ROLE OF PROTEIN IN GENERAL WELL-BEING AND SPECIFIC NUTRITIONAL REQUIREMENTS

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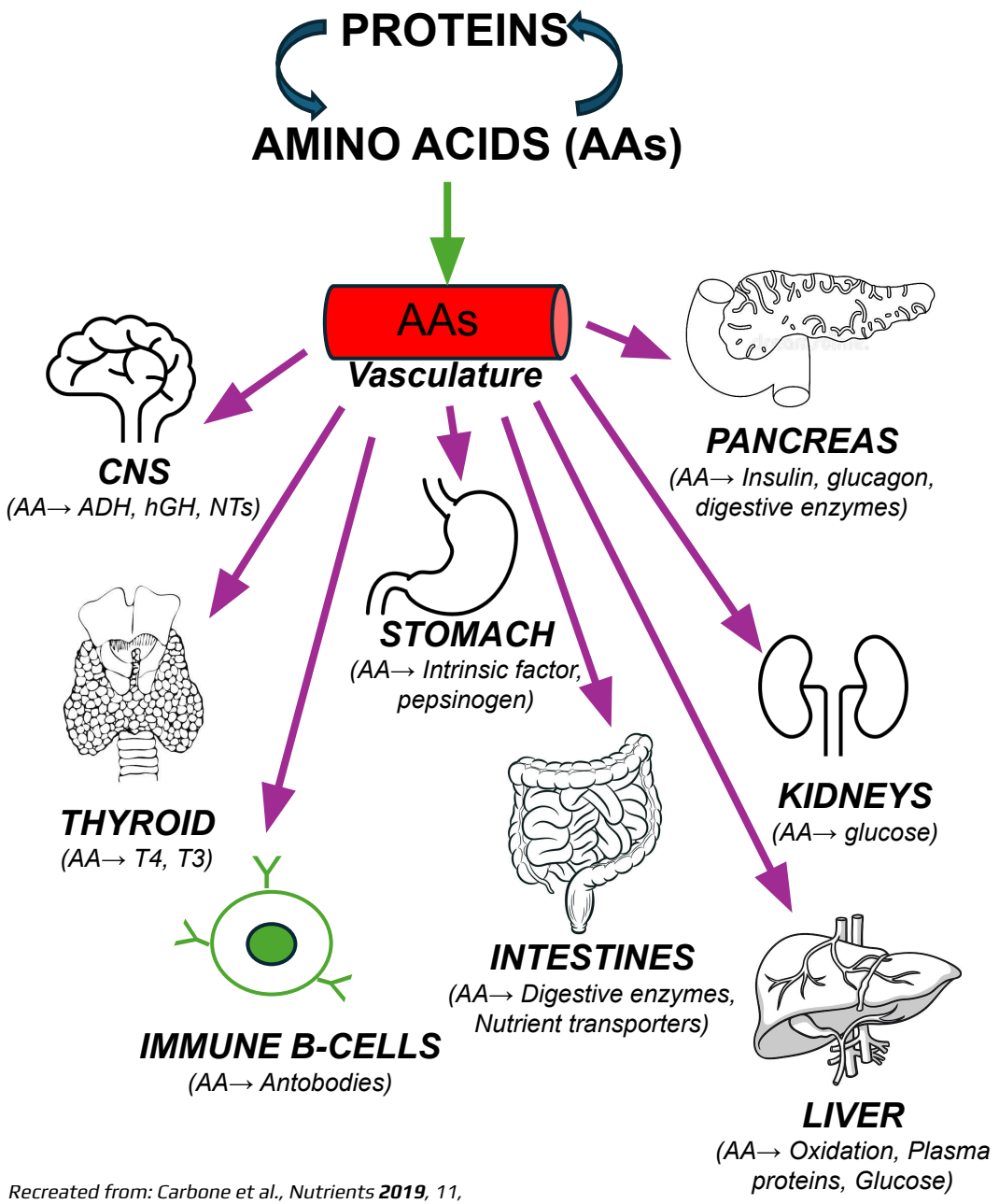
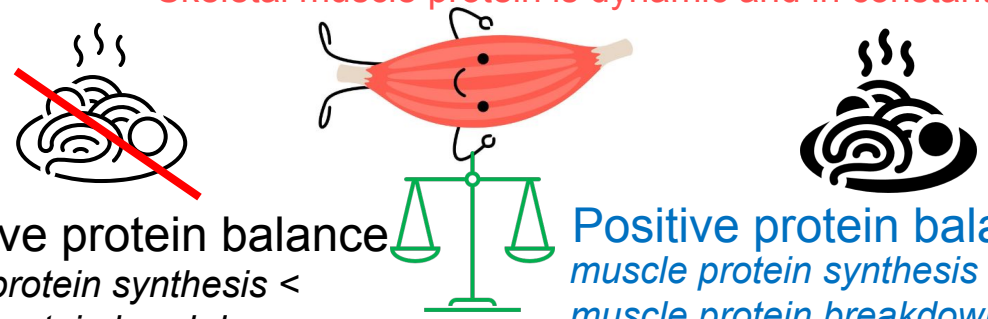
WHY SHOULD I EAT PROTEINS?



