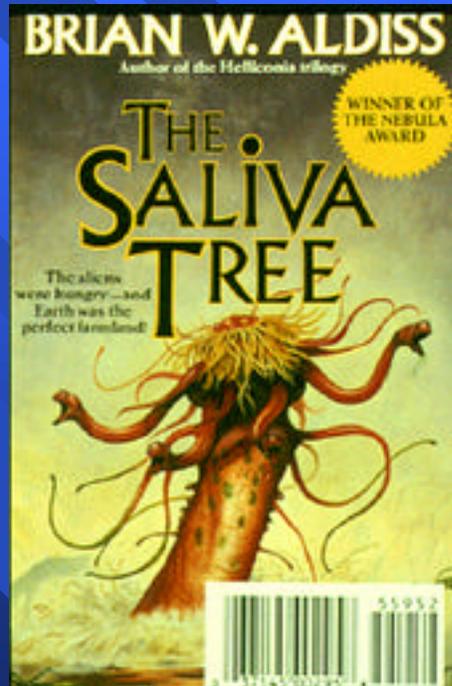


# Introduction to the Salivary Glands

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Even Science  
Fiction Has  
Discovered the  
Importance of  
Saliva!



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
- Debredement/lavage
- Aggregation
- Antibacterial, antifungal, antiviral
- Maintenance of pH
- Maintenance of tooth integrity

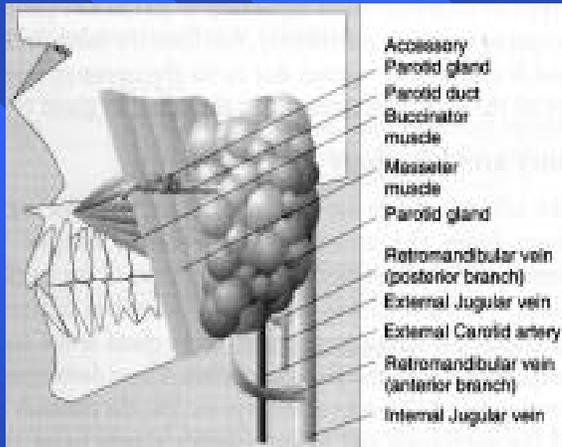
Numerous functions, critical to health, that involve saliva. These functions will be addressed during the course.

## Salivary Gland Anatomy

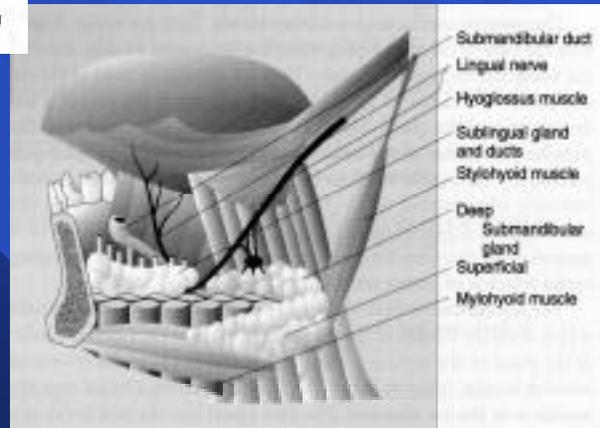
- Parotid Gland
- Submandibular Gland
- Sublingual Gland
- Minor Glands

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.

