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

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M1 - GI Sequence

Salivary Glands and Esophagus

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Winter, 2009

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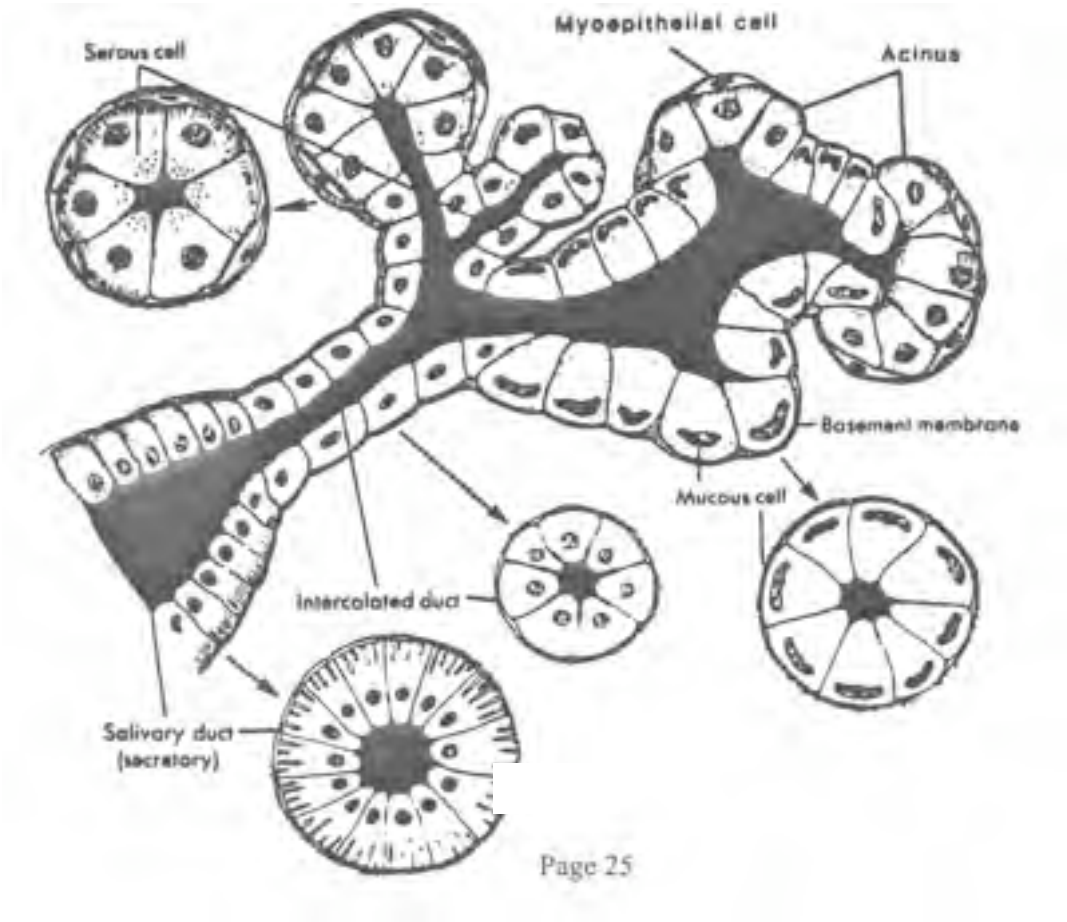
SALIVARY GLANDS