*Recreated from: Carbone et al., Nutrients **2019**, 11,*
Image

Images of thyroid, liver: freepik.com; Image of intestine: shutterstock; Image of pancreas: Dreamstime.com

Skeletal muscle protein is dynamic and in constant flux



Negative protein balance
muscle protein synthesis < muscle protein breakdown (POST ABSORPTIVE)

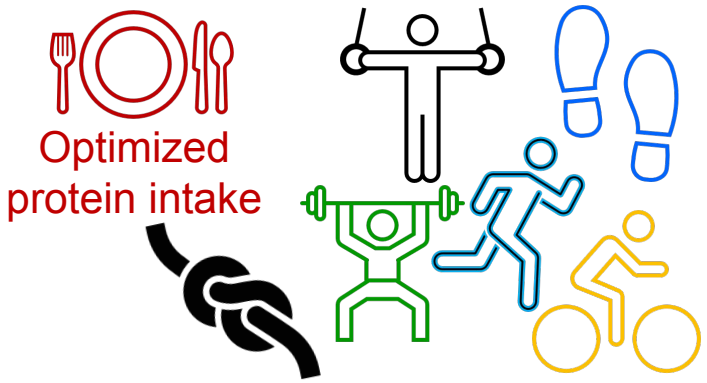
Positive protein balance
muscle protein synthesis > muscle protein breakdown (POST PRANDIAL)

- Muscle protein serves as the **primary repository of amino acids**
- Readily catabolized to release free AAs
- Either reincorporated into muscle protein or used to support other critical physiological needs

DIETARY PROTEIN, PROTEIN QUALITY AND ITS FORMAT influence[1]:

- Magnitude of the postprandial **stimulation of muscle protein synthesis**
- suppression of muscle (and whole-body) protein breakdown, to a positive protein balance

KEY TAKE AWAY[2]



- ❖ Enhanced modelling and repair of existing proteins
- ❖ Synthesis of new muscle protein
- ❖ Muscle maintenance and growth

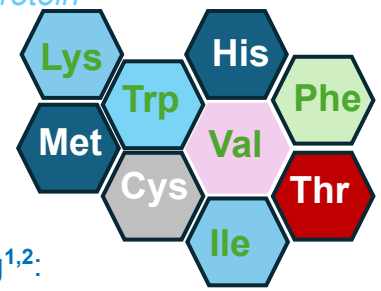
1. *Carbone et al., Adv. Nutr.2019, 10, 70–79*
2. *Burd, N.A. et al., Sport Sci. Rev. 2017, 45, 187–191*

GENERAL WELL-BEING and SPECIAL CONDITIONS

DIETARY PROTEINS

9 essential amino acids → **Synthesize tissue proteins in the body**

High quality protein



Considering[1,2]:

- Indispensable amino acid requirements
- N-balance data: adequate N (and protein requirements); Meta-analyses
- Requirements across different age groups
- Safe levels

CURRENT DIETARY PROTEIN RECOMMENDATIONS FOR ADULT[1]

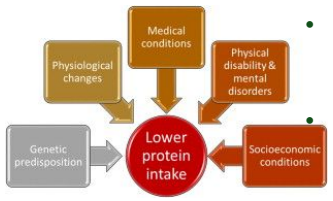
- **EAR:**0.66 g/kg/d
- **RDA:** 0.83 g protein/kg/d
- **AMDR:** proteins contributing 10-15 En%

Ageing population (>65Y)[3]

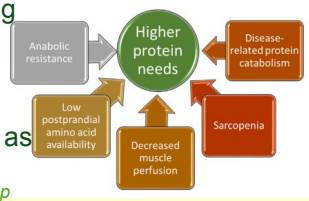
Adequate amount of higher protein to spare muscle mass

- At least 1.0-1.2g protein/kg b.w./day
- Daily physical activity as long as possible

ESPEN Expert Group



Factors leading to lower protein intake in older persons



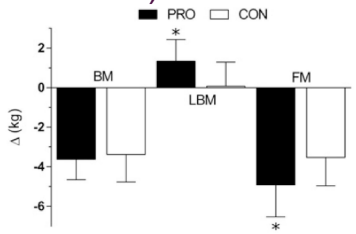
Factors leading to higher protein needs in older persons