# Major Salivary Glands



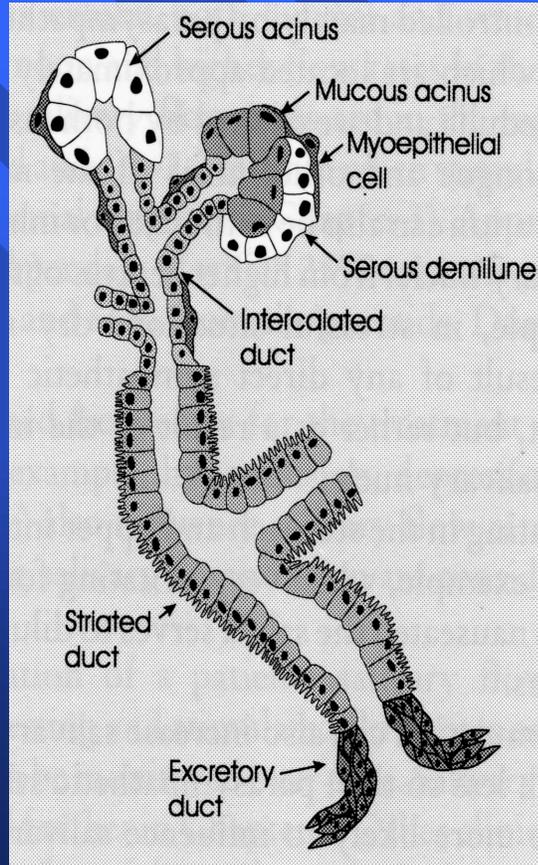
Parotid Glands



Submandibular Glands

You should know these names and locations.

## Structure of the Ducts



Detail of the salivary glands.

## Salivary Constituents

- Water & electrolytes
- Proteins
- Non-electrolytes
- Non-glandular proteins

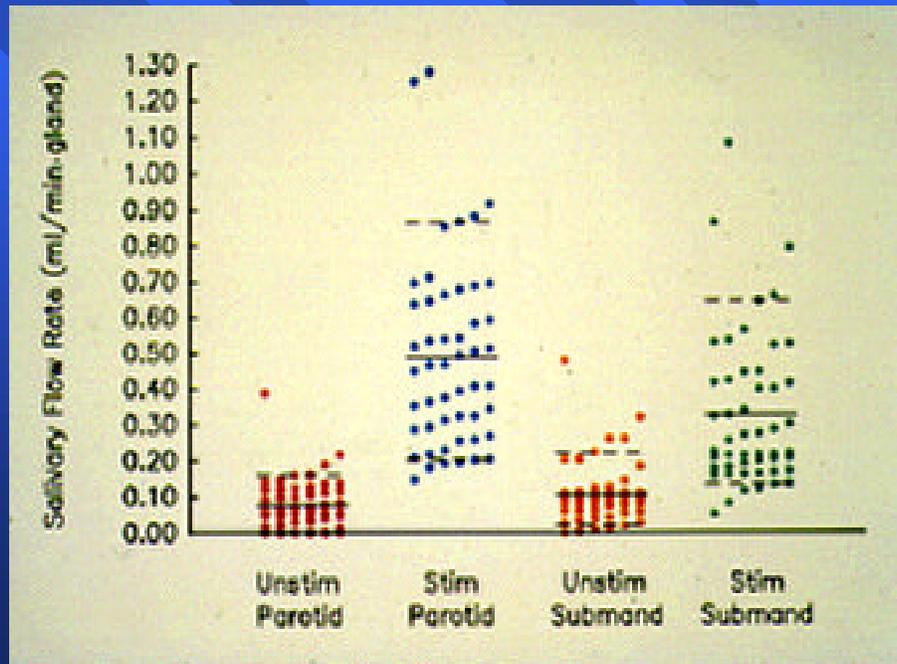
## Factors Contributing to Saliva Content

- 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 Variations in Saliva Output



Normal defines a wide range of salivary flow rates.