1. Saliva produced by three major and a number of minor glands

2. Glands are acinar-ductal in structure

3. Made up of Serous and Mucus Acinar Cells, Duct Cells, and Myoepithelial Cells

Histology of a Generic Salivary Gland



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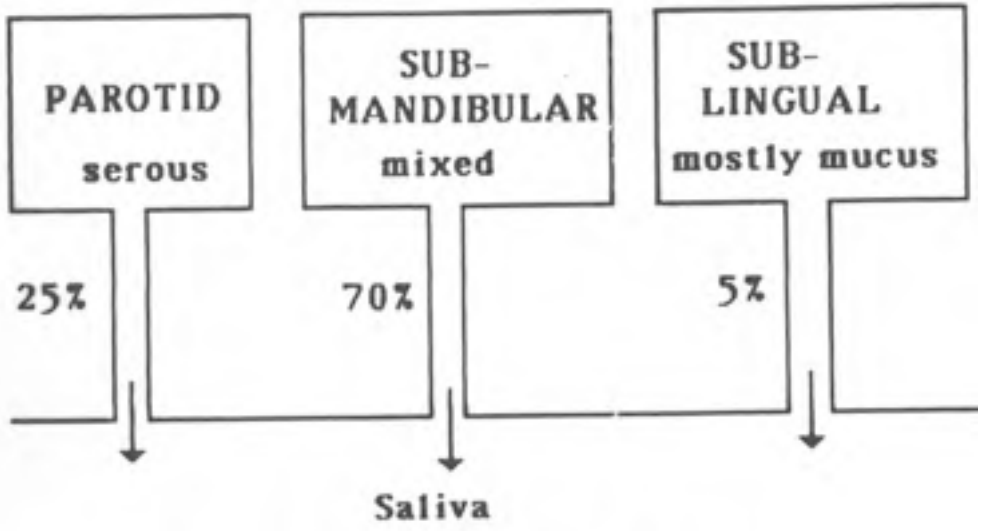
Contents of Saliva

- H_2O
- Ions (HCO_3^-)
- Enzymes
  - Amylase
- Antibacterial Compounds
  - Lysozyme
  - Lactoferrin
  - IGA
- Mucus

Function of Saliva

1. Lubrication of food - mucins
2. Partial digestion of polysaccharides - amylase
3. Moisten mouth and wash away dissolved food (necessary for taste)
4. Mild antibacterial - lysozyme, lactoferrin
5. Neutralize acids in food and regurgitated stomach acid
6. Maintenance of teeth - Ca^{2+}, fluoride

