

Introduction of Histology

Stains

General

- Hematoxylin
- Eosin

Special

- Trichrome
- PAS
- Sudan black
- Metal impregnation
- Immunostaining

Ⓐ Immunofluorescence

Ⓑ Immunohistochemistry

- Toluidine Blue
- Alcian Blue

From the
past papers

- Hoechst stain
- picrosirius Red

General Stains

Hematoxylin

- Behaves like a basic dye
- Staining basophilic tissue components

* DNA, RNA, and glycosaminoglycan:

ionize and react with basic dyes do so because of acids in their composition.

* The nucleus appears bluish-purple because DNA and RNA are negatively charged and attract the basic dye Hematoxylin.

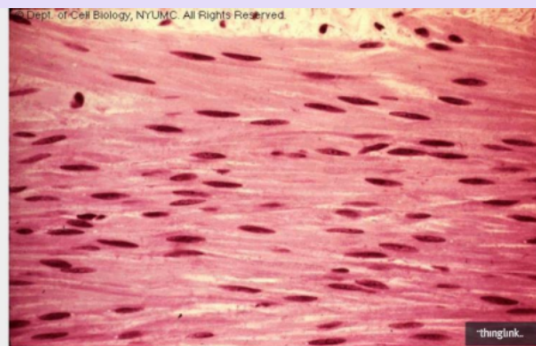
Eosin

- Acid dye
- ① [eosin, Orange
② and acid
③ function]

Stains

- mitochondria
- secretory granules
- collagen

* The cytoplasm appears pink because many cytoplasmic components are positively charged and bind to the acidic dye Eosin.



Hematoxylin and eosin (H&E):
nucleus/blue,
cytoplasm/pink

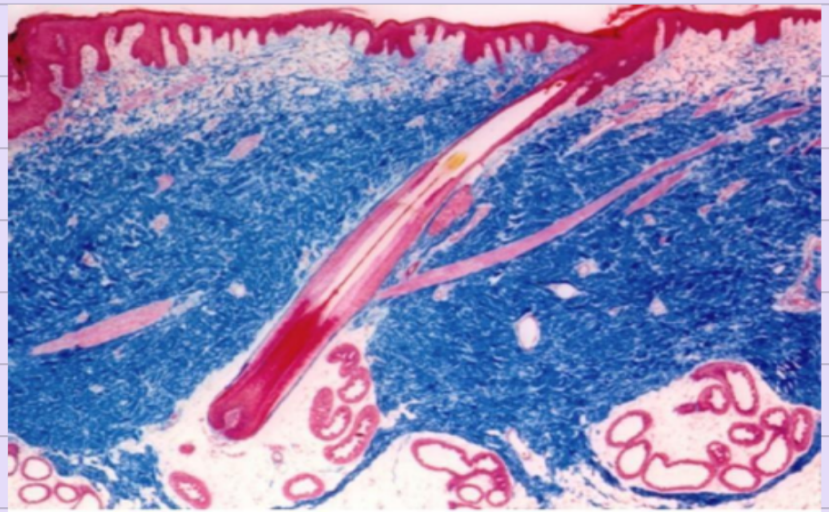
Special Stains

1 Trichrome stains & allow greater distinctions among various extracellular tissue components

Like:- Masson trichrome.

- Usually, it is used to distinguish the different tissues in the specimen

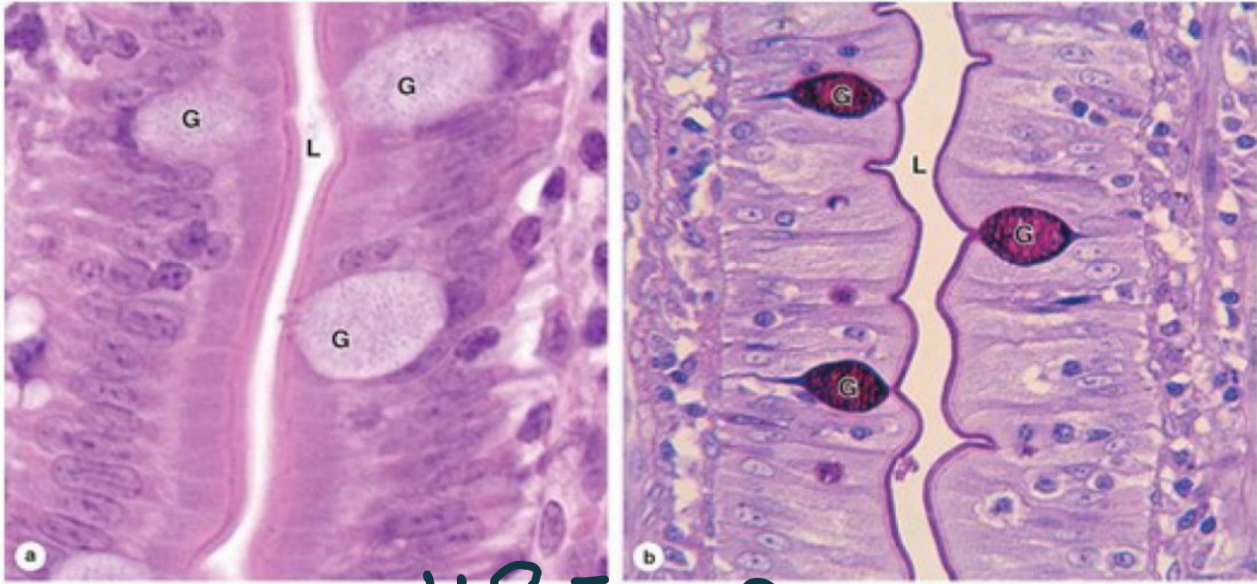
Trichrome method: three color system to emphasize support fibers: connective tissue/blue, cytoplasm/pink, nuclei/dark brown.



