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**DIGESTION AND**

**ABSORPTION**

**OF PROTEINS**


# OBJECTIVES

* **Sources of proteins**
* **Digestion of proteins**
* **Absorption of proteins**
* **Abnormalities of protein digestion and absorption**

# Sources of proteins

* **Exogenous (dietary) proteins**
* **Endogenous proteins**

# Exogenous (dietary) proteins

***Daily requirement*** *--* 0.5–0.7 g/kg body weight and for children (1–3 years), it is 4 g/kg.

# Exogenous (dietary) proteins

**Structure** *--* made of long chains of amino acids bound together by peptide linkages.

# Exogenous (dietary) proteins

* ***Sources of dietary proteins* with high biological value**
* Meat, fish, eggs, cheese and other milk products, Soyabeans, wheat and various types of pulses are also rich source of proteins.

# Endogenous proteins

* Total - **30–50 g/day.**
* The proteins which reach the intestine through various gastrointestinal secretions and those which are present in the desquamated epithelial cells of the gut

# Digestion of proteins

Digested by the proteolytic enzymes to amino acids and small polypeptides.

# Digestion of proteins

Digestion of proteins **does not occur** in the mouth, as there are no proteolytic enzymes in the saliva.

# Digestion of proteins

Digestion of proteins, thus begins in the stomach and is completed in the small intestine.

# DIGESTION OF PROTEINS

* In stomach.
* In small intestine.

# stomach

* ***Pepsin -*** secreted by

chief cells of the main gastric glands in an inactive form

(pepsinogen)

* **Digest** - about 10–15% proteins entering the GIT.

# stomach

Pepsinogen

Pepsin

Proteins

Proteoses,

peptones and

polypeptides

**The optimum**

**pH for the**

**action**

**of pepsin is 2.0;**

# small intestine

* Enzymes responsible are
* Pancreatic proteases
* Brush border peptidases
* Intracellular peptidases

# Pancreatic proteases

* Digest proteins into dipeptides, tripeptides & small polypeptides.
* These are further absorbed into

epithelial cells of mucosa & digested by intracellular enzymes into amino acids

# Brush border peptidases

* Includes aminopeptidase, dipeptidase, tripeptidase.
* Finally converts proteins into polypeptides & amino acids.

# Intracellular peptidases

These digest the last dipeptides & tripeptides into amino acids which enters the blood.

# Digestion of nuclei acid and nucleoproteins

These are found in abundance in foods such as liver, kidney, pancreas, yeast etc.

# Digestion of nuclei acid and nucleoproteins

Brush border enzymes as nucleases, nucleotidase & nucleosidase converts nucleotides & nucleosides into pentoses.

# Absorption of proteins

Mechanism of absorption into intestinal epithelial cells occurs through luminal membrane of epithelial cells.

# Absorption of proteins

* Mechanisms
* Na dependent active transport mechanism Simple diffusion Endocytosis.

# Na dependent active transport mechanism

* Creation of electrochemical gradient across the cell
* Binding of Na & amino acids to carrier protein
* Movement of Na &

amino acid inside cell.

# Simple diffusion

* The dextro amino acids are absorbed solely by the passive diffusion.

**Endocytosis.**

* Proteins absorbed by endocytosis usually excite immunological/allergic reaction.

**Endocytosis.**

* In newborn infants, immunoglobulins present in the colostrum are absorbed in the intestinal mucosa by endocytosis and impart passive immunity to child.

# Further digestion in the epithelial cells

In the cell peptidases break the remaining linkages of tripeptides, and dipeptides causing release of amino acids.

# Transport of amino acids into blood capillaries

the amino acids are transported into the interstitial space across the basolateral membrane of the cells by facilitated or simple diffusion.

# Transport of amino acids into blood capillaries

From the interstitium, the amino acids enter the capillaries of villus by simple diffusion, and then via portal vein, they reach the liver and general circulation.

# Abnormalities of protein digestion and absorption

* Inadequate absorption of proteins, due to lack of trypsin is a common consequence of **pancreatic diseases.**
* Malabsorption of amino acids due to lack of transporters is relatively rare.

**OBJECTIVES seen…………..**

* Sources of proteins
* Digestion of proteins
* Absorption of proteins
* Abnormalities of protein digestion and absorption

# THANK YOU