SALIVARY GLANDS



Rate: basal - 0.25 ml/min
max - 5 -10 ml/min
typical - 1.0 - 1.5 liters/day

Osmolarity: hyptonic

pH: alkaline

Major Proteins: alpha amylase (ptyalin)
mucins

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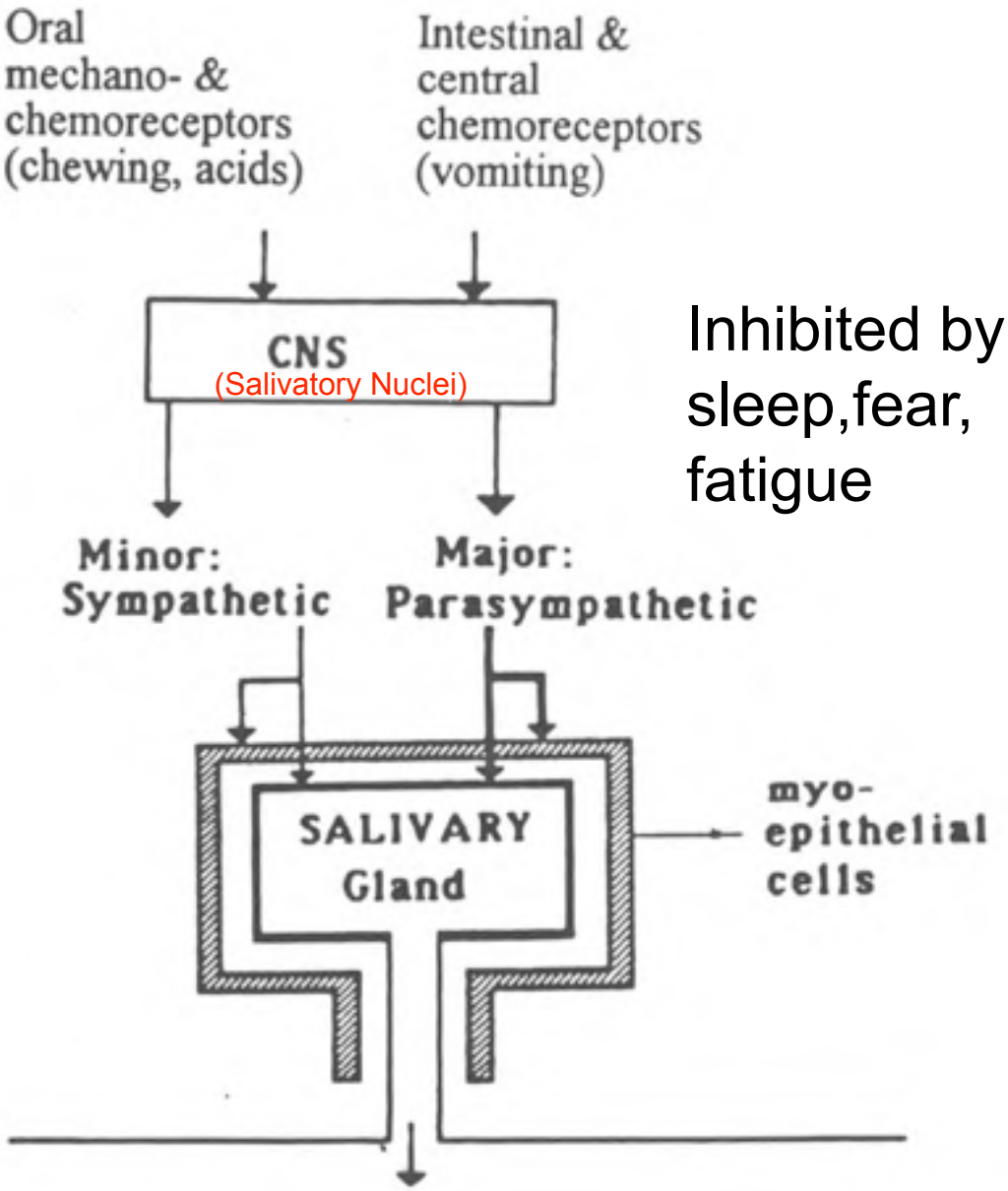
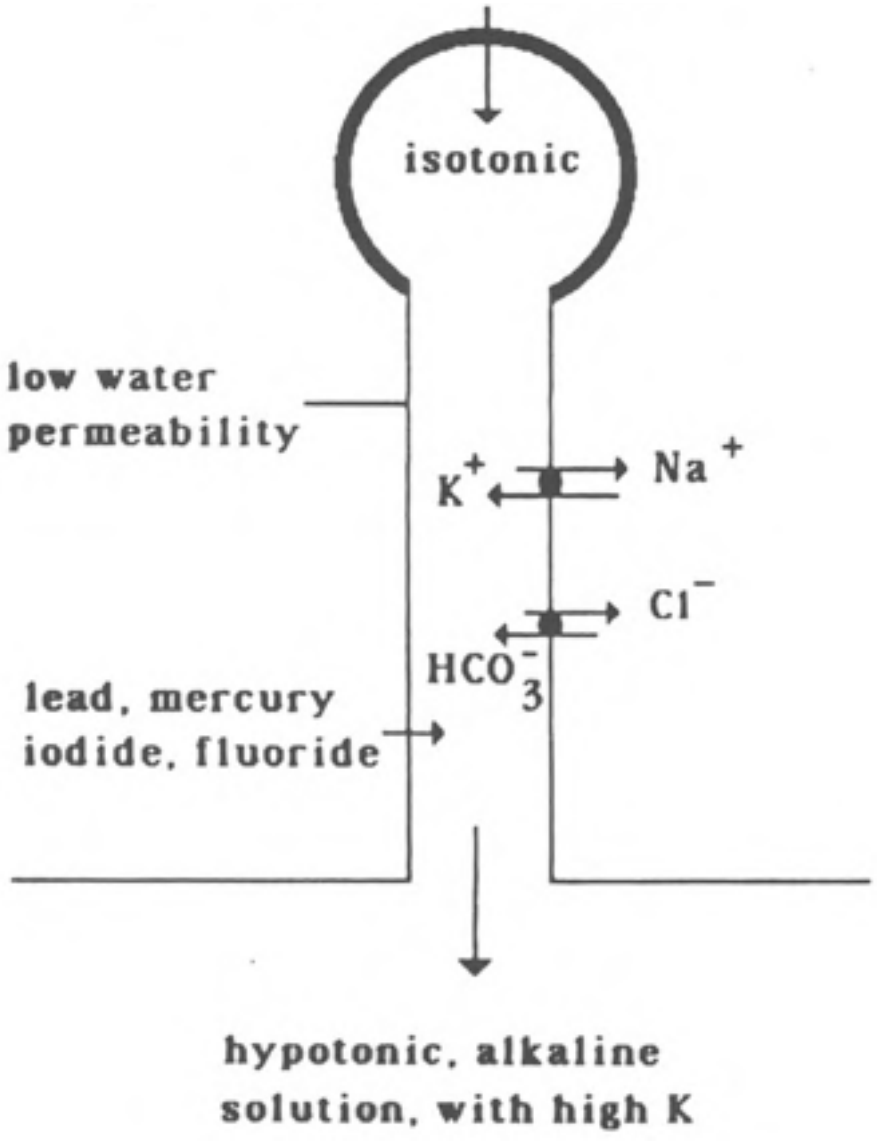


