

Dietary Reference Intakes of Protein and Protein Quality Evaluation

Kyoichi Kishi (Institute Health Biosci. Univ. Tokushima Grad. Sch.)

There have been three approaches for assessing human protein requirements, namely observations of dietary intakes, factorial method and nitrogen balance method. The first is to examine actual protein intakes of healthy people. For example, protein requirement of infant is estimated from the intake of milk by normally growing infants and protein content of milk. Factorial method is applied to children and pregnant and lactating women, in which requirements for growth and milk formation are added to maintenance requirement. Nitrogen balance method has been used to determine protein requirement of adults. Because the balance can be achieved over a wide range of protein intakes, the protein requirement based on this method is a minimum intake. Although the balance method is useful to examine the subtle changes in whole body protein metabolism, it has substantial limitations, one of them is the tendency to overestimate nitrogen retention.

The quality of food proteins depends on digestibility, amino acid availability and amino acid pattern. There are basically two methods of assessing protein quality: biologic assays and chemical scoring method. Protein efficiency ratio (PER) and biological value (BV) are the most widely used examples of biologic assays. PER is usually determined using growing rats and BV can be measured in any subjects, animal or human, growing or adult. Chemical scoring methods (amino acid score) is based on the essential amino acid composition of a test protein as compared with reference pattern. The validity of chemical scoring method is dependent on reference amino acid pattern. Chemical score does not take account of digestibility of the protein. Hence, protein-digestibility corrected amino acid score (PDCAAS) has been proposed as the more appropriate method for measuring food protein quality than simple amino acid score for human population.