## Unstimulated vs. Stimulated Saliva

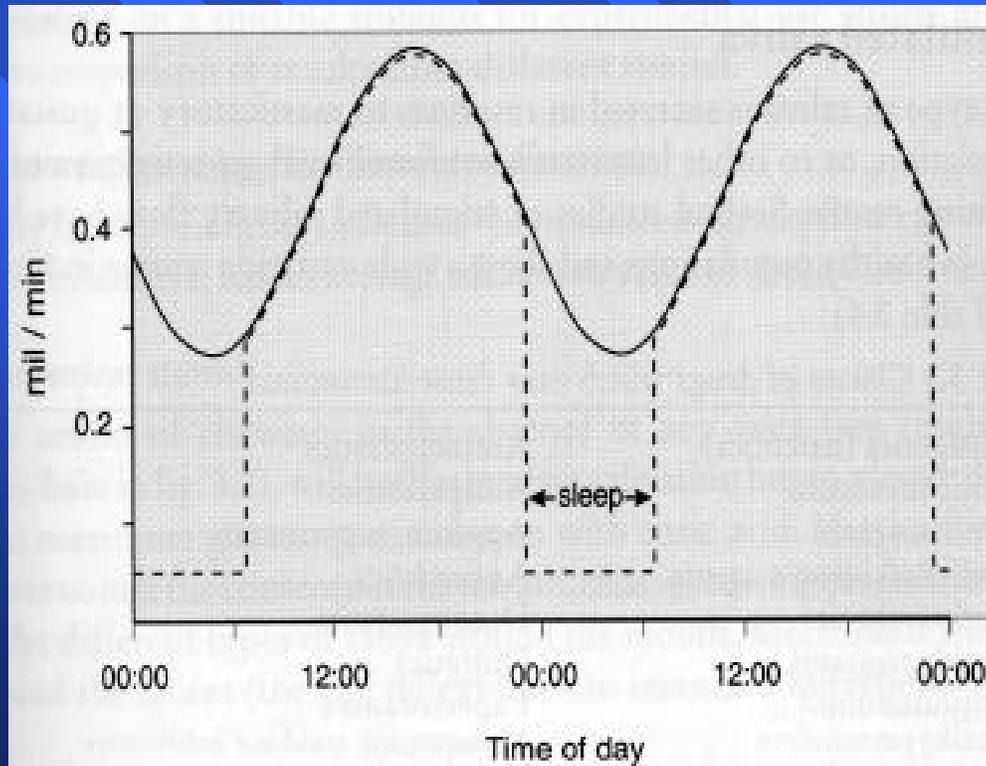
### ■ Unstimulated

- 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

## Circadian Rhythm



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

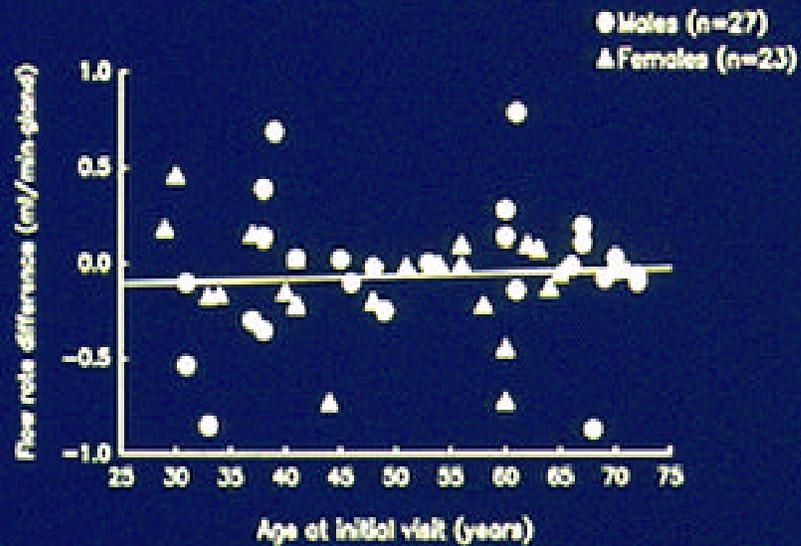
- No significant changes in major secretions
- No significant changes in minor secretions

