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Author: John Williams, M.D., Ph.D., 2009

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M1 - GI Sequence

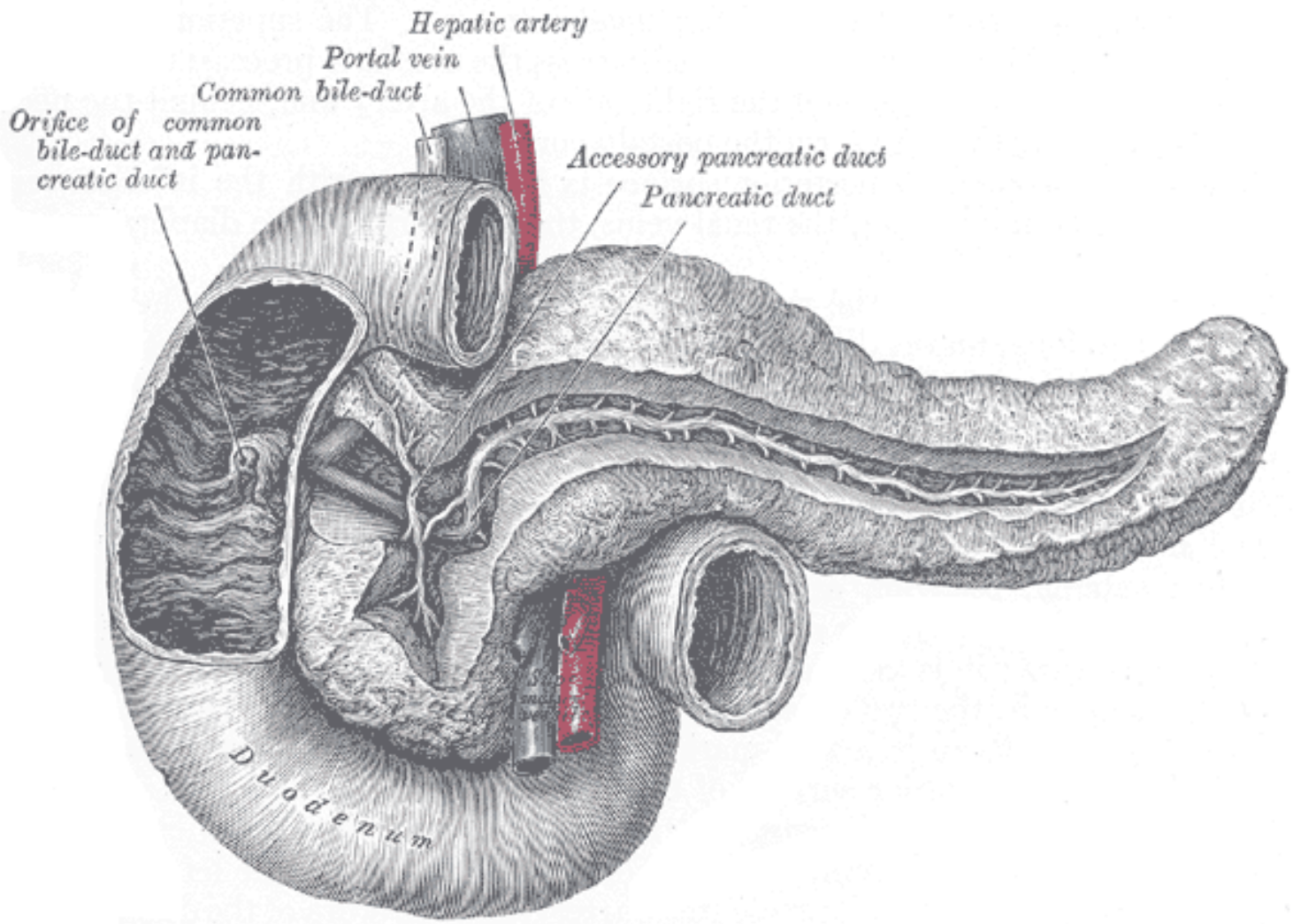
Pancreas

John Williams, M.D., Ph.D.

Winter, 2009

University of Michigan
Medical School

PANCREAS



PD-EXP Gray's Anatomy, wikimedia commons

The pancreas is made up of three functional components:

Endocrine – Islets 2%

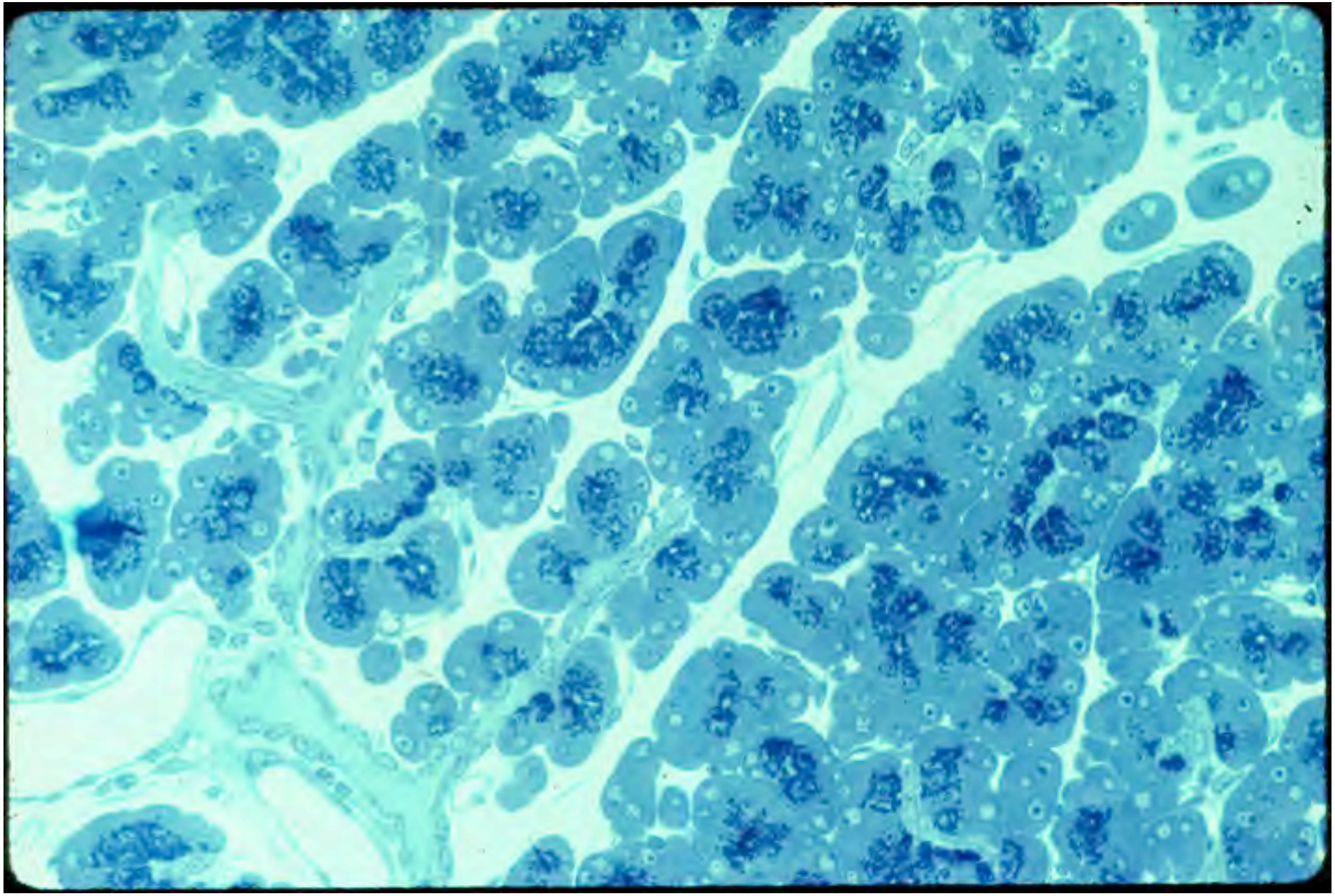
Exocrine – Acinar 80%
Digestive Enzymes

Exocrine - Ducts 8%
Bicarbonate Rich Fluid

Innervation

Vagal – Acini Ach main transmitter
Ducts
Islets

