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Pharmacology
BCH204 NUTRITION

1. Biological value is a measure of the proportion of absorbed protein from a food which becomes incorporated into the proteins of the organism's body. It captures how readily the digested protein can be used in protein synthesis in the cells of the organism. Proteins are the major source of nitrogen in food.

The biological value of a protein extends beyond its amino-acid composition and digestibility, and can be influenced by additional factors in a tissue-specific manner. In healthy individuals, the slow appearance of dietary amino acids in the portal vein and subsequently in the systemic circulation in response to bolus protein ingestion improves nitrogen retention and decreases urea production. This is promoted by slow absorption when only protein is ingested (e.g. casein). When a full meal is ingested, whey achieves slightly better nitrogen retention than soy or casein, which is very likely achieved by its high content of essential amino acids (especially leucine). Elderly people exhibit 'anabolic resistance' implying that more protein is required to reach maximal rates of muscle protein synthesis compared to young individuals. Protein utilization in inflammatory or traumatic conditions increases substantially in the splanchnic tissues containing most of the immune system, and in wounds and growing tissues. This happens especially in the elderly, which often suffer from chronic inflammatory activity due to disease, physical inactivity and/or the aging process itself. Consequently, the proportion of protein absorbed in the gut and utilized for muscle protein synthesis decreases in these situations. Exercise has both direct effects on muscle mass and health, and indirect effects by increasing the utilization of dietary protein (especially whey) to enhance rates of muscle protein synthesis.

2. Assessment of protein

An evaluation of protein status can be approached by use of anthropometric, clinical, and biochemical data, either singly or in combination, and further aided with dietary data. Each of these approaches has advantages and limitations. Biochemical evaluation has the potential of being the most objective and quantitative. Indicators that have been or might be used include plasma hormone responses to reduced protein intake, plasma levels of specific proteins or specific amino acids, urinary excretion of specific amino acids and other nitrogen-containing compounds, anthropometric and physical measurements of body muscle mass, and functional tests of muscle strength. Several measurements can be combined to produce nutritional indices of broader potential value. The importance of concomitant infection and inflammation, with its many effects on protein metabolism, cannot be ignored in making these assessments. Unfortunately, no single test or group of tests can be recommended at this time as a routine and reliable indicator of protein status. Nonetheless, our increasing knowledge of the metabolism and functions of proteins, together with the recent use of noninvasive stable isotope techniques and of sophisticated physicochemical measurements, provides encouragement that more appropriate indicators are in the offing.