### ■ Quality

- No general changes

## Stimulated Parotid Flow Over Time

Stimulated Parotid Flow Rate Differences Over 10 Years



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

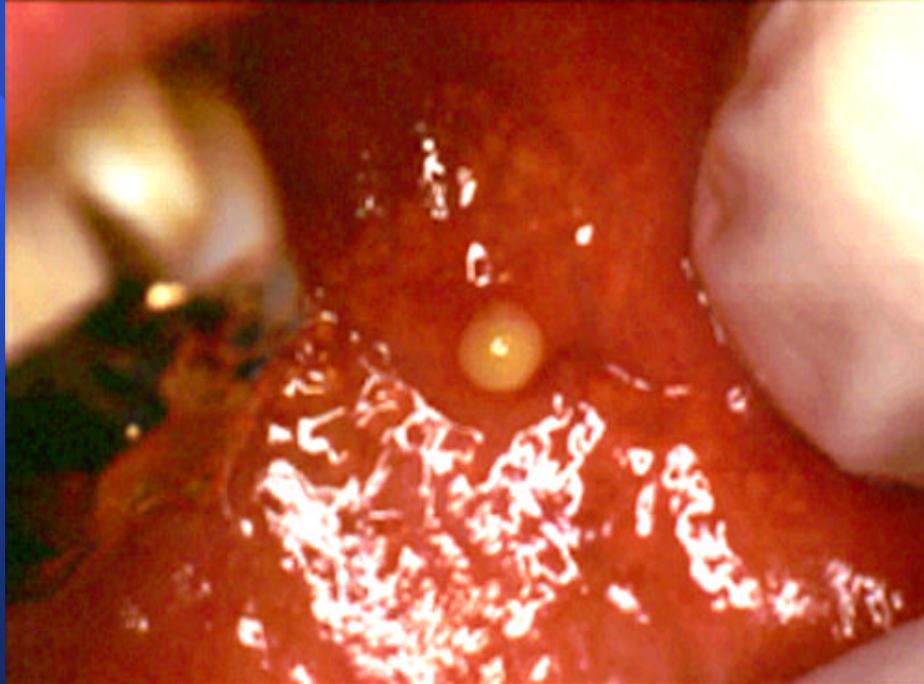
## Local Factors Affecting Saliva

- 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

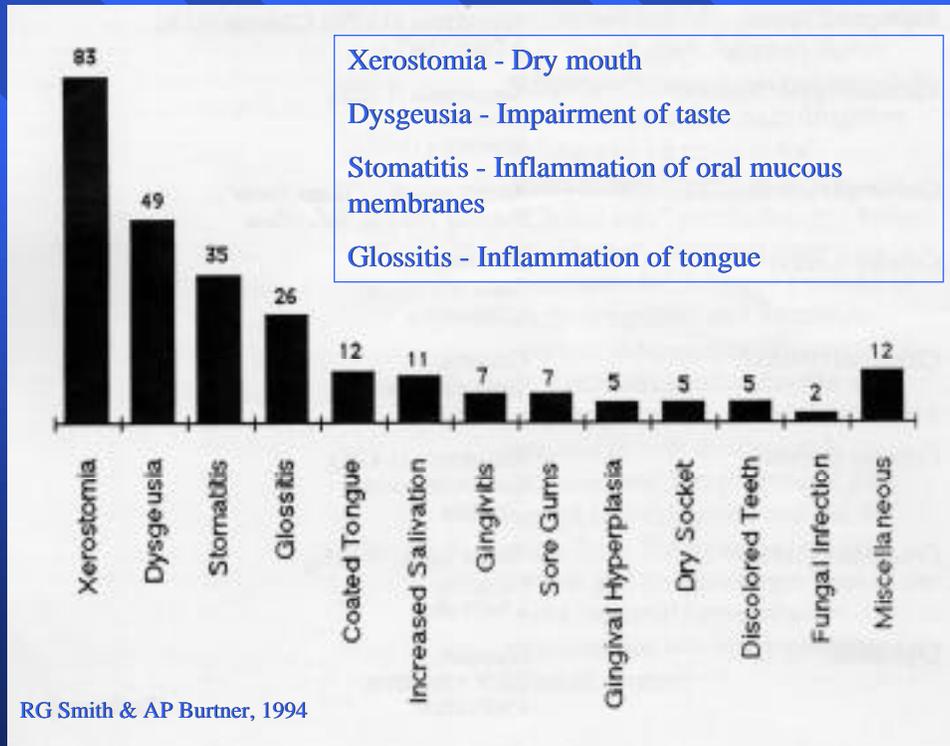


Note exudate from gland upon manual expression.