Sympathetic – Islets NE main transmitter
Blood Vessels



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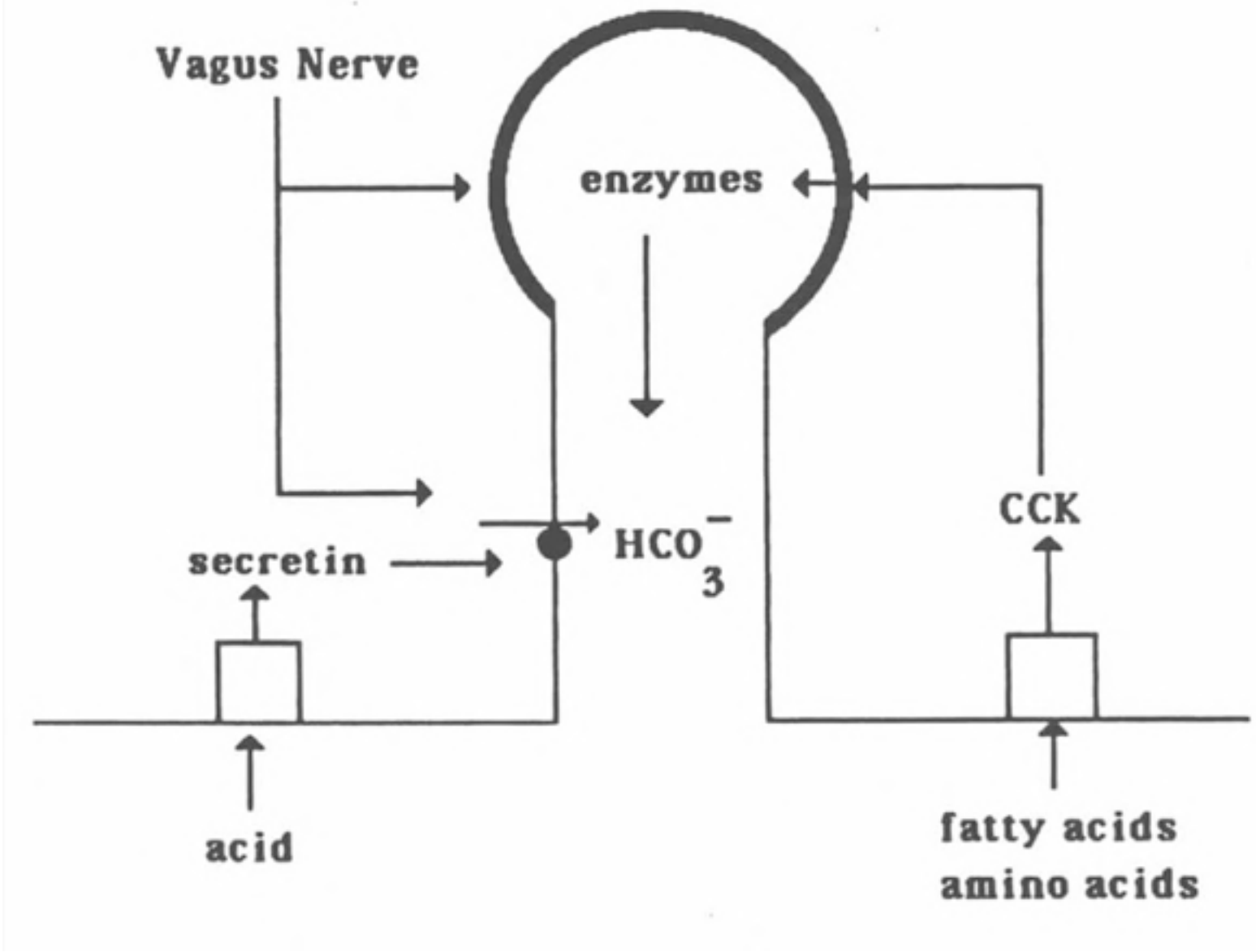
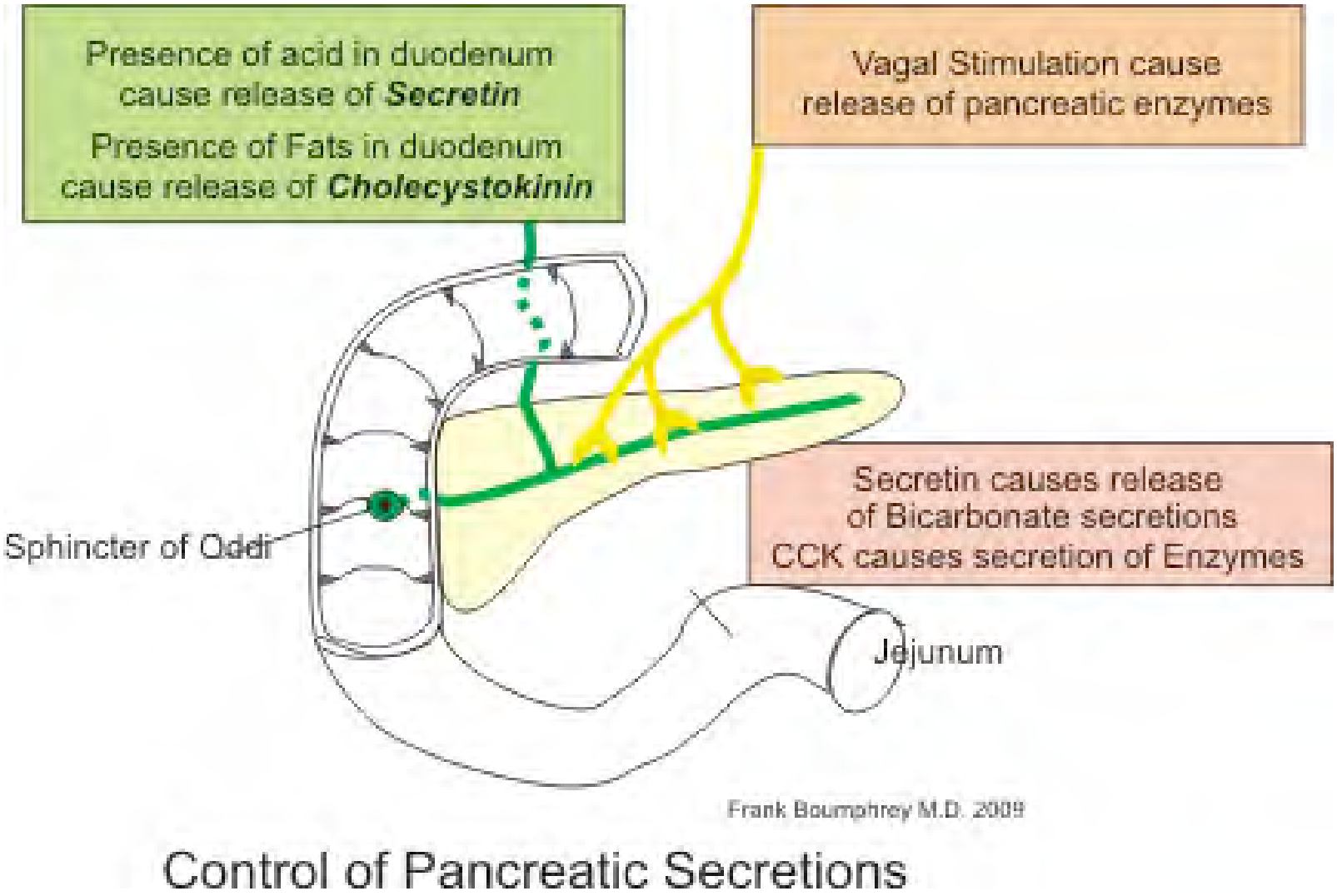
REGULATION OF PANCREATIC SECRETION

