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**BCH 204**

**18/MHS07/001**

**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.

**ANSWER:**

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.

## 2BODY PROTEIN METABOLISM

Assessing protein quality with respect to its efficiency in supporting body protein metabolism should include consideration of the capacity of the diet to provide substrate needs for protein synthesis and any other biosynthetic pathways, ie, a suitable source of nitrogen and IAA (lysine, threonine, valine, isoleucine, leucine, methionine, phenylalanine, tryptophan, and histidine). However, to this assessment method should be added provision of sufficient signal amino acids, (eg, leucine), required for those regulatory steps whereby metabolism is optimized and anabolism is stimulated . It is arguable that current methods used for assessing protein quality have only evaluated substrate needs rather than any provision of regulatory amino acids

## DIETARY PROTEIN AND AMINO ACID BIOAVAILABILITY

A second important issue in quality evaluation relates to the bioavailability or digestibility of a protein or the capacity to provide metabolically available nitrogen and amino acid to tissues and organs. The food matrix in which a protein is consumed can have significant impact on the bioavailability of amino acid for metabolic needs. Digestive losses and structural changes of amino acids are caused by numerous antinutritional factors in foods. These issues have been addressed with particular attention to animal compared with plant proteins.

the PDCAAS value is calculated by first scoring the test protein against an appropriate reference amino acid pattern, then correcting for digestibility. The currently accepted method for assessing digestibility is based on measures of fecal nitrogen in a rat assay. Fecal measures in this assay appear to appropriately assess human nitrogen digestibility. It has been noted, however, that ileal measures may better assess amino acid digestibility. Both cost and time involved in measuring true ileal digestibility in human subjects are intensive ,although other monogastric species, such as the pig, have been considered . It has also been noted that research is needed to assess the impact of kinetic differences between proteins in the intestinal lumen when measuring ileal digestibility .

## PROTEIN QUALITY IN RELATION TO ENERGY TURNOVER AND GLUCOSE HOMEOSTASIS

Dietary protein function is not usually considered in relation to energy status and glucose homeostasis. Although energy intake and expenditure, either above or below metabolic needs, influences protein utilization, the impact of protein quality in populations with varying levels of energy turnover has not been considered in the past. However, it is logical to question the influence of energy turnover on amino acid needs and the consequent reference amino acid pattern for assessing protein quality in any target population. Current evaluation of dietary protein utilization, especially in relation to its quality, assumes subjects are in energy balance, consuming nutritionally adequate diets, and engaging in moderate rates of physical activity. Departure from energy balance markedly changes protein utilization and has been suggested as an important factor in the lack of reproducibility of the nitrogen balance studies . In subjects who are otherwise in energy balance, the protein utilization effects of varying levels of physical activity are very poorly understood.

## SATIETY INDUCTION

in the context of weight and energy-balance regulation, dietary protein is now known to play an important role in appetite regulation. Thus, the effect of protein on satiety becomes a potential endpoint for quality assessment. Given the complexity of the neuroendocrine and metabolic mechanisms of appetite regulation ,it is difficult to predict how quality will modulate protein's influence within the satiety cascade given the likelihood of both pre- and postabsorptive signaling. Proteins that are more rapidly digested (fast proteins), such as whey, appear to have greater influence on satiety than casein (a slow protein), which clots in the stomach and induces a slower hyperaminoacidemia . In part, the difference in rate of digestion alters levels of the gut hormones glucagon-like peptide-1 and cholecystokinin . Hence, another feature of protein that influences its effectiveness (ie, “quality”) in terms of appetite regulation relates to its tertiary structure and consequent behavior in the gastrointestinal tract. Protein structure is a characteristic not currently addressed in quality evaluation.