The functions of essential amino acids
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Protein plays a role in building and maintaining body tissues, such as muscle and bone. Proteins are made of smaller building blocks called amino acids, which can be classified into essential and non-essential amino acids.

There are 2 types of amino acids

The liver can produce 11 non-essential amino acids if dietary intake is insufficient.

The body cannot produce the essential amino acids (EAAs) and they need to be obtained from dietary sources. The 9 EAAs and their functions:

1. Histidine
   - Necessary to produce histamine for immune response and sleep-wake cycles. Critical for maintaining myelin sheath, a protective barrier surrounding nerve cells.

2. Isoleucine
   - Involved in healing/repair of muscle tissue. Important for immune function, hemoglobin production and energy regulation.

3. Leucine
   - Important for protein synthesis and muscle repair. Helps regulate blood sugar levels, stimulates wound healing and produces growth hormones.

4. Lysine
   - Involved in protein synthesis, hormone and enzyme production and absorption of calcium. Important for energy production, immune function and production of collagen and elastin.

5. Methionine
   - Important role in metabolism and detoxification. Necessary for tissue growth and absorption of zinc and selenium.

6. Phenylalanine
   - Precursor for neurotransmitters tyrosine, dopamine, epinephrine and norepinephrine. Integral role in structure and function of proteins and enzymes and production of other amino acids.

7. Threonine
   - Major part of collagen and elastin, which are important components of skin and connective tissue. Plays a role in fat metabolism and immune function.

8. Tryptophan
   - Maintain nitrogen balance, precursor to serotonin, a neurotransmitter that regulates appetite, sleep and mood.

9. Valine
   - Helps stimulate muscle growth and regeneration and involved in energy production.

Foods that are rich in all 9 EAAs include milk, yoghurt, cheese, meats, poultry, fish and eggs.
Milk is considered a source of **high quality protein** as evidenced by its **high digestibility factor** and the surplus of **EAA** as compared to the reference **EAA pattern**.\(^4,5\)

**Dietary protein** must be **accessible** for **digestive enzymes** in the **gastrointestinal tract**. This might sound obvious but in fact it is not. Industrial food processing, product composition, cooking, plant cell walls, interaction with reducing sugars, and enzyme inhibitors—especially in plant based foods—all affect digestibility and therefore lower availability of EAAs. **Thus, protein quality is not only determined by the levels of EAAs but also by their digestibility.**\(^4,5\)

Currently, the **Protein Digestibility Corrected Amino Acid Score (PDCAAS)** is used to **measure protein quality**.

According to both methods, **milk protein scores well above 100%**.

**High protein quality**\(^5-10\)

Milk contains more than just **high quality proteins**. It is also a natural source of calcium, phosphorus, potassium and the vitamins B2 and B12.\(^11,12\)
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