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QUESTION: 1. What do you understand by the term “biological value of proteins”

2. List and explain the various methods of assessment of protein quality.

1. Biological value (BV) of protein 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. BV assumes protein is the only source of nitrogen and measures the proportion of this nitrogen absorbed by the body which is then excreted. Biological Value (BV) is the most common method of determining and labeling the quality of proteins. The quality of a protein is determined by the level of the valuable essential amino acids it contains. Unlike many other measurements, biological value is measured directly in human beings. A protein is ingested on an empty stomach. Then, measurements are taken to determine nitrogen balance (how much nitrogen stays in body versus the amount excreted). Biological Values show how efficiently a food protein can be metabolized into a protein the body can use. If a given food protein lacks one of the nine essential amino acids, it always has a Biological Value of zero.

1. There are various methods of assessing the quality of proteins. They include:

* **Biological Value (BV)**

Biological value, as defined has long been considered the method of choice for estimating the nutritive value of proteins. It has been defined as the "percentage of absorbed nitrogen retained in the body" and a complete evaluation of the dietary protein includes measurement of the Biological Value and the Digestibility. These values are obtained by measuring the fecal and urinary nitrogen when the test protein is fed and correcting for the amounts excreted when a nitrogen-free diet is fed.

* **Net Protein Utilization (NPU)**

NPU estimates nitrogen retention but in this case by determining the difference between the body nitrogen content of animals fed no protein and those fed a test protein. This value divided by the amount of protein consumed is the NPU which is defined as the "percentage of the dietary protein retained". A procedure which involved replicate groups of 4 weanling rats housed in group cages which were fed either the "protein-free" or the "test" diet for 10 days. These conditions were chosen empirically and the particular merits of these conditions remain to be demonstrated.

* **Amino acid score**

It is a method of evaluating the quality of a protein based on both the amino acid requirements of humans and their ability to digest it. Using this method, the protein quality rankings are determined by comparing the amino acid profile of the specific food protein against a standard amino acid profile with the highest possible score being a 1.0. This score means, after digestion of the protein, it provides per unit of protein 100% or more of the indispensable amino acids required.

The formula for calculating the PDCAAS percentage is: (mg of limiting amino acid in 1 g of test protein / mg of same amino acid in 1 g of reference protein) x fecal true digestibility percentage.

* **Net protein ratio**

The net protein ratio, or NPR, is the ratio of amino acid mass converted to proteins to the mass of amino acids supplied. This figure is somewhat affected by the salvage of essential amino acids within the body, but is profoundly affected by the level of limiting amino acids within a foodstuff. In this method an allowance is made for the protein requirements for maintenance.