Protein turnover

All the body proteins except collagen are in a constant state of degradation and resynthesis. About 1-2% of total body proteins are degraded and resynthesized every day.

Nitrogen Balance

Nitrogen balance means the difference between nitrogen intake and nitrogen loss.

Nitrogen Intake

1. Dietary protein, every 100 gram proteins contain 16 gram nitrogen
2. Traces of inorganic nitrogen in the form of nitrates and nitrites

Nitrogen loss

1. In urine in the form of non-protein nitrogenous substances as urea, uric acid, creatine, creatinine and ammonia
2. In stools in the form of digestive juices
3. In sweat in the form of urea

Positive nitrogen balance means that nitrogen intake is more than nitrogen loss. It occurs in:
- Growing children
- Pregnancy
- Convalescence from wasting diseases

Negative nitrogen balance means that nitrogen loss is more than nitrogen intake. It occurs in:
- Diabetes mellitus
- Fever
- Starvation
- Wasting diseases

Nitrogen equilibrium means that nitrogen intake equals nitrogen loss. It occurs in healthy adults on an adequate diet

G/N ratio (D/N ratio)

It is the ratio between glucose and nitrogen excreted in the urine of an animal rendered diabetic by phlorizin to deplete glycogen stores. Feeding 100 grams proteins give:

- 16 gram nitrogen
- 58.14 gram glucose

\[
\text{G/N ratio} = \frac{58.14}{16} = 3.65
\]
Role of Pyridoxal Phosphate in Protein Metabolism

1- It has a role in absorption of amino acids
2- It acts as a coenzyme for transamination
3- It acts as a coenzyme for non-oxidative deamination
4- It acts as a coenzyme for amino acid decarboxylation
5- It acts as a coenzyme for desulfhydration reactions.
6- It acts as a coenzyme for aminolevulinic acid (ALA) synthetase which is the key enzyme in haeme biosynthesis
7- It acts as a coenzyme for tryptophan pyrrolyase which is the key enzyme in nicotinic acid biosynthesis

Role of Liver in Protein Metabolism

1- Catabolism of amino acids by transamination and deamination
2- Urea formation
3- Biosynthesis of nonessential amino acids
4- Biosynthesis of amino acid derivatives as creatine and taurine
5- Biosynthesis of plasma proteins and coagulation factors
6- Catabolism of carbon skeleton to form glucose or ketone bodies
7- Detoxication by conjugation with amino acids. e.g.:
   - Conjugation of benzoic acid with glycine to form hippuric acid
   - Conjugation of phenyl acetic acid with glutamine to form phenyl acetyl glutamine.

Hormonal Control of Protein Metabolism

1- Anabolic hormones
   Hormones that stimulate protein biosynthesis
   - Growth hormone
   - Insulin
   - Testosterone
   - Thyroxin in physiological doses

2 Catabolic hormones
   Hormones that stimulate protein breakdown
   - Glucocorticoids are the main catabolic hormones
   - Glucagon
   - Thyroxin in large doses