Inhibited by sleep,fear, fatigue

Fluid Flow Model for Production of Saliva



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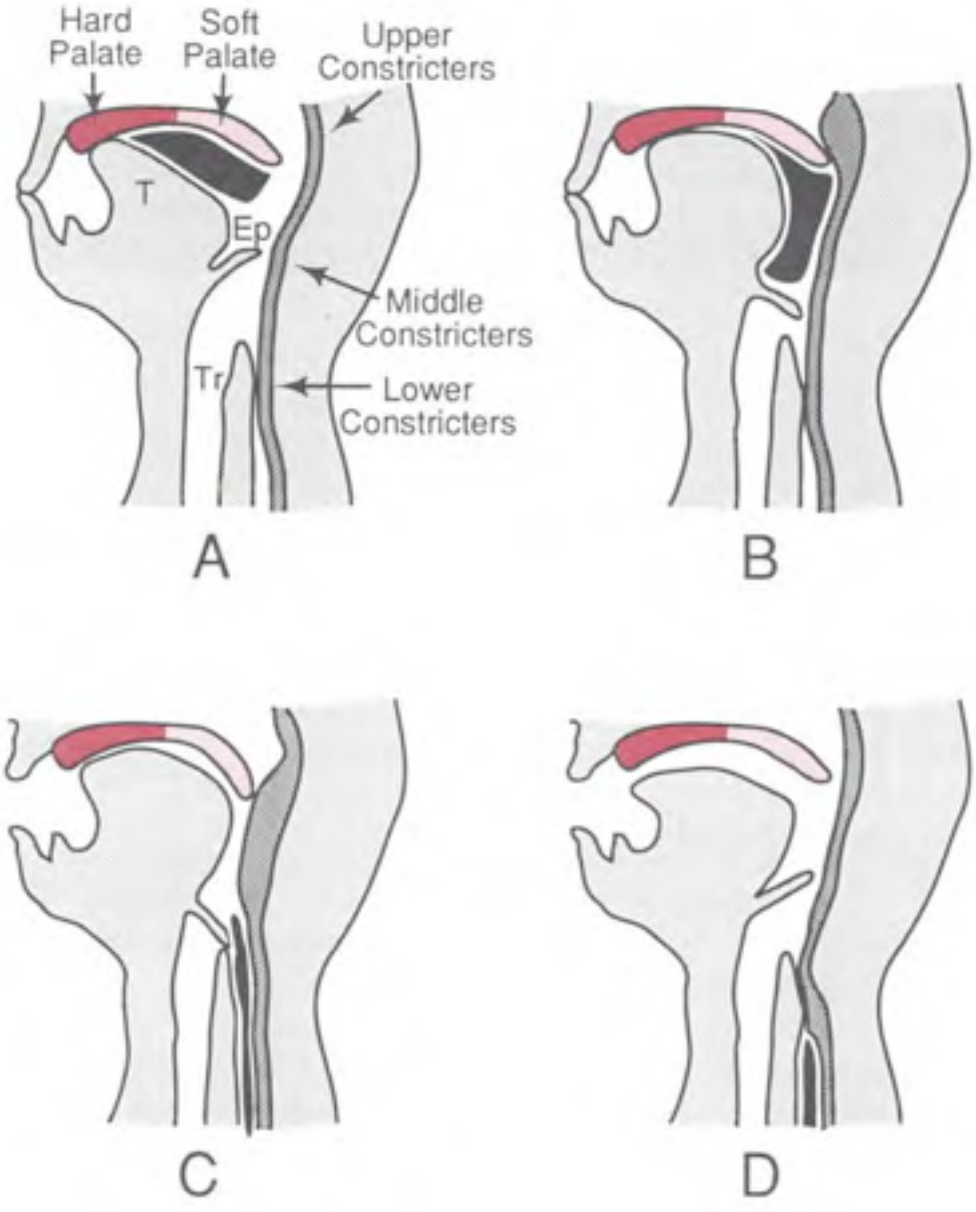
SALIVARY PATHOPHYSIOLOGY

