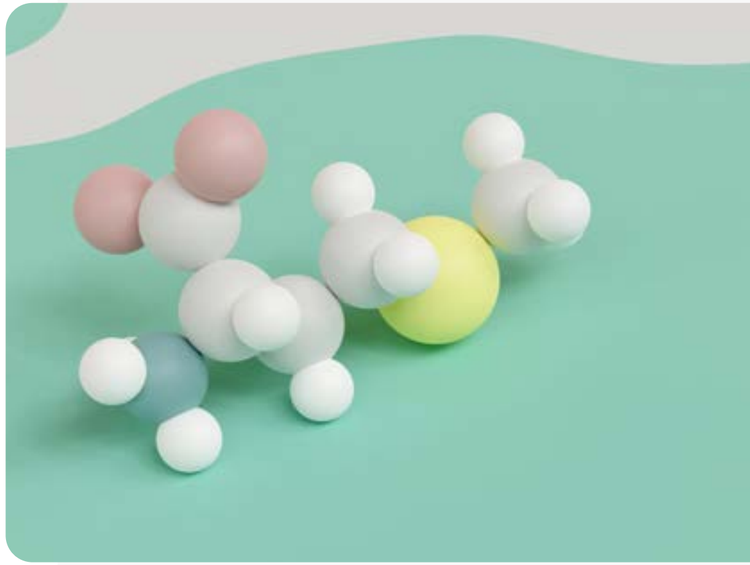


Adhikari et al 2022

Recap on Amino Acids

Essential vs Non-Essential Amino Acids

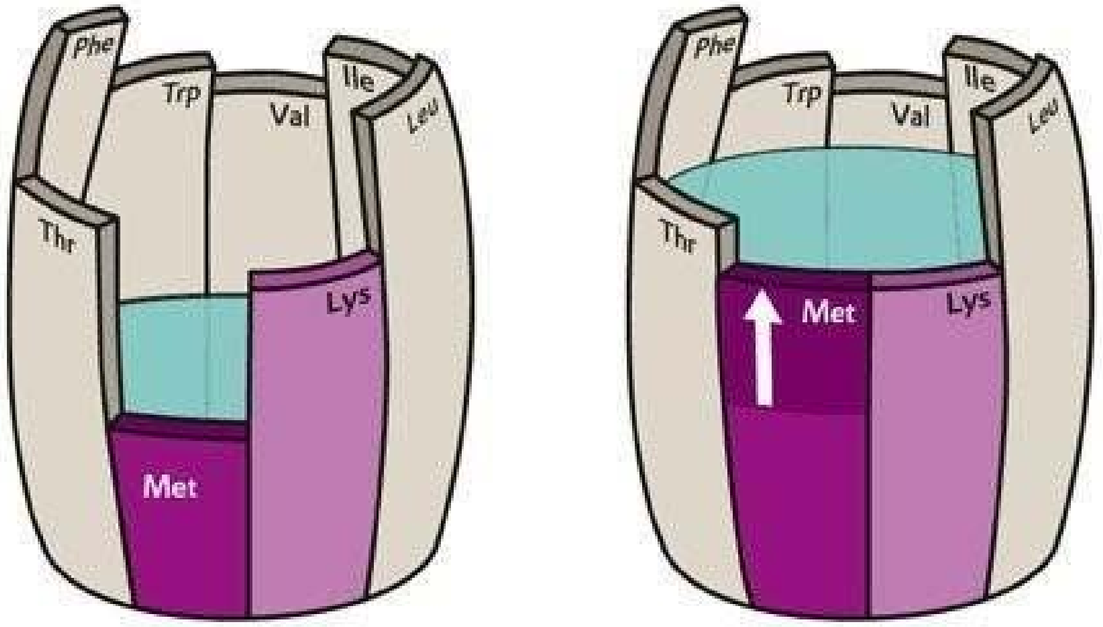
Essential	Conditionally Non-Essential	Non-Essential
Histidine	Arginine	Alanine
Isoleucine	Cystine	Asparagine
Leucine	Glutamine	Aspartate
Lysine	Glycine	Glutamate
Methionine	Proline	Serine
Phenylalanine	Tyrosine	
Threonine		
Tryptophan		
Valine		



