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M1 - GI Sequence

Oral Cavity and Salivary glands

Winter, 2009
Cell and Developmental biology
Layers of the Digestive Tract

Digestive Tube (GI tract)
- Mucosa (mucous membrane)
  - epithelium
  - lamina propria
  - musculris mucosa

Submucosa

Muscularis Externa
- inner-circular
- outer-longitudinal
  (3RD layer in stomach)

Serosa or adventitia

Glands
- Glands within the GI Tract
- Glands outside - Salivary glands, Liver, Pancreas
Oral Mucosa

1. **Lining Mucosa:** lip, cheek, floor of mouth, soft palate, ventral surface of tongue
   - Epithelium - non-keratinized
   - Submucosa contains salivary glands

2. **Masticatory Mucosa:** gingiva, hard palate
   - Epithelium - keratinized or parakeratinized
   - Submucosa - absent

3. **Specialized Mucosa:** dorsal surface of tongue
   1. Filiform Papillae – keratinized epithelium
   2. Fungi form Papillae - non-keratinized epithelium
   3. (Foliate Papillae) - rudimentary in human
   4. Circumvallate Papillae – non-keratinized epithelium with associated taste buds and von Ebner’s salivary glands
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Vestibule

Oral cavity proper

Lip

Gingiva

Hard palate

Soft palate

Nasal cavity

Oral cavity

Michigan Medical School Histology Slide Collection
Slide 114
Lip

Oral mucosa:
St. sq. non-keratinized epithelium
Labial salivary glands in submucosa

Skin:
Hair follicles
Sebaceous glands
Sweat glands

Vermillion border (zone)
Dilated venules and veins lacks salivary glands

Orbicularis oris muscle
Lining mucosa

Labial gland

Orbicularis oris muscle

absence of salivary glands
dilated vessels

Orbicularis oris muscle
Muco-gingival Junction
Tooth Structure

Cell and Tissue Biology, L. Weiss 6th Ed. Pp. 597

Orofacial Histology and Embryology, Moss-Salentijn, L., et al., F.A. Davis Co.
Diagram of a tooth (incisor) in its alveolar socket.
Teeth in Alveolar Bone (Sockets)
Periodontal Ligaments (fibers)
Cellular Cementum, Cementocytes

Dentin

Cementum

Enamel

Dentin

Pulp

Cementum acellular cellular

Crown

Root

Root canal

Orofacial Histology and Embryology

© PD-INEL Moss-Salentijn, L., et al., F.A. Davis Co
Deciduous and Permanent Teeth

Deciduous and permanent teeth
Erosion of Enamel and Cavity Formation
The Epithelial Attachment
X-section of the Tongue

Intrinsic and Extrinsic Muscles
Filiform and Fungiform Papillae

Keratinized epithelium, no taste buds

Non-keratinized epithelium with secondary papillae and scattered taste buds.
Abnormal Keratinization of Filiform Papillae

Hairy tongue

Geographic tongue

Over keratinized

Under keratinized

Source Undetermined
Circumvallate papillae and Taste Buds
Taste Buds

oral cavity

lingual epithelium

taste pore

taste receptor cell

connective tissue

basal cell

afferent nerve

[Image: NEUROtiker, Wikimedia Commons]
Areas of Taste Perception

Chorda tympani

- Salt
- Sour
- Sweet
- Bitter
Major Salivary Glands

1. Parotid
2. Submandibular
3. Sublingual
Saliva

**Secretion**

- About 1,000 ml/day
- Submandibular Glands: 65%
- Parotid Glands: 23%
- Sublingual Glands: 4%
- Minor Salivary Glands: 8%

**Flow Rate**

0.3 ml/min (Unstimulated)

**Stimulation**

- Autonomic Nervous System

**Composition**

- Varies with flow rate
Composition of Saliva

Water
Ions: Bicarbonate, potassium, sodium, chloride, etc

Glycoproteins: Mucus

Proteins: Enzymes – Amylase (parotid gland), nucleases, etc.

Cells: Desquamated Epithelial cells, Leukocytes

pH: ~ 7.0
Glandular Lobules and Lobes

Many Lobules form a Lobe

Acini, Intra lobular duct, Inter lobular duct
Structural and functional Unit of Salivary Gland

- Basal lamina
- Myoepithelial cells
- Acinar cells
- Intercalated duct
- Striated duct
- Acinus
Mixed, Sero-mucous Gland

Serous acini

Mucous acini
Submandibular and Sublingual Gland
Parotid gland
Serous (parotid) Acinar Cells
Innervations of the Acinar Cells

Salivary Gland secretion is regulated by the autonomic nervous System

NE: Nerve endings of postganglionic fibers

Exocytosis
Intercalated (blue) and Striated (green) Ducts
Salivary Gland Ducts
EM of Striated Duct Cells
Role of Striated Ducts in Saliva Production

Image of ion flow through striated ducts removed
Intra and Inter Lobular Ducts
Intra (left) and Inter (right) Lobular Ducts
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Slide 30: Bloom and Fawcett, Histology, p. 568
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Slide 37: Sun-Kee Kim