

**Al Rasheed College of Dentistry
Oral Histology**

**Dr. Omar Faridh Fawzi
Lecture 21**

HISTOCHEMISTRY

Histochemistry: quantitative It is the study of qualitative identification and assessment of chemical groupings within cells and tissues

Histochemical techniques are based on

- **Precise chemical rationales for their ability to identify or stain different biochemical substances.**
- **Visualizing Chemicals and Enzymes in tissue.**
- **Based on chemical reactions between cell components and stains.**
- **The end products of the reaction are permanent, colored precipitates that can be viewed under the microscope. There are stains specific to each component of the cell, based on the basic or acidic nature of dye.**

Applications

- **Origin- based on the chemical substances**
- **Progression**
- **Microbial infections**
- **Healing**
- **Repair**

Structure and chemical composition of oral tissues

Epithelium and its derivatives

- **Connective tissue**
- **Cells and fibers**
- **Ground substance**

Epithelium and its derivatives

- **Oral epithelium Epithelial components of tooth Salivary glands Cells and Fibers**
- **Fibroblasts**
- **Collagen (types I & III)**
- **Reticular fibers**
- **Elastic fibers**

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Ground substances

- Key role is adhesion and signaling events
- Composition-Mixture of macromolecules
- Proteoglycans
- Cell surface associated macromolecules
- Extra cellular macromolecules
- Glycoproteins
- Fibronectin-fibroblasts, smooth muscle, etc.,
- Laminin- epithelial cells, basement membrane
- Chondronectin- chondrocytes
- Osteonectin-osteoblasts

Histochemical techniques

Fixation procedures

- **Chemical**
 - Formaldehyde
 - Acrolein
 - Glutaraldehyde
 - Rossman's fluid- glycogen, glycoproteins
 - Camoy's mixture- nucleic acid (Feulgen reaction)
 - Paraformaldehyde- lipids
- **Non-chemical**
 - Freeze drying- cytochrome oxidases
 - Freeze fracture-electron microscopy (3D picture of cell membranes)

Histochemical study of teeth and bone

- Simultaneous fixation and decalcification with formaldehyde or glutaraldehyde and EDTA (ethylenediaminetetraacetic acid) for light and electron microscopic histochemistry.
- Recently techniques have been developed for sectioning freeze-dried, undecalcified tissues. (e.g.: for studying DC).
- Bone-deproteinization with concentrated Hydrazine.

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Specific histochemical methods

- **Carbohydrates:**
 - PAS Proteoglycans-Toluidine blue, Azure A, Alcian blue.
 - Proteins-Dinitrofluorobenzene, Ninhydrin or Ferric ferricyanide.
 - Lipids- Sudan dyes (Sudan black-phospholipids)
 - Enzymes (For e.g. Phosphatases-Gomori method)

Histochemistry of Oral hard tissues

- Carbohydrates (PAS) Proteins (dinitrofluorobenzene, ninhydrin or ferric ferricyanide)
- Lipids (Sudan dyes)

Histochemistry of oral soft tissues

- Polysaccharides
- Proteins
- Lipids
- Mucins (PAS for neutral mucins & alcian blue for acid mucins)

Recent techniques

- In situ hybridization (identification of gene or gene products)
- Laser spectroscopy (inorganic components of calcified tissue)
- Confocal Laser scanning microscope (3D picture)
- Radioautographic techniques (explains uptake of chemicals)