Complete vs Incomplete Proteins

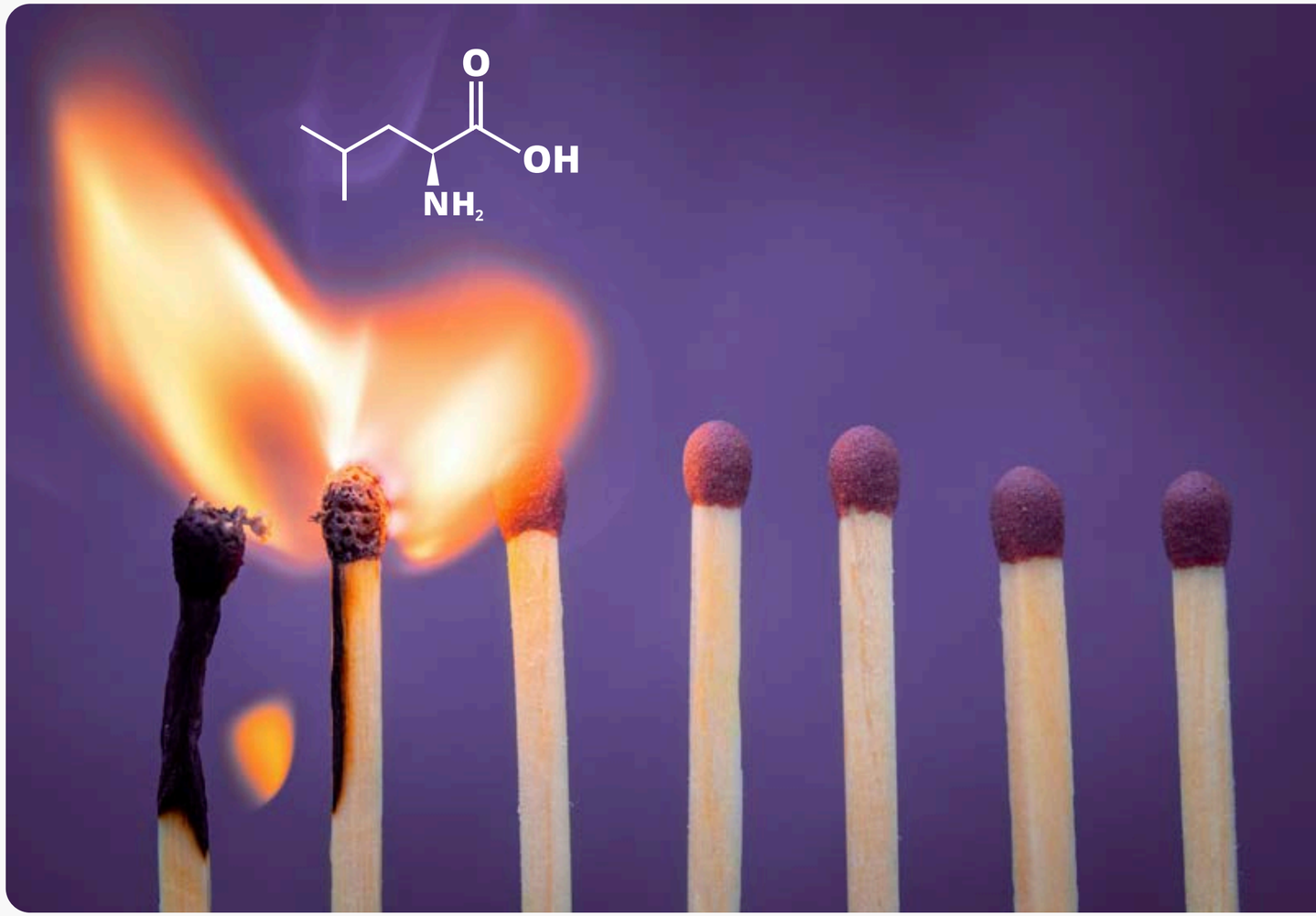
Complete Proteins (All 9 essential amino acids)	**Incomplete Proteins** (Missing one or more essential amino acid)
Animal	**Plant**
• Fish and other seafood • Meat • Dairy • Eggs	• Lentils • Beans & chickpeas • Rice • Nuts & nut butters • Grains
Plant	
• Soy • Quinoa • Buckwheat • Hempseed & spirulina	

Limiting Amino Acids

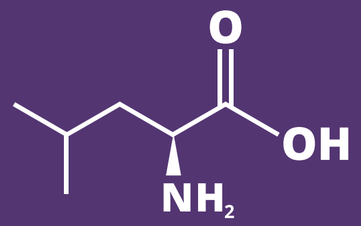


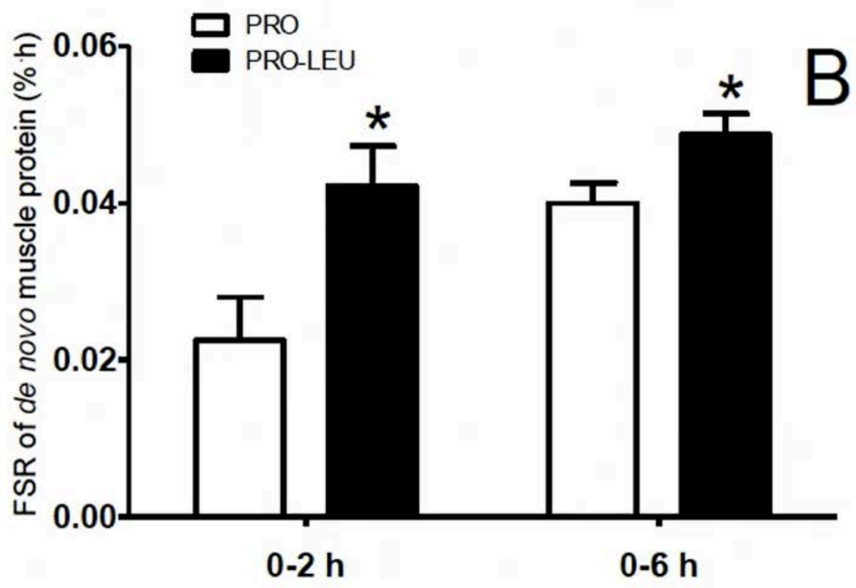
Marvin Ingi Einarsson et al. 2019

Key Amino Acids –
The Leucine Trigger



Leucine Co-ingestion





Wall *et al., Clin Nutr*, 2013

Part 2
Protein Quality in Clinical Nutrition

Many malnourished patients have

- Increased protein requirements
- Decreased protein intake

(Kruizenga et al 2022)