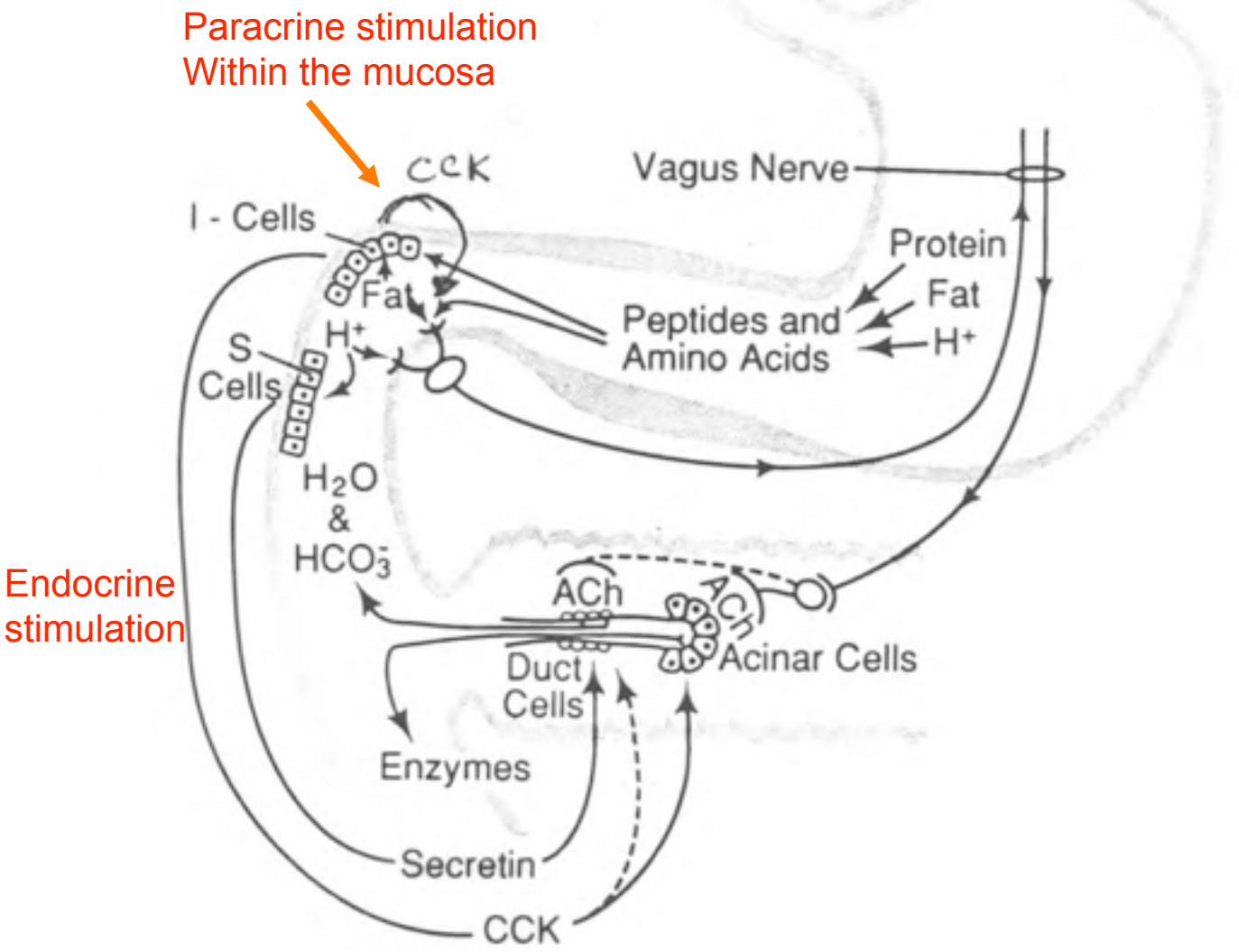


 Jim Sherman

Stimulation of Pancreatic Secretion during the Intestinal Phase



Stimulation of Pancreatic Secretion during the Intestinal Phase