## Medications Influence Saliva

- Anti-cholinergics
- Anti-histamines
- Anti-depressants,  
antipsychotics
- Sedative and hypnotic  
agents
- Anti-hypertensives
- Anti-Parkinson drugs

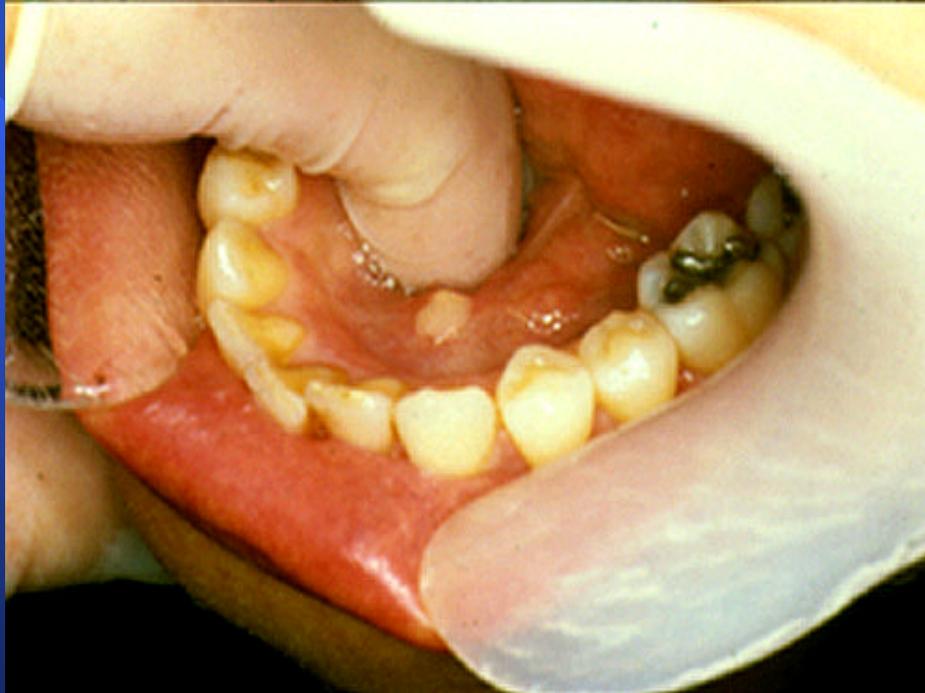
## Oral Side Effects Prescribed Drugs



## 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

## Salivary Flow Following Radiation Therapy



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