Intense Physical activity/ Exercise/ Athletes

Protein is not stored as a reserve. Daily protein intake should match daily protein metabolism to satisfy daily protein requirements

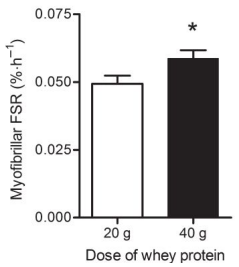
A[4]. High protein + Intense exercise training during marked energy deficit (~40% reduction)

- *Protein:2.4g/kg/d vs. 1.2g/kg/d*
- *Recreationally active young men; 28d protocol*



Consuming a higher protein diet during energy deficit (~40% reduction in energy intake compared with requirements) while performing intense resistance exercise training and high intensity training can augment LBM over a 28-d period

B[5]. Response of MPS to 2 different doses of protein following a bout of whole-body resistance exercise

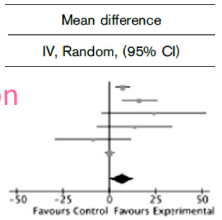


- *20 or 40 g of whey protein isolate in 500 mL drink immediately after exercise*
- *Healthy resistance trained males*

40g stimulated MPS to a greater extent than a 20g whey protein isolate during acute (0–300 min) exercise recovery in young, resistance-trained males

C[6]. Performance benefits of ingesting a protein–carbohydrate drink during exercise (Meta-analysis)

- *time-to-exhaustion studies effect (p =0.008)*
- *Isocarbohydrate studies effect (p = 0.05)*



Compared to carbohydrate alone, co-ingestion of protein and carbohydrate during exercise demonstrated an ergogenic effect on endurance performance in above points

Pathological- Eg: Chronic kidney disease (CKD)

The kidneys have an important role in the synthesis, reabsorption, metabolism and excretion of amino acids and their products[7].

CKD[8]: Glomerular filtration rate (GFR) <60ml/min/ 1.73m^2 indicates reduced kidney function *(KDIGO, 2012)*

rate of deterioration in kidney function

- underlying cause of CKD
- elevated blood pressure
- ↑ proteinuria
- diabetes mellitus
- symptoms of uraemia

Dialysis or transplants

Low protein diets have been proposed for participants with CKD with the aim of slowing the progression to end-stage kidney disease (ESKD) and delaying the onset of renal replacement therapy

Nephrologists & dietitians → low (0.5 to 0.6 g/kg/ day) or very low (0.3 to 0.4 g/kg/day) high biologic-value protein diets

Help delay the onset of ESKD

Loss of metabolizing renal tissue in CKD[9]

- ❖ ↑ circulating levels of AAs because of reduced renal clearance
- ❖ Kidney removal of citrulline, s-adenosyl-homocysteine (SAH) and glutamine is blunted
- ❖ Synthesis of AAs generated by kidney is reduced

- ❑ Very low protein diets are frequently supplemented with essential amino acids and nitrogen free keto-analogues of amino acids to reduce the risk of malnutrition.
- ❑ Required careful monitoring of clinical and biochemical markers to avoid nutritional deficiencies.

Ref: 1. ICMR-NIN: RDA and EAR-Nutrient requirements for Indians – **2020**; 2. Carbone et al., Nutrients **2019**, 11, 1136; 3. Deutz et al.,Clin Nutr 33 (**2014**) 929-936; 4. Longland et al., Am J Clin Nutr **2016**;103:738–46.; 5. Macnaughton et al., **2016**, 4(15)e12893.; 6.Stearns et al. J Strength and Conditioning Research 2010; 24(8):p 2192-2202,;7. Knol et al., 2024. Nat Rev Nephrol.; 8. Hahn et al., Cochrane Database of Systematic Reviews **2020**, Issue 10. Art. No.: CD001892; 9. Verzola et al., Nutrients **2021**, 13, 83

CONCLUSIONS, KEY POINTS

1. Protein : an essential macronutrient is not stored in the body as a reserve
2. Dietary proteins are energy macronutrients providing nitrogen, amino acids (AA), and energy
3. Utilization of protein is dependent on adequate intake of energy and micronutrients
4. Recommended intake of protein to be accompanied by a balanced diet that meets all the micronutrient requirements
5. Nutritive value of proteins from food and diet depends not only on the amount of protein, but also on the AA composition, concentration, and on bioavailability of protein-derived nitrogen and AAs
6. JUDICIOUS APPROACH : In situations which need specific kind of protein / of levels, it would be appropriate to consult a physician/dietician/nutritionist or a person such

THANK YOU

- PFNDAI
- To all who have listened to the talk