To support MPS, and maintain bodily functions, adequate nutrition is essential

(Bauer et al 2013,Hurt et al 2017, Ochoa Gautier et al 2017, Rostom & Shine 2018, Hou et al 2015).

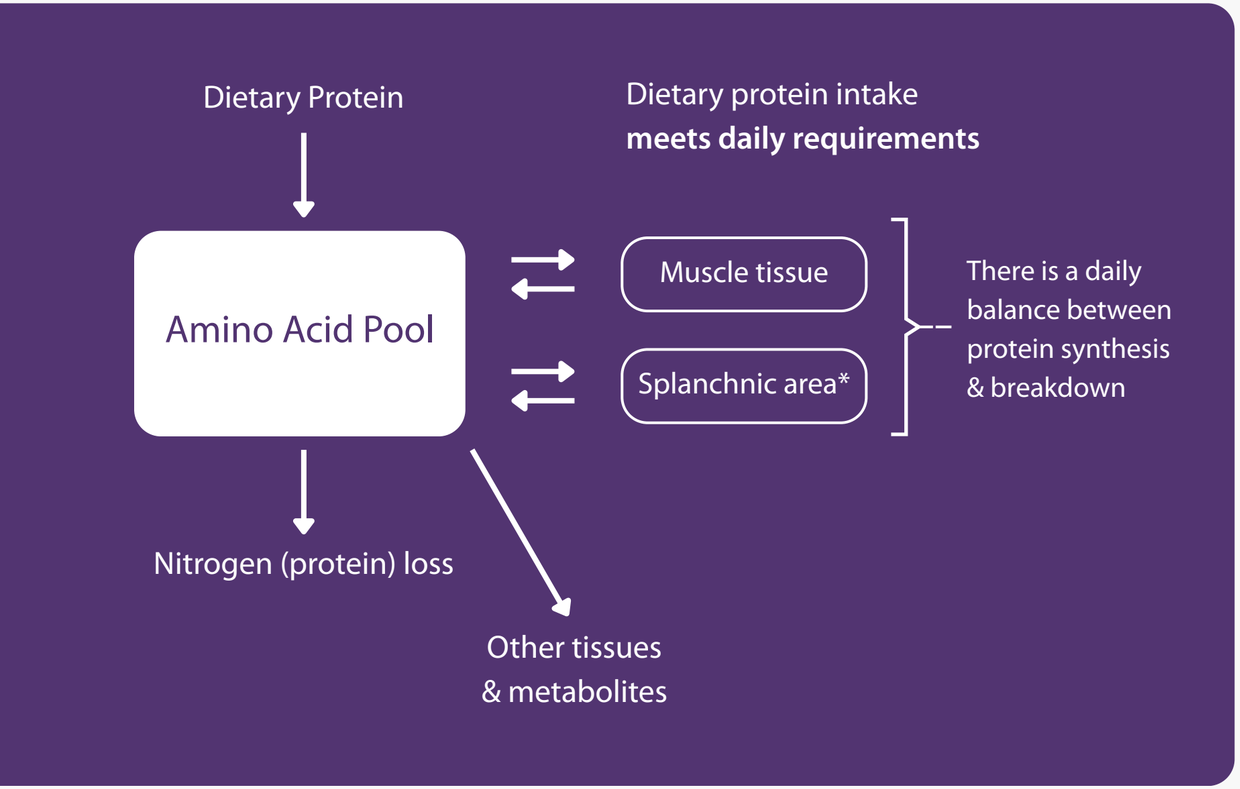
Ensuring high-quality protein is essential

Supporting patients to meet their nutritional needs is key, ensuring correct protein quantity and quality is given. This may be achieved by dietary counselling, fortification and the use of oral nutritional supplements, enteral or parenteral nutrition dependent on their needs.