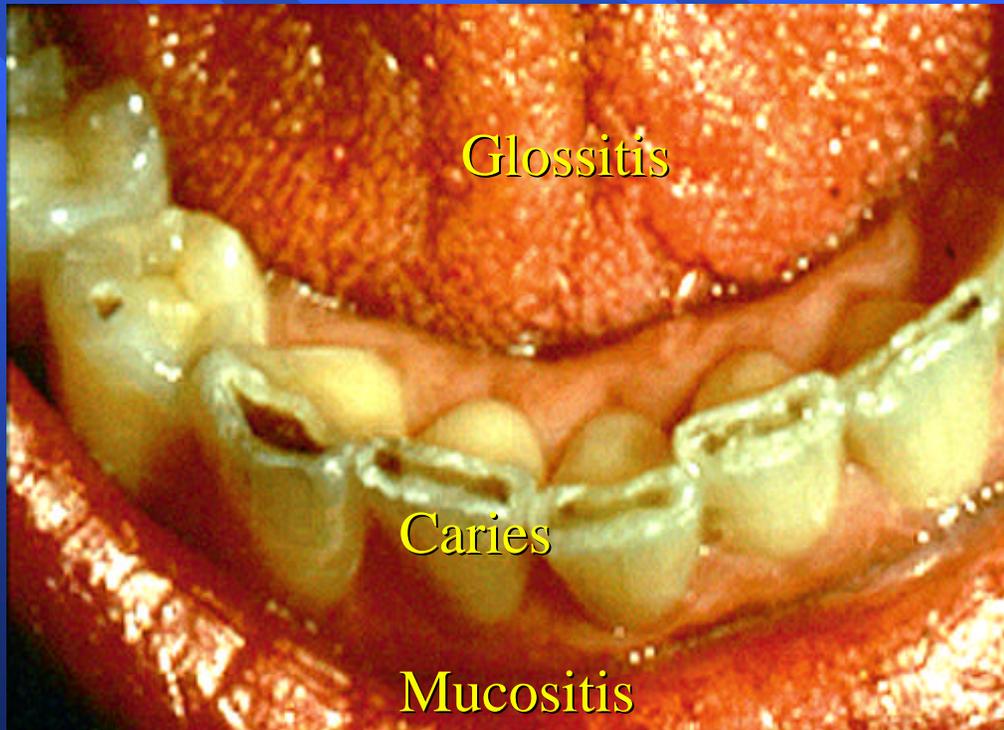
- Incipient decay
- Recurrent decay
- Root vs. coronal decay

## 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.

## Caries in a xerostomic individual



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

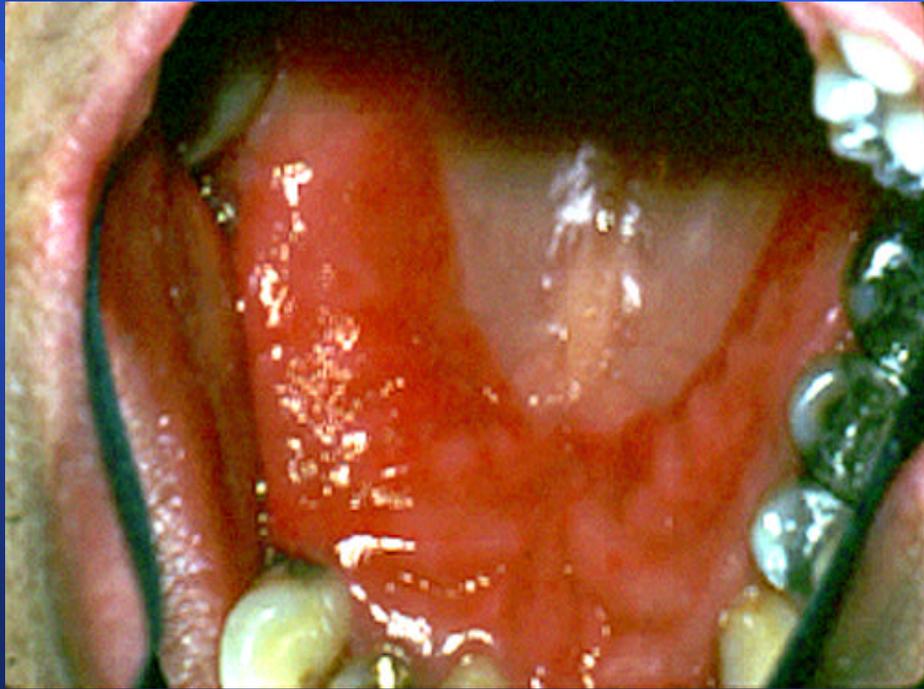
## Salivary Dysfunction and Oral Sequelae: Infections

- 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

