

Exam 4

Lecture 31

- 1
 - Protein Degradation
 - Dietary
 - Cellular
 - Amino acid Catabolism
 - Inborn Errors of Metabolism
 - Amino Acids Catabolism
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Notes:

- 2 CATABOLISM OF DIETARY PROTEINS
 - Pepsinogen: Zymogen
 - Pepsin: Active enzyme
 - Synthesized and released into stomach and activated by low pH, Non-specific cleavage of protein.
 - Proteolysis of Dietary Protein Begins in Stomach
 - Low pH also denatures proteins
 - Random coils accessible to protease
 - Synthesized and released into the stomach as pepsinogen, in low pH pepsinogen unfolds and cleaves itself autocatalytic.

Notes: Pepsin- hydrolyzes proteins in a non specific manner. Pepsinogen cleaves dietary proteins. With the low pH proteases get access to the proteins. when the zymogen unfolds it can clip, 44 residues out of the inactive zymogen to for the active enzyme pepsin. Pepsinogen become denatured in a pH of 5 or higher

- 3 CATABOLISM OF DIETARY PROTEINS

- Pancreatic Proteases
 - Released as zymogens
 - Cleave proteins at *specific residues*
 - Enteropeptidase- Activates pancreatic protease cascade
 - Oligo-peptides: proteolyzed: **aminopeptides** in luminal surface
 - Di- and Tri- Peptides cleaved by **peptidases** in enterocytes.
 - Amino acids are: ***used In synthetic reactions***, or ***catabolized***
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Notes: catabolism continues in the duodenum- first part of small intestine. this is done by proteases in the pancreas and zymogens that are released into the duodenum. Pancreatic proteases cleave proteins at certain residues as part of a protolytic cascade. Begins with peptidase which is in enterocytes (line lumen of small intestine). Peptidase turns the zymogens into active enzymes. the enzymes cleave protein to make short oligo-peptides. Then cleaved more by amino peptidases and made into Di and Tri-peptides to get into the cell. Free amino acids can enter the cell easily.

- 4 GASTRIC AND PANCREATIC ZYMOGENS

- Pancreas
 - Zymogen: Chymotrypsinogen, Active Enzyme: Chymotrypsin
 - Zymogen: Trypsinogen, Active Enzyme: Trypsin
 - Zymogen: Procarboxypeptidase, Active Enzyme: Carboxypeptidase

- Zymogen: Proelastase, Active Enzyme: Elastase
- Stomach
- Zymogen: Pepsinogen, Active Enzyme: Pepsin

Notes: proteolytic cascade activated by enteropeptidase, enzyme that is found on the lumen. forms the zymogens that later can be activated to active enzymes. KNOW THE PATHWAY AND NAMES OF THE ENZYMES. Stomach pepsinogen is activated by low pH. Pancreas zymogens are activated by proteolysis. AMINO PEPTIDASE: attack at amino end of protein to release amino acids one after another. Carboxypeptidase cleave proteins are carboxy terminus.

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- Pepsin is active only in a low pH environment- at pH values 6.5 and greater, it becomes inactive... Why is this characteristic important for proteolysis in the duodenum?
- Pancreatic proteolytic zymogens enter the duodenum along with bicarbonate, and mix with the dietary contents just leaving the stomach.
- What effect does bicarbonate have?

Notes: Bicarbonate ion raises the pH ≥ 7 . Important for proteolysis because pepsin cleaves proteins randomly and by increasing the pH, and deactivating pepsin it is prevented from proteolyzing the zymogens and enzymes in small intestine.

- 6 CATABOLISM OF CELLULAR PROTEIN
- Regulation through turnover
 - Quality control
 - mistranslated
 - misfolded
 - oxidized