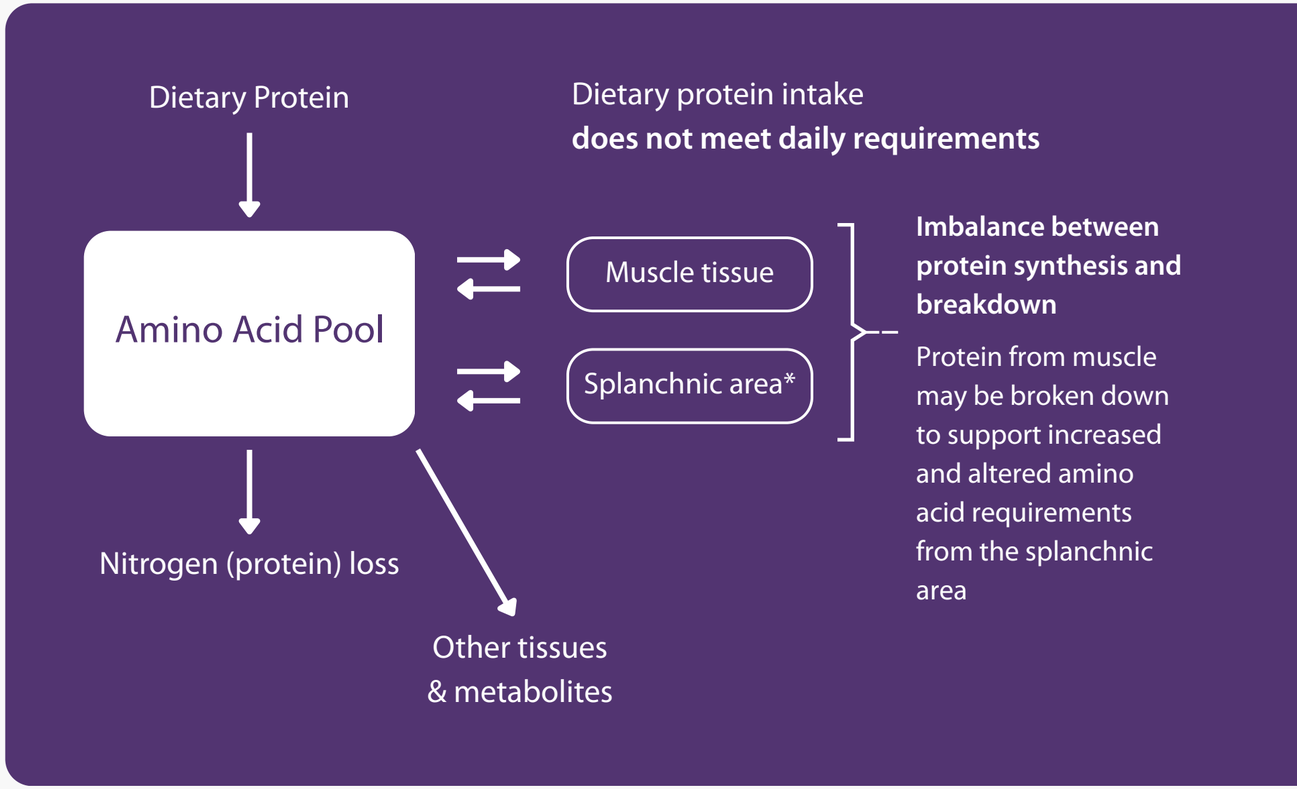
Amino Acid Metabolism in Health and Disease

> There are differences in amino acid metabolism in health compared to disease, resulting in different amino acid requirements.**