Xerostomia - the condition of dry mouth resulting from the absence of saliva

Can be due to Sjogrens Syndrome, radiation damage or as a side effect of certain drugs

Absence of saliva leads to tooth decay, infections and discomfort

CHEWING AND SWALLOWING



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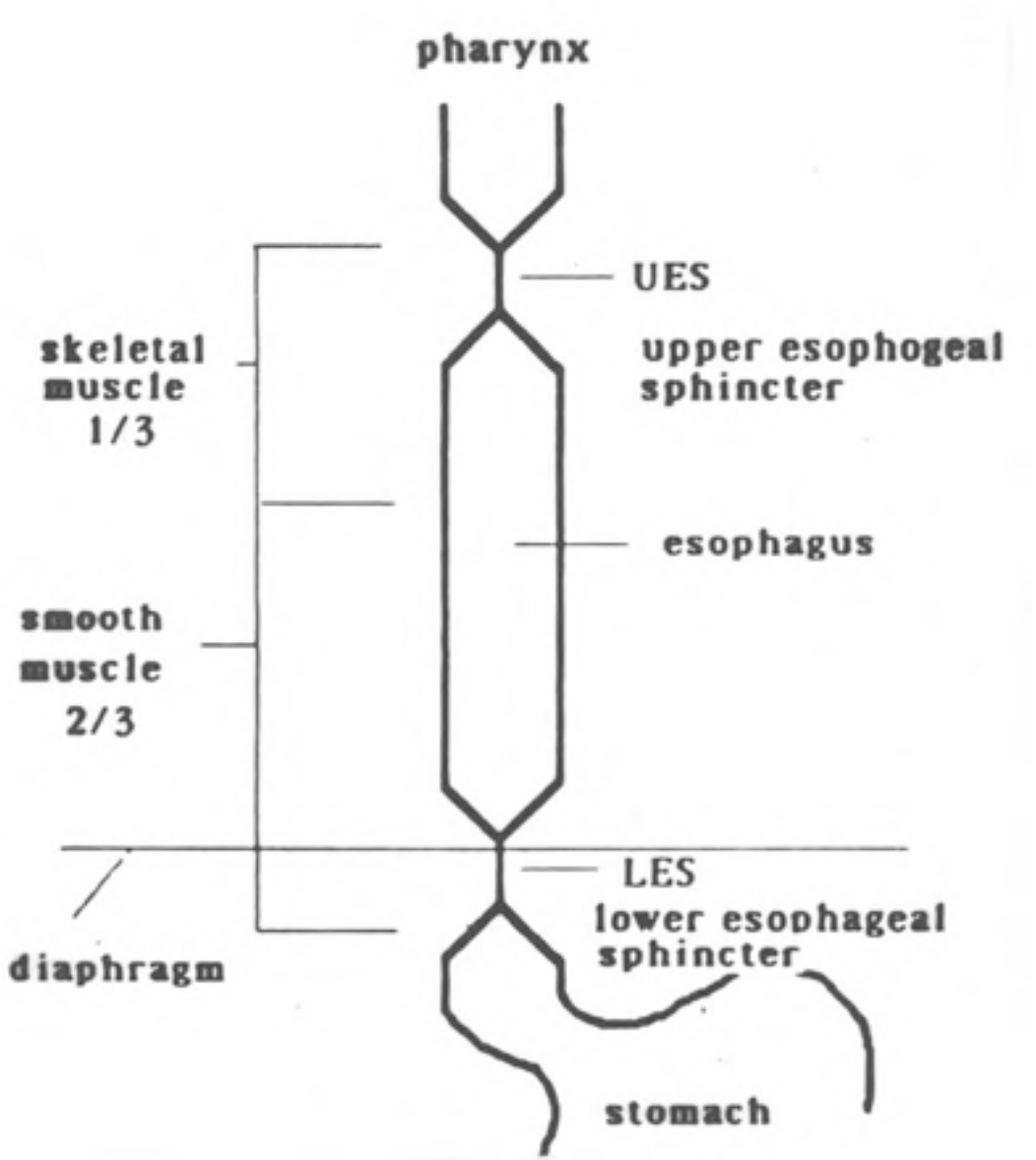
ESOPHAGUS



