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Question: what do you understand by the term biological value of proteins?

Biological value of protein is defined as the percentage of absorbed nitrogen retained by the body or it can also be 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. True digestibility is defined as the percentage of food nitrogen absorbed from the gut and is calculated by:

$$(BV) = \frac{\text{Nitrogen retained Biological value}}{\text{Nitrogen absorbed}} \times 100$$

Question 2: list and explain the various methods of assessment of protein quality

1. Chemical score or amino acid score

2. Net protein utilization (NPU)

3. Protein efficiency ratio (PER)

4. Biological value (BV)

1. Chemical score or amino acid score

It is a measure of the concentration of each essential amino acid in the test protein which is then compared with reference protein (usually egg protein). It is calculated by following formula:

$$\text{Amino acid score} = \frac{\text{Number of mg of one amino acid per gm of test protein}}{\text{Number of mg of the same amino acid per gm of egg protein}} \times 100$$

This mode of chemical assessment does not take into account the digestibility of dietary proteins.

Hence, biological methods based on growth or nitrogen (N) retention are used to determine the overall quality of a protein.

2. **Net protein utilization (NPU)**

• It is a product of digestibility coefficient and biological value divided by 100.

• Biological measures of NPU gives a more complete expression (both absorption and retention) of protein quality than the amino acid score as said above. It is calculated by the following formula: Nitrogen retained by the body

$$\text{NPU} = \frac{\text{nitrogen retained by the body}}{\text{Nitrogen intake}} \times 100$$

• The protein requirement varies with the NPU of dietary protein. If the NPU is low, the protein requirement is high and vice versa.

• The NPU of the protein of Indian diets varies between 50 and 60.

3. **Protein efficiency ratio (PER)**

The overall quality, i.e. nutritive value of a food protein can be determined with laboratory animal like rat as follows. The gain in weight of young animals per gm of protein consumed is measured and the value obtained is used to determine the protein efficiency ratio (PER) as follows:

$$\text{PER} = \frac{\text{Gain in body weight in gm}}{\text{Protein ingested in gm}}$$

4. **Biological value**

Biological value of protein is defined as the percentage of absorbed nitrogen retained by the body and is calculated by:

(BV) = Nitrogen retained Biological value × 100

Nitrogen absorbed

• The amount of nitrogen in the diet eaten and in excreta of adult animals are measured and the percentage of nitrogen retained by animals from out of nitrogen absorbed from the diet is calculated. The value thus obtained is the “biological value” (BV) of the protein.

• This test also gives an estimate of digestibility of the protein. But it cannot take into account the nitrogen that might be lost during the digestion process.