In Health



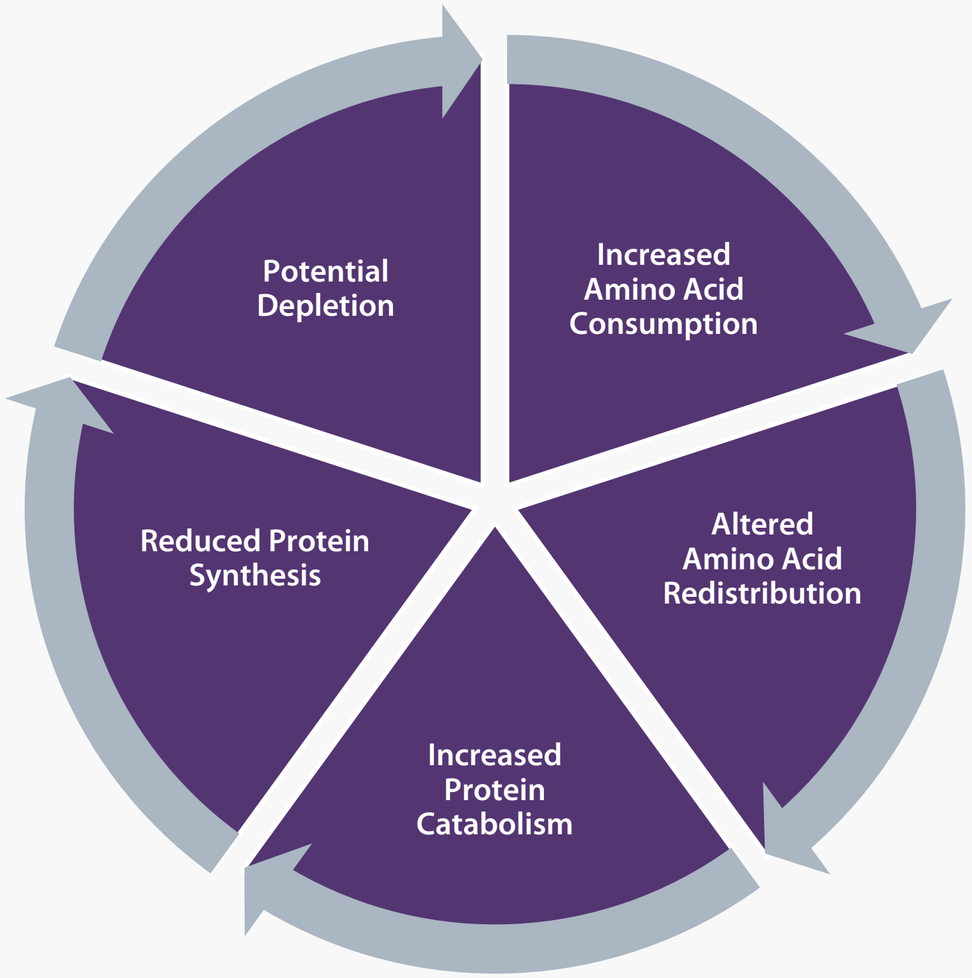
In Disease



*Gut, liver, pancreas, spleen.

**Jonker et al. Br. J. Nutr. 2012 & Weijs et al. Crit care. 2014

Amino Acid Metabolism
During Illness

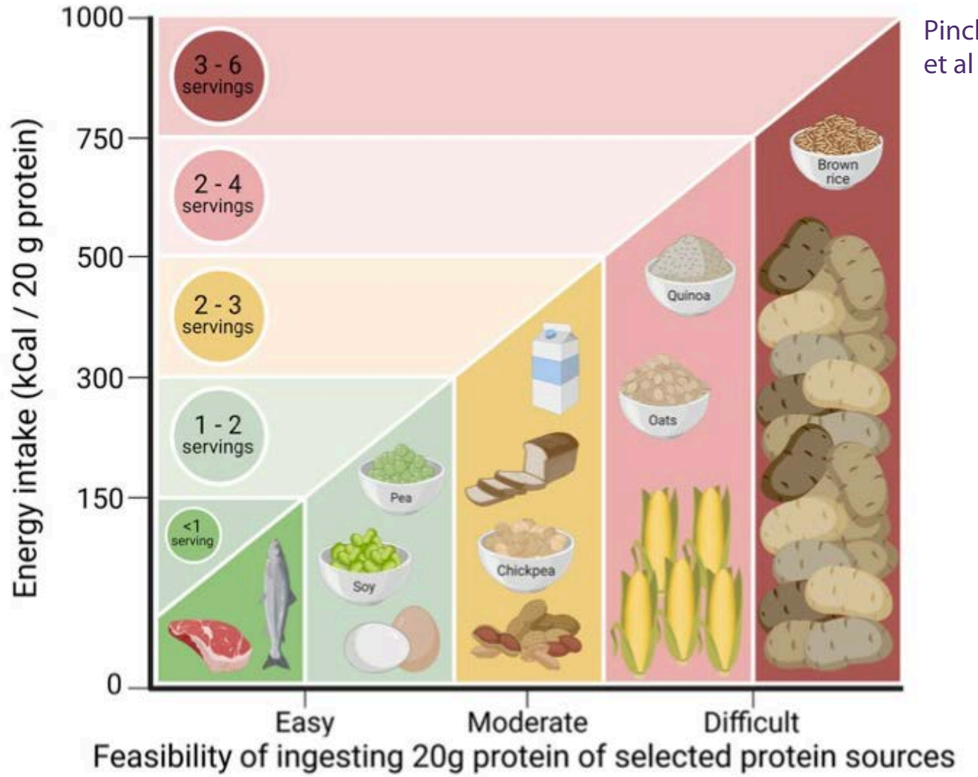


Animal vs. Plant Proteins in Whole Foods

Fig. 1

Type of food	Low in	Combine with
Legumes (except soy)	Methionine	Grains, nuts, seeds
Grains (except quinoa)	Lysine, threonine	Legumes
Nuts/seeds	Lysine	Legumes
Corn	Tryptophan, lysine	Legumes

Fig. 2



Pinckaers et al 2021

Fig. 2

Categorical representation of the feasibility of consuming 20 g protein provided by ingesting the whole food source (x-axis), with the amount of food that needs to be consumed expressed as servings with the concomitant energy intake equivalent (v-axis). Serving sizes: meat/salmon: ~ 100 g, egg: ~ 120 g (2 eggs), soy: ~ 100 g, pea: ~ 150 g, chickpea: ~ 150 g, peanut: ~50 g, bread (wheat): ~70 g (2 slices), milk: ~ 200 mL, corn: ~ 150 g, oats ~40 g (raw), quinoa: ~ 75 g (raw), brown rice: ~ 75 g (raw), potato: 175 g.