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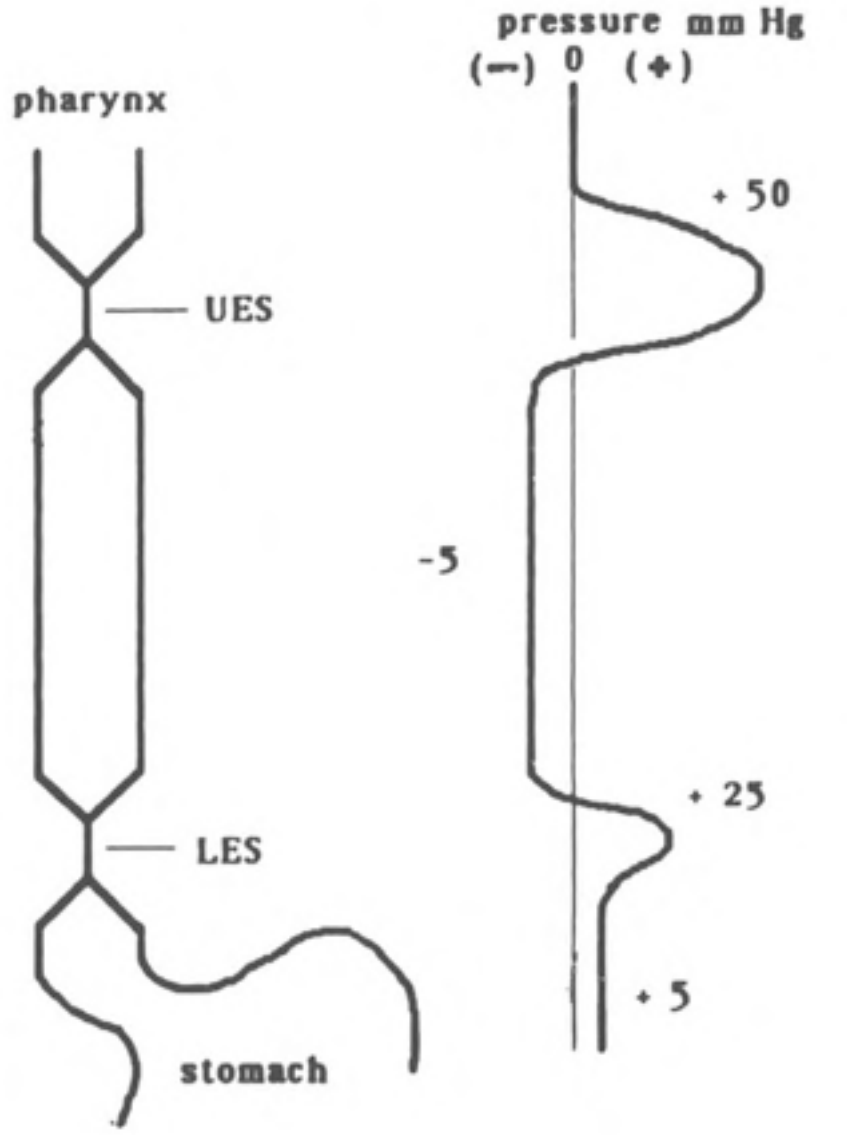
Esophageal Pressures Measured by a Catheter