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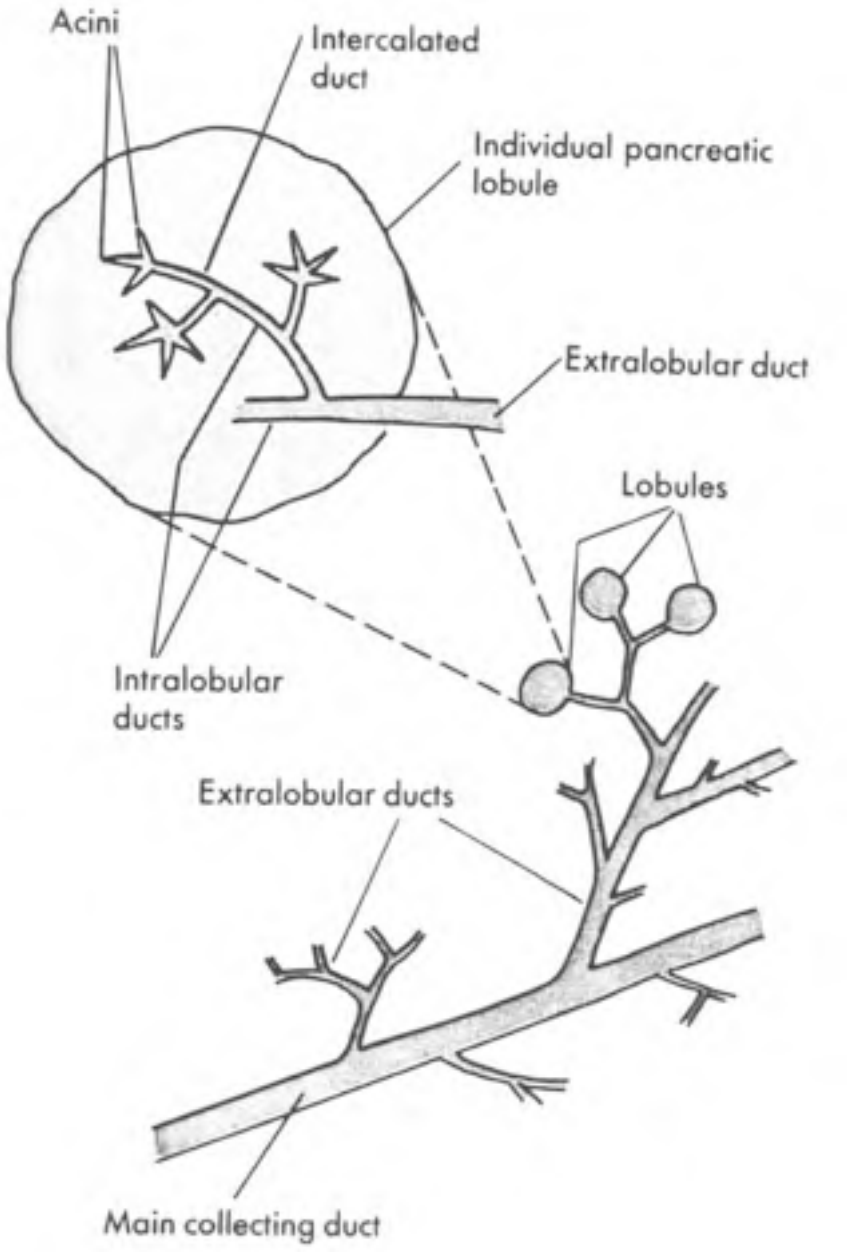
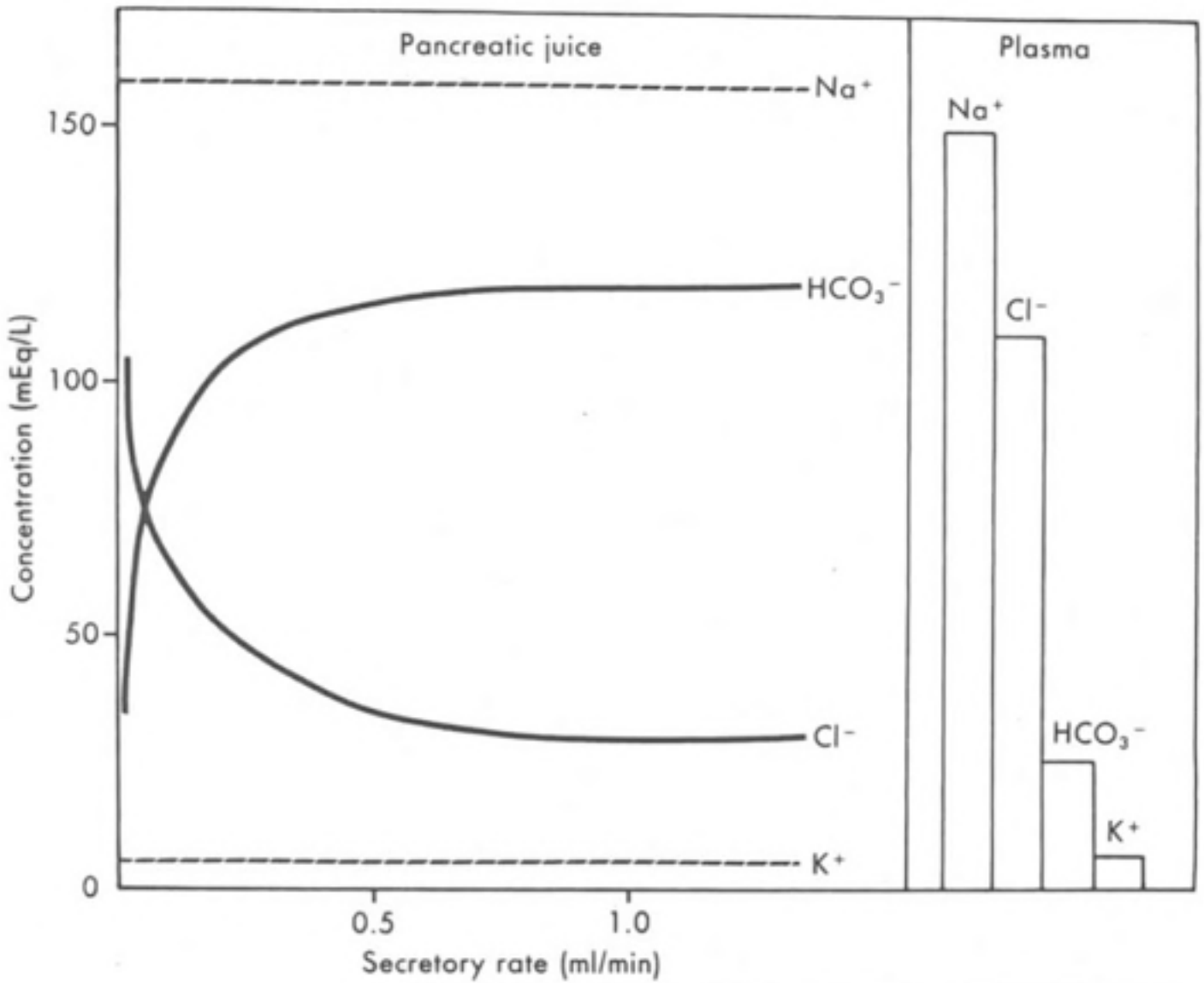
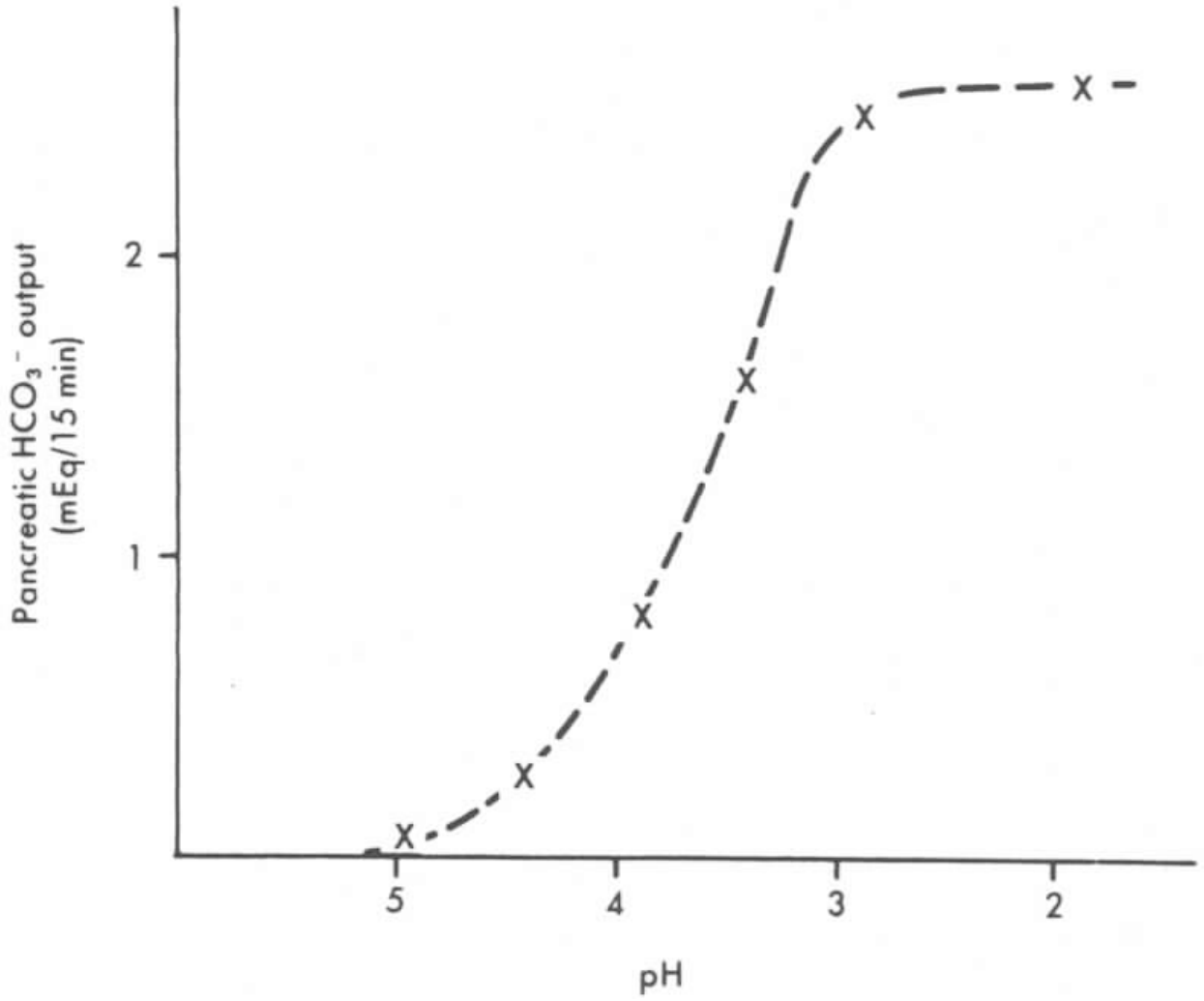