Protein Sources

Whole Proteins

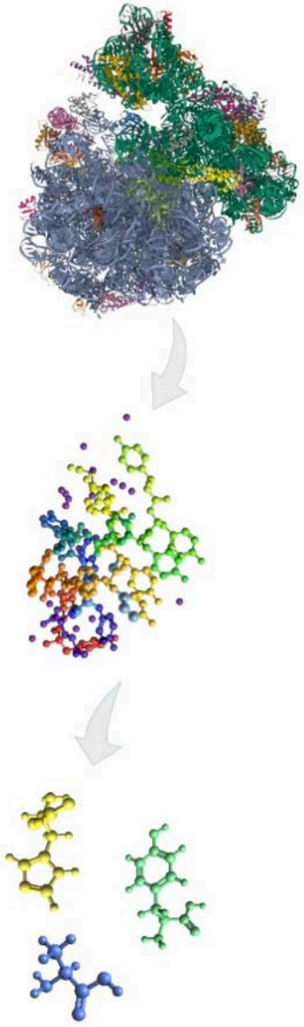
- Chains of folded amino acids
- Require more digestion to break down the matrix
- Large volume of protein needs to be consumed

Isolates

- Higher protein content per gram
- More bioavailable (easier to digest)

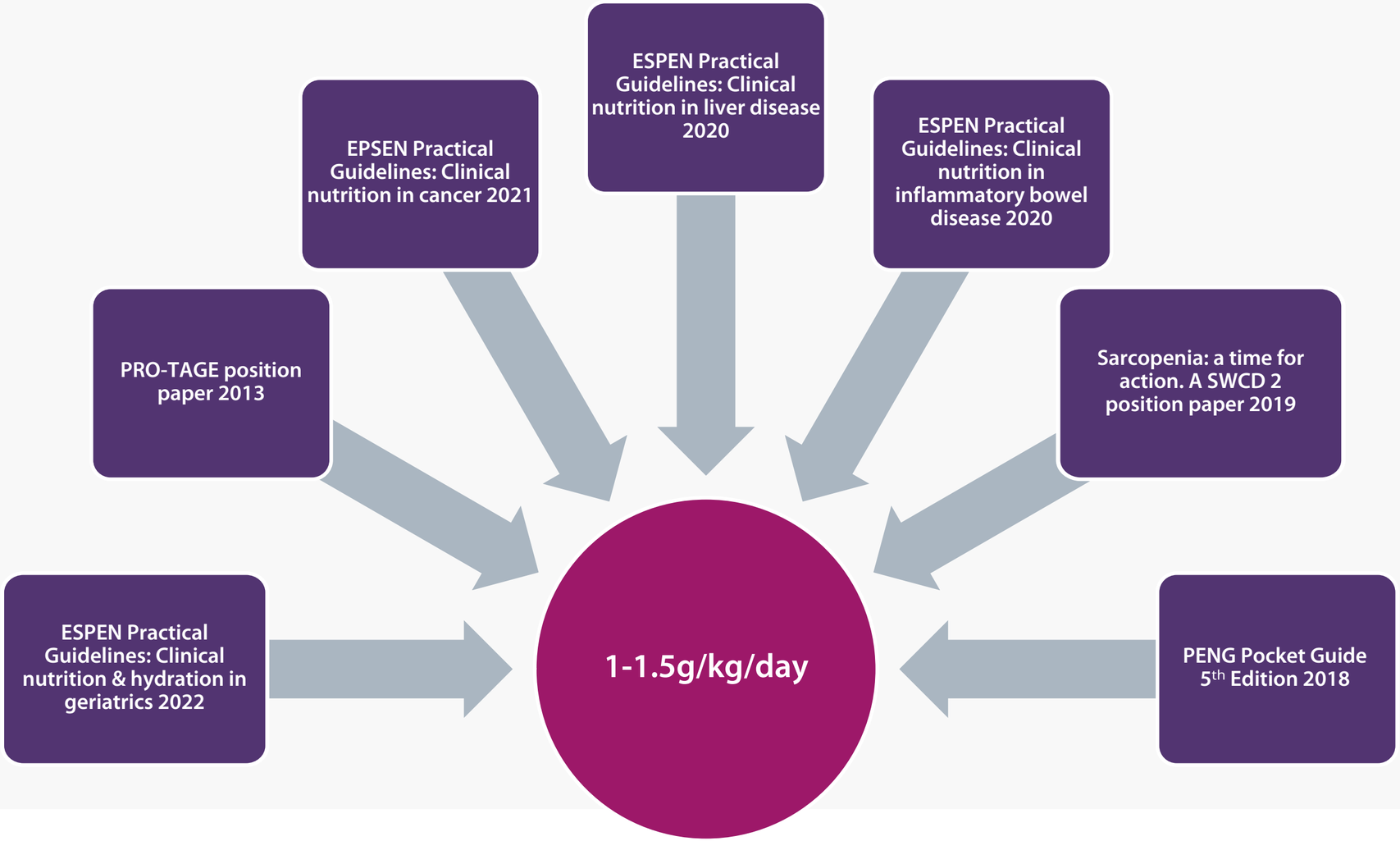
+ Specific Supplemental Amino Acids

- Ensures protein is more complete & reduces the problem of limiting amino acids, but taste can be a challenge