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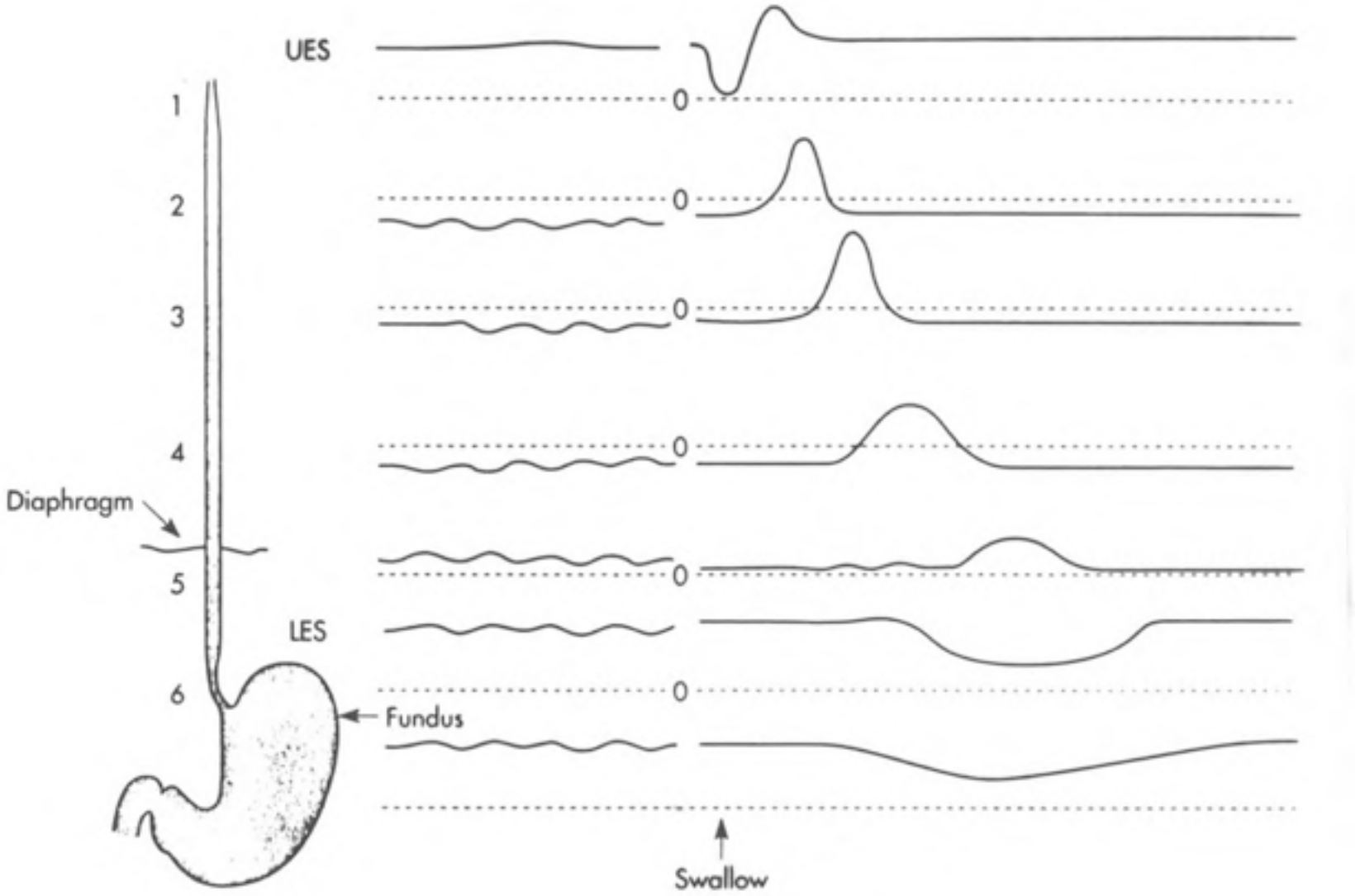
Pressure Changes During a Primary Peristaltic Wave