Concentration of Ions in Pancreatic Juice as a Function of Flow



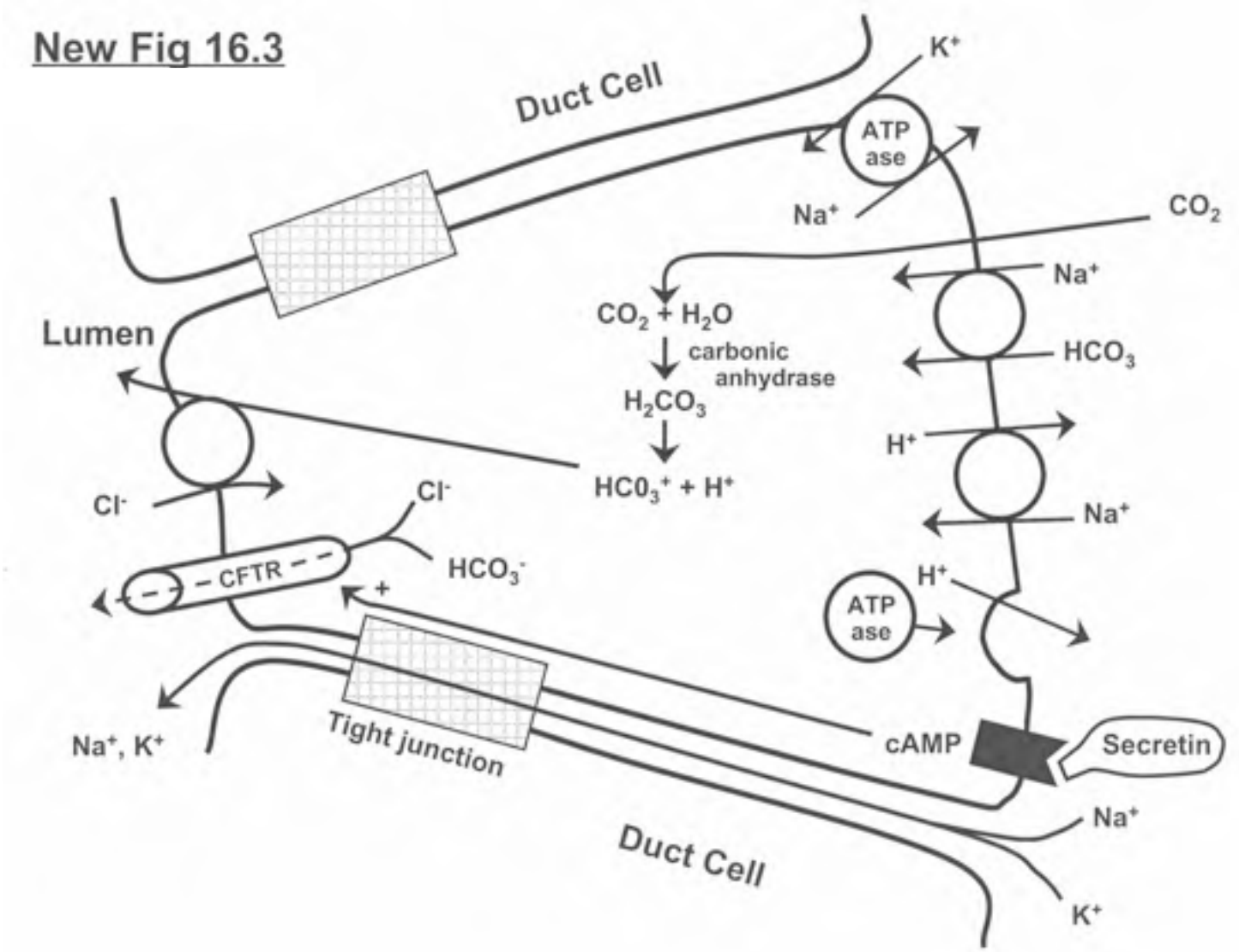
PD-INEL Fig. 9-2 Johnson, L. *Gastrointestinal Physiology*, 7th ed. Mosby Elsevier, Philadelphia, PA; 2007: 87.

Pancreatic Bicarbonate output increases in response to low Duodenal pH



PD-INEL Fig. 9-5 Johnson, L. *Gastrointestinal Physiology*, 6th ed. Mosby Elsevier, St. Louis, MO; 2001: 102.