Protein sources in ONS	Protein sources (As per UK Datasheet)	Supplemented AA
Compact style ONS RTD		
Fortisip compact protein	Cows milk proteins	Nil
Ensure Plus Compact	Milk proteins	
Fresubin 3.2	Collagen hydrolysate, milk protein	
1.5kcal/ml ONS RTD		
Ensure Plus	Milk proteins, soy protein isolate	
Fortisip	Cow's milk proteins	Nil
Plant based ONS RTD		
Actagain 1.5 Plant Powered	Faba protein isolate	
Fortisip Plant Based	Soy protein isolate	
Juice Style ONS RTD		
Ensure Plus Juce	Milk proteins	
Fortijuce	Whey protein isolate (from cow's milk),	Nil
Fresubin juicy	Whey protein	
Actagain juce	Milk proteins	
Altrajuce	Cow's milk proteins	
Liquid protein supplements		
Prosource 20	Hydrolysed Collagen (Bovine) and Whey Isolate (milk)	Amino Acids (L-Leucine, L-Phenylalanine, L-Valine, L-Isoleucine, L-Lysine, L-Methionine, L-Tryptophan, L-Histidine, L-Threonine),
Renapro shot	Bovine collagen peptides	L-tryptophan
Actagain protein shot	Collagen peptides (bovine)	L-tryptophan

Meeting Protein Requirements



Per Meal Anabolic Thresholds

Recommended Protein Intake for Healthy Older People: Current Recommendations and Evolving Evidence

PROT-AGE recommendations for dietary protein intake in *healthy* older adults

- To maintain and regain muscle, older people need more dietary protein than do younger people; older people should consume an average daily intake in the range of 1.0 to 1.2 g/kg BW/d.
- The per-meal anabolic threshold of dietary protein/amino acid intake is higher in older individuals (ie, 25 to 30 g protein per meal, containing about 2.5 to 2.8 g leucine) in comparison with young adults.
- Protein source, timing of intake, and amino acid supplementation may be considered when making recommendations for dietary protein intake by older adults.
- More research studies with better methodologies are desired to fine tune protein needs in older adults.

To maximize the acute postprandial muscle anabolic response
(i.e. overcome anabolic resistance)

0.4g/kg – 0.6g/kg per meal

Aragon et al 2025

70kg Male

28 to 42 g protein per meal

Protein Requirements in Different Clinical Conditions

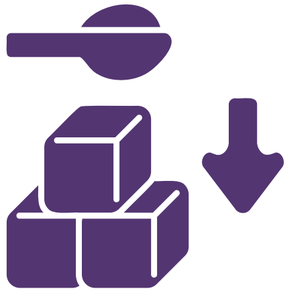
PENG Pocket Guide 2018

BMI 18.5-30kg/m^2	1.0-1.5g/kg/d actual body weight
BMI <18.5kg/m^2	1.5g/kg/d actual body weight
Post injury/recovery phase	1.9g/kg/d actual body weight
Adults with burns/ burn Injury	1.5-2.0g/kg/d
Cancer and cancer survivors	>1g/kg/d
Patients receiving radiation therapy	≥1.2g/kg/d
IBD active state	1.2-1.5g/kg/d
Liver disease	1.2-1.5g/kg/d
Older adults with acute or chronic illness	illness1.2-1.5g/kg/d
Older adults with severe illness, injury, marked malnutrition	≥2g/kg/d
Adults at risk of or with PU	1.25-1.5g/kg/d

Recap

Increased requirements with increasing age and illness

Altered amino acid metabolism and storage



Reduced intake

Part 3
Challenges Meeting Protein Requirements in the Hospital Setting

- Standard diet minimum protein to be provided by the hospital menu = 45g Women, 56g Men
- “Protein recommendations for those over the age of 65 years are between 1.0-1.5g protein/kg/day (2, 4). It can be presumed that those who require over 1.2g protein/kg/day will likely require specialist dietetic intervention to meet protein requirements. However, a hospital menu should be capable of providing protein intakes up to 1.2g protein/kg/day to ensure it has the ability to meet the needs of most patients in the hospital setting, including those over the age of 65 years. Therefore, using the increased target of 1.2g protein/kg body weight/day for adults and the more accurate weight range of 66-77kg thus provides an increased target protein requirement of 79-92g protein/day (2, 4, 5).”
- “It is likely that some patients will require a protein intake greater than 1.2g/kg/day (2, 4), such as those in critical care or with liver conditions. These patients will need at least three meals (breakfast, lunch and dinner) and two higher energy snacks but may also need intervention from a dietitian.”

It is important to note that ensuring patients have the opportunity to meet their energy and protein requirements both at a mealtime and across the day, relies not just on the capacity of the menu offered, but also on the support given to both order and consume appropriate options

- Higher protein diet is included as an optional code

Table 10.2
Nutrition Targets for Menu Planning

Complete meal nutrition targets (optional starter + main + dessert) for lunch and dinner meals	Nutritionally Well	Nutritionally Vulnerable
Energy (kcal)	500	800
Protein (g)	15	27

> "These patients can make up a third of hospital admissions"

Targets for Higher Protein Menu Code	Protein g
Starter	**≥3**
Main course (Entrée and sides)	**≥19 (>15 Entrée, >4 Sides)**
Dessert	**>5**
Snacks	**>4**

Practical Considerations

- Menu planning (home, hospital, community setting) with a focus on protein quality is key
- Combining plant protein sources if vegan, to provide all essential amino acids and ensure optimal protein synthesis
- Food fortification and additional high quality, high protein snacks are essential to meet most patient's requirements unless appetite and intake are good
- Consider proteins with a high leucine content – such as foods containing whey protein
- ONS may be required to meet protein requirements, this may include complete nutritional supplements or protein supplements
- Consider protein quality, dose and timing when advising on meals, snacks and ONS.