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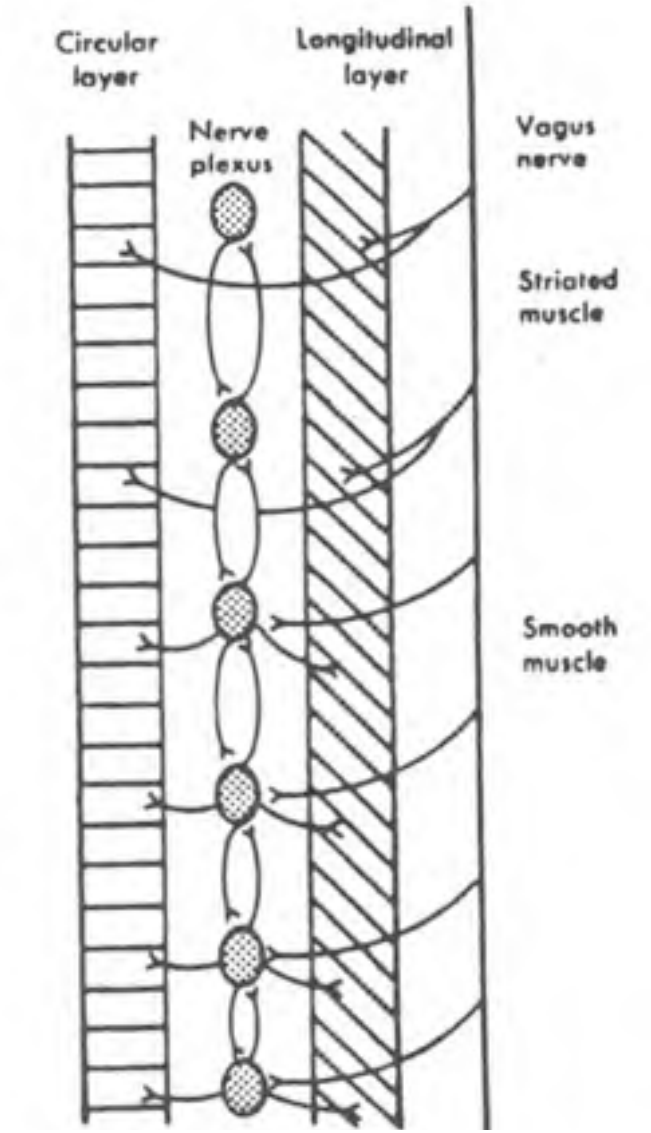
Neural Innervation of the Esophagus



PD-INEL Fig. 3-4 Johnson, L. *Gastrointestinal Physiology*, 6th ed. Mosby Elsevier, St. Louis, MO; 2001: 32.

REGULATION OF THE LOWER ESOPHAGEAL SPHINCHTER

1. LES contraction regulated by intrinsic properties of smooth muscle, nerves and hormones

2. Basal tone is myogenic but increased by ACh and Gastrin

3. Transient relaxation mediated by inhibitory neurons that use VIP or NO as a neurotransmitter

4. Sphincter tone lacking in newborns and decreased during pregnancy

ABNORMALITIES OF LES

1. Failure of LES to function as a sphincter leads to reflux esophagitis or "heartburn"

2. GERD – Gastroesophageal Reflux Disease

3. Failure to relax results in "Achalasia"

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