Introduction to the Salivary Glands

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Saliva is important, even in science fiction.
Role of Saliva in Oral Health

- Lubrication
- Maintenance of mucous membrane integrity
- Soft tissue repair
- Maintenance of ecological balance
- Debridement/lavage
- Aggregation
- Antibacterial, antifungal, antiviral
- Maintenance of pH
- Maintenance of tooth integrity

Numerous functions, critical to health, that involve saliva. These functions will be addressed during the course.
It is not our intent to cover anatomy during this course. However, you should know the locations and characteristics of the salivary glands. The fine anatomical and histological details will be covered in other courses.
You should know these names and locations.
Detail of the salivary glands.
Salivary Constituents

- Water & electrolytes
- Proteins
- Non-electrolytes
- Non-glandular proteins
Factors Contributing to Saliva Content

- Normal Human Variability
- Unstimulated vs. stimulated saliva
- Aging
- Medications
- Disease
- Circadian rhythms
- Objective vs. subjective determinations
Human Variations

- Large range defines “normality”
- A little goes a long way
- Changes over time
Normal defines a wide range of salivary flow rates.
Unstimulated vs. Stimulated Saliva

- **Unstimulated**
  - Basal production
  - Confers most protection
  - Importance of minor and submandibular output
  - Low output during sleeping hours

- **Stimulated**
  - Protection during mastication
  - Assists in deglutition
  - Importance of parotid output
What is the significance of the salivary flow dropping at night? When would the teeth be most susceptible to demineralization?
Effects of Aging on Saliva

- **Quantity**
  - No significant changes in major secretions
  - No significant changes in minor secretions

- **Quality**
  - No general changes
In a study of 27 males and 23 females, tested over a period of 10 years, there were no significant changes in stimulated parotid saliva flow.
Assessment of Salivary Flow

- **Objective measures (Clinical tests)**
  - Major gland secretions
  - Minor gland secretions
  - Whole saliva

- **Subjective measures (Patient perceptions)**
  - **Xerostomia** (Do you have a dry mouth?)
  - **Questionnaires** (Dry mouth, trouble swallowing?)
  - **Thirst** (Are you often thirsty?)
Factors Affecting Salivary Production

- Local diseases
- Systemic diseases
- Medications
- Head and neck radiation
- Chemotherapy
Local Factors Affecting Saliva

- **Obstructive Diseases**
  - Neoplasms, mucous plugs, calculi

- **Inflammatory Diseases**
  - Acute viral sialadenitis (myxovirus of mumps)
  - Acute suppurative bacterial sialadenitis
  - Chronic recurrent sialadenitis
  - Allergic parotiditis

- **Head and Neck Irradiation**

- **Diet**
Sialadenitis: Inflammation of the Salivary Gland
Bacterial Parotiditis: Inflammation of the Parotid Gland

Note exudate from gland upon manual expression.
Medications Influence Saliva

- Anti-cholinergics
- Anti-histamines
- Anti-depressants, antipsychotics
- Sedative and hypnotic agents
- Anti-hypertensives
- Anti-Parkinson drugs
Oral Side Effects Prescribed Drugs

- Xerostomia - Dry mouth
- Dysgeusia - Impairment of taste
- Stomatitis - Inflammation of oral mucous membranes
- Glossitis - Inflammation of tongue

RG Smith & AP Burtner, 1994
Systemic Diseases That Influence Saliva

- Sjögren’s syndrome
- Sarcoidosis (a systemic granulomatous disease, especially of lungs, but affecting many other organs, including parotid glands)
- Cystic fibrosis
- Diabetes
- Alzheimer’s disease
- AIDS
- Dehydration
Submandibular Duct Obstruction 2° to Infection
Head and Neck Radiation

- Parotid vs. submandibular
- Dysfunction is dose- and field-dependent
- Threshold of permanent destruction: 2100-4000 cGy
Modified Carlson-Crittenden collectors have been placed over parotid glands to collect saliva. Note lack of saliva flow from the right gland. Markings on patient’s neck indicate field of irradiation. The apparent “sunburn” is due to irradiation burn.
Chemotherapy

- Alters salivary constituents
- Normal function returns
- Bone marrow transplantation: graft vs. host disease
Salivary Dysfunction and Oral Sequelae

- Caries
- Mucositis
- Oral ulceration
- Taste
- Swallowing
- Dentures
- Infections
Salivary Dysfunction and Oral Sequelae: Caries

- Incipient decay
- Recurrent decay
- Root vs. coronal decay
Extensive Caries in a post-radiation patient

Note the cervical decay (at the gumline) due to lack of saliva. This is a hallmark of radiation therapy.
Note incisal decay and erosion resulting from lack of lubrication and remineralization.
Salivary Dysfunction and Oral Sequelae: Mucositis

- Pain
- Infections
- Dysphagia
- Impaired nutrition
- Dehydration
Mucositis

Note the inflamed lips and gingival tissue due to the lack of the protective effects of saliva.
Salivary Dysfunction and Oral Sequelae:
Oral Ulceration

- Wound healing
- Lichen planus
- Recurrent aphthous ulcers
- Pain
- Secondary infection (Candidiasis)
Xerostomia: Dry Fissured Tongue
Salivary Dysfunction and Oral Sequelae: Taste

- Reduced enjoyment of eating
- Altered supra-threshold and threshold performance
  - Sucrose, sodium chloride
  - Citric acid, quinine sulfate
Salivary Dysfunction and Oral Sequelae: Swallowing

- Subjective complaints of dysphagia
- Increased duration in oral swallow times
  - Dry swallows
  - Wet swallows
Salivary Dysfunction and Oral Sequelae: Dentures

- Decreased retention and stability
- Increased complaints
- Greater likelihood for *Candida* infections
Salivary Dysfunction and Oral Sequelae: Infections

- Candidiasis
- Caries
- Gingivitis
- Viral infections
- Bacteremias
- Aspiration pneumonia
Candida 7th Week Following Tonsil Radiation Treatment
Candida/Denture Stomatitis

Note inflamed outline of prosthesis.
Saliva and Oral health: Conclusions

- Saliva in health
- Saliva in disease
- Prevention of disease
- Treatment of disease
Saliva deficient