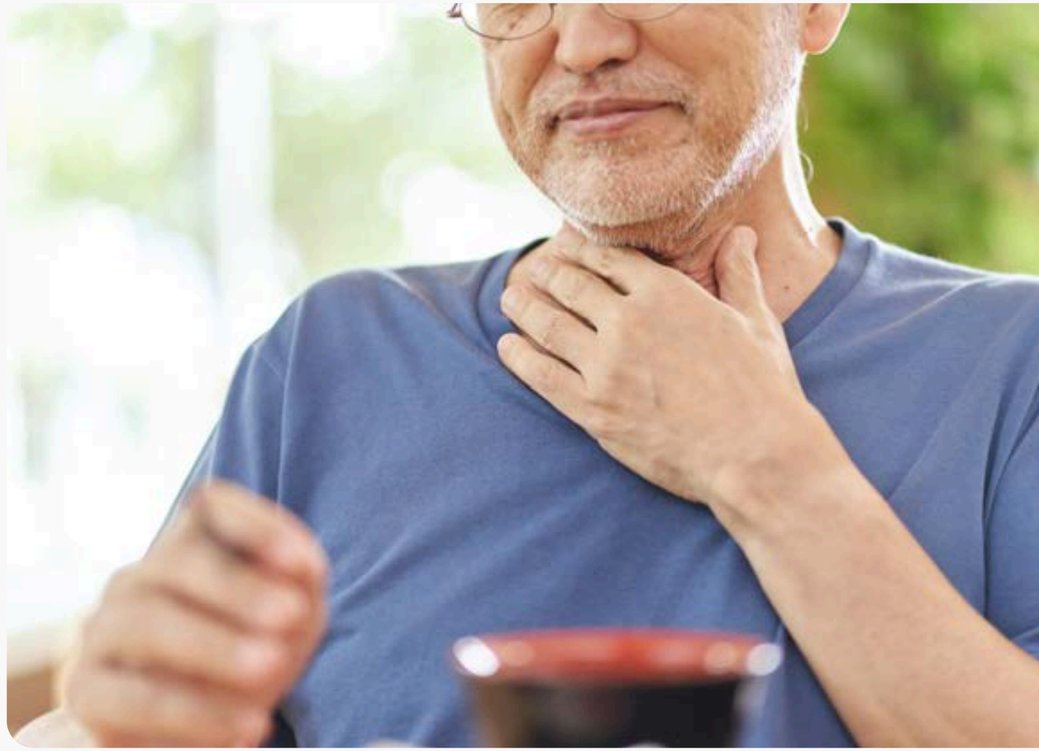
Case Discussions

Challenges in meeting protein requirements in different clinical conditions

Case Study 1
Dysphagia

72-year-old male
82kg, Height 1.8m, BMI 24.8kg/m^2, weight stable

- Dysphagia patient post-haemorragic stroke, ongoing rehab
- Assessed by SALT, IDDSI level 4 diet and level 1 fluids
- Managing 100% of meals



Case Study 1
Considerations & Questions

Estimated Protein Requirements:
(Older adults with complicating medical conditions / acute or chronic illness 1.2-1.5g/kg/d)
= 98.4g – 123g protein per day

IDDSI level 4 meal protein = Higher protein choices approx. 20g protein per main meal

If full hospital meal consumed

- IDDSI Level 4 high protein breakfast, fortified porridge = 7g
- 2 x IDDSI Level 4 main meals, plus fortified dessert = 54g
- 3 x IDDSI snacks, fortified rice pudding, custard, yoghurt = 21g

Total at breakfast 7g
Main meals 27g per meal
Total 82 grams

- What challenges can you see?
- How do you meet protein requirements?
  - Total requirements
  - 0.4-0.6g/kg per meal to meet anabolic threshold (33.6-50.4g per meal)
- What support might you consider?
- Does protein quality matter in this patient?

Case Study 2
Decompensated Alcoholic Liver Disease

65-year-old female
Estimated dry weight of 60kg, Height 1.68m, BMI 21.3kg/m^2
– weight loss of approx. 10% in past 3 months

- Recent ascitic drainage - (4L drained, potentially <25g/L protein loss)
- Now ascites has been drained appetite has improved - managing 75% of hospital meals and 2 additional snacks per day
- CRP = 24, WCC 12

Case Study 2
Considerations & Questions

Estimated Protein Requirements:
1.2-1.5g/kg = 72-90g per day

High protein hospital menu = 79-92g per day = 75% consumed = 59-69g per day

- What challenges can you see?
- How do you meet protein requirements?
- Total requirements
  - 0.4-0.6g/kg per meal event to meet anabolic threshold (24-36g)
- What support might you consider?
- Does protein quality matter in this patient?

Q&A

Closing Poll

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