Mechanism of Pancreatic Bicarbonate Secretion



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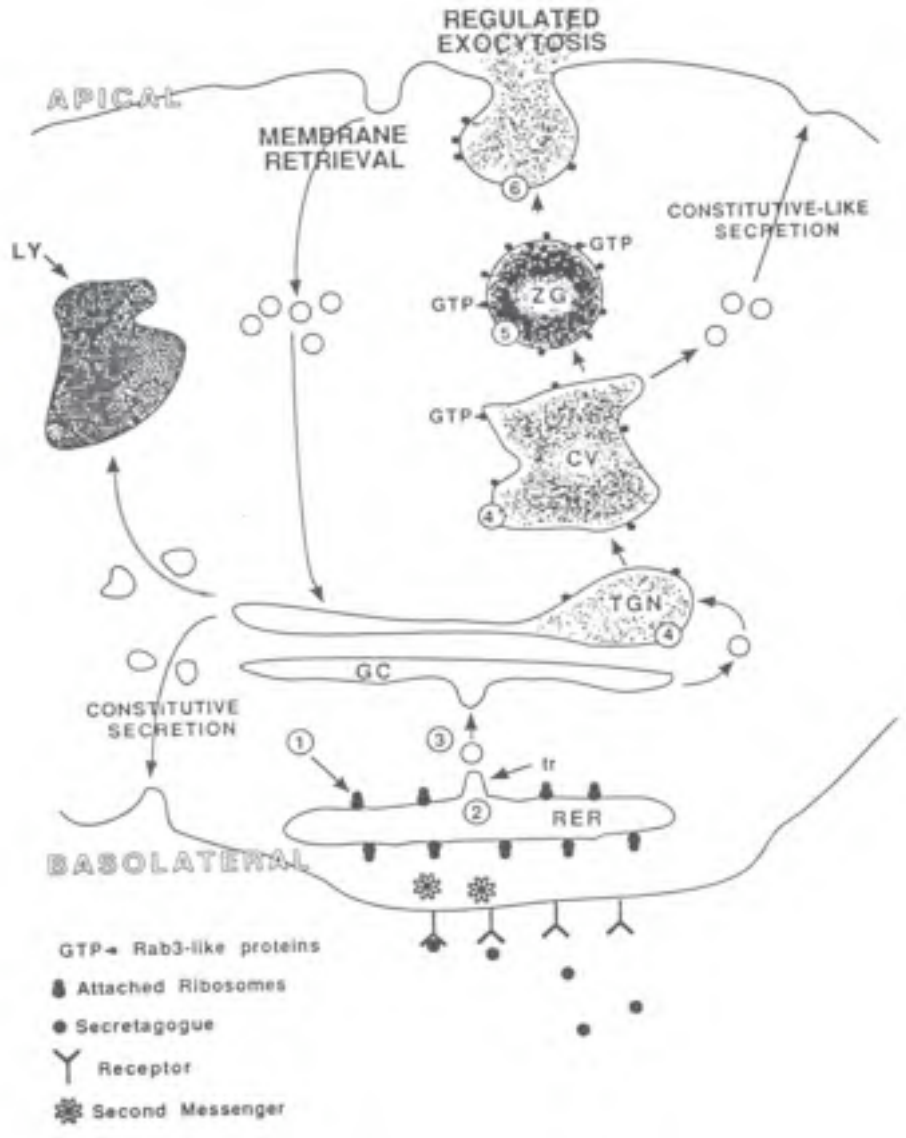
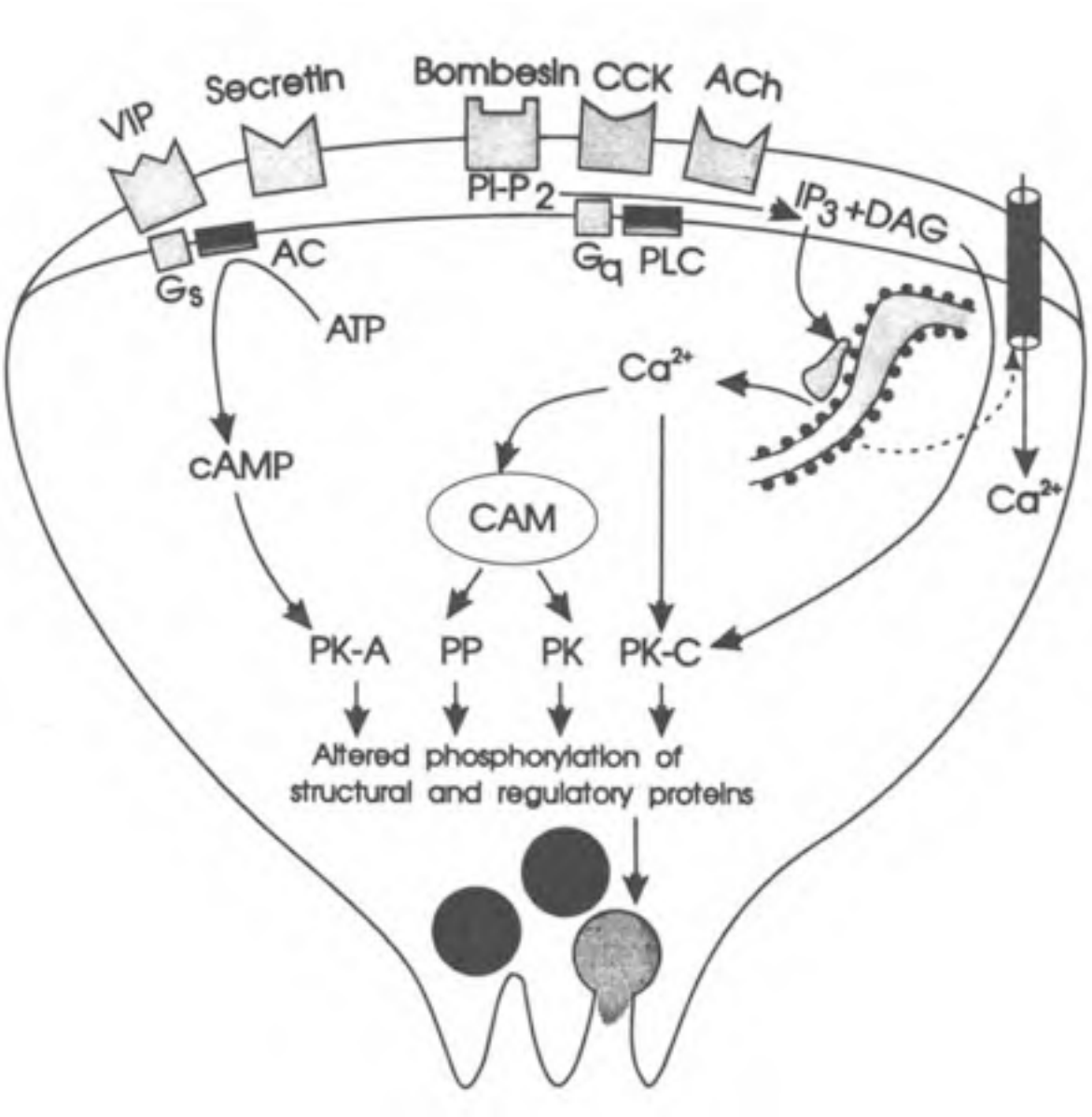
INTRACELLULAR TRANSPORT OF PANCREATIC SECRETORY PROTEINS



Stimulus-secretion Coupling of Pancreatic Enzyme Secretion



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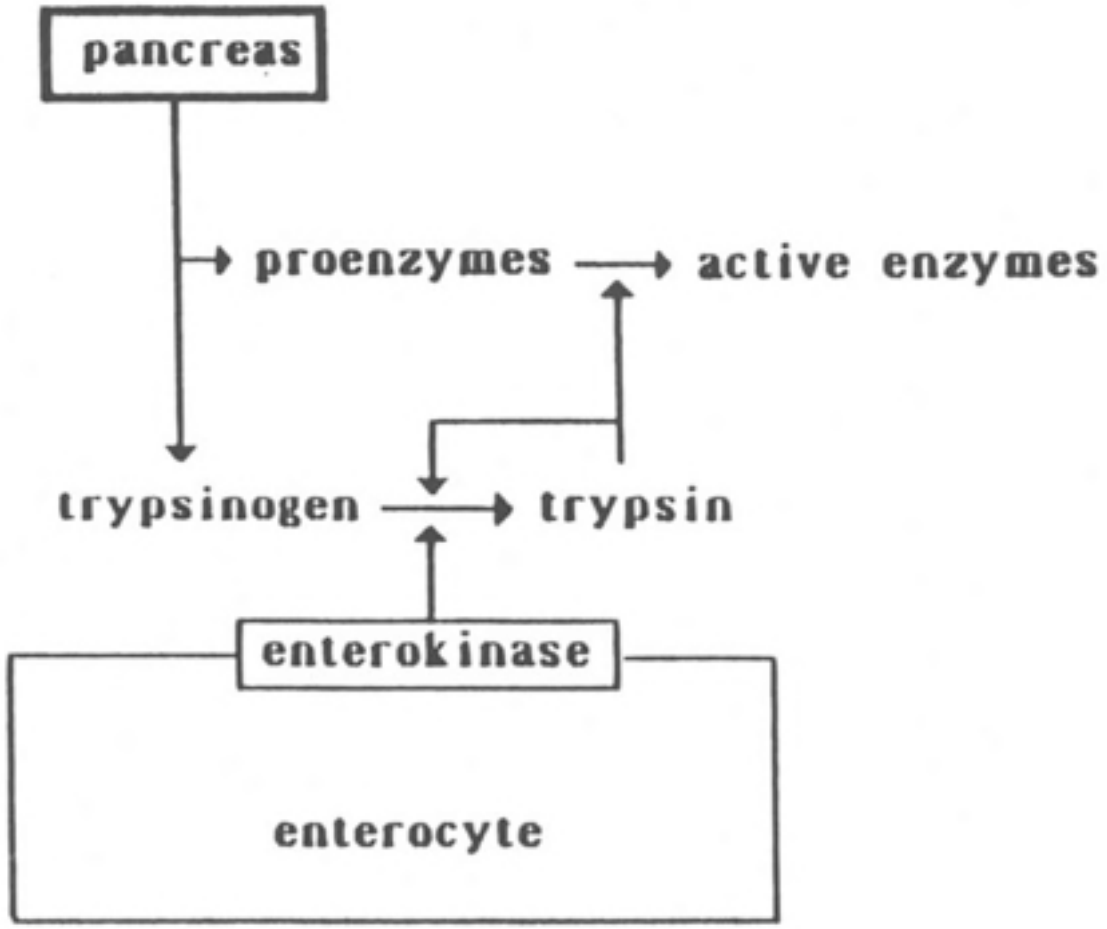
Human pancreatic exocrine enzymes

Enzyme	Molecular weight (daltons)
Proteases	
Trypsinogen 1	25,000
Trypsinogen 2	25,000
Trypsinogen 3	23,400
Chymotrypsinogen	24,000
proElastase 1	33,000
proElastase 2	26,600
Protease E	33,000
Kallikreinogen	35,000
proCarboxypeptidase A1	44,500
proCarboxypeptidase A2	47,000
proCarboxypeptidase B1	47,300
proCarboxypeptidase B2	47,300
Glycosidase	
Amylase	57,000
Lipases	
Triglyceride lipase	48,000
Colipase	10,000
Carboxyl ester hydrolase	100,000
Phospholipase A2	14,000
Nucleases	
DNase I	30,000
RNase	15,000

Activation of Pancreatic Proenzymes in the Intestine involves Enterokinase and activated Trypsin



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