2 The periodic acid - Schiff (PAS)

reaction utilizes the hexose rings of polysaccharides and other carbohydrate-rich tissue structures

and stains such macromolecules distinctly **purple or magenta**.



Source: Anthony L. Mescher: Junqueira's Basic Histology: Text and Atlas, 15th Edition. Copyright © McGraw-Hill Education. All rights reserved.

H&E

PAS STAINING

Similar to H&E , but more details are shown , a line is present on cells containing carbohydrates

[3] Sudan black & lipid-soluble dyes stains lipids, avoiding the processing steps that remove lipids such as: treatment with heat and organic solvents (or alcohol effect) which can be useful in diagnosis.

↳ we have to omit these steps in order to preserve the fat, and then using the sudan black.

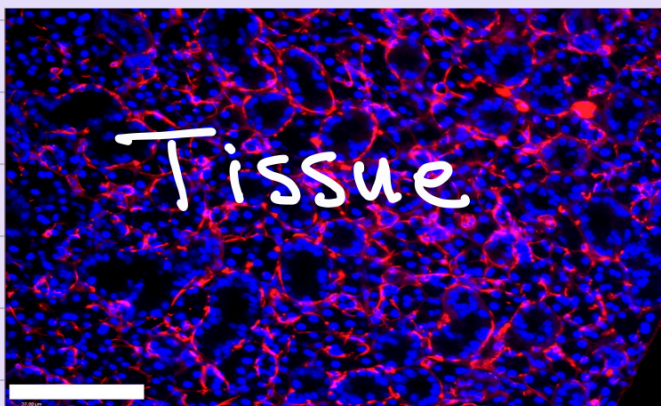
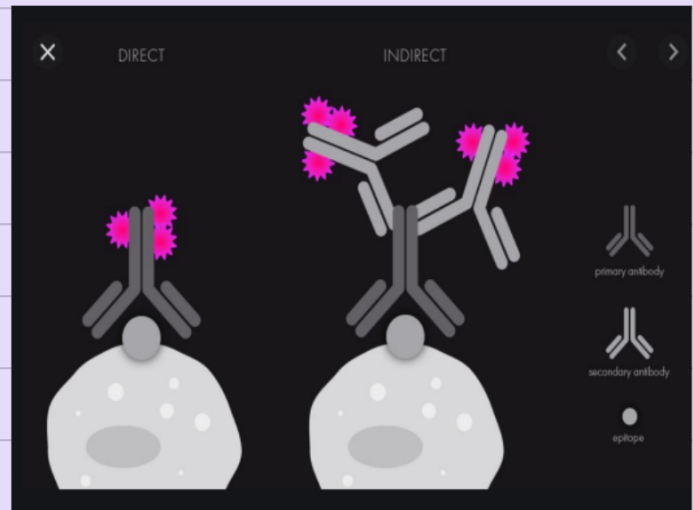
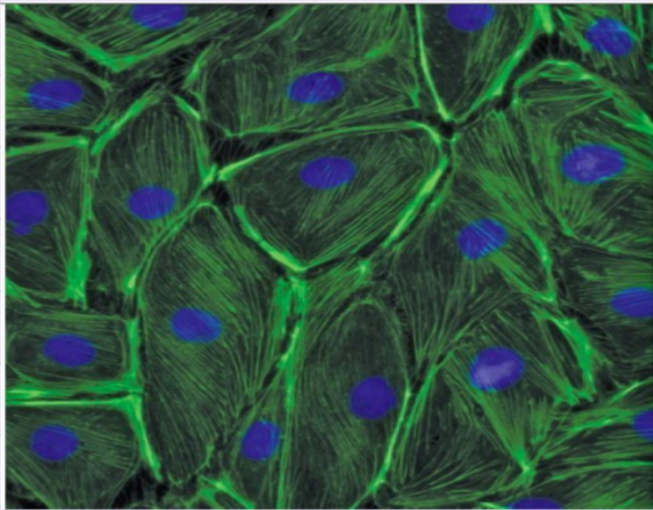
[4] Metal impregnation: less common methods. Using solutions of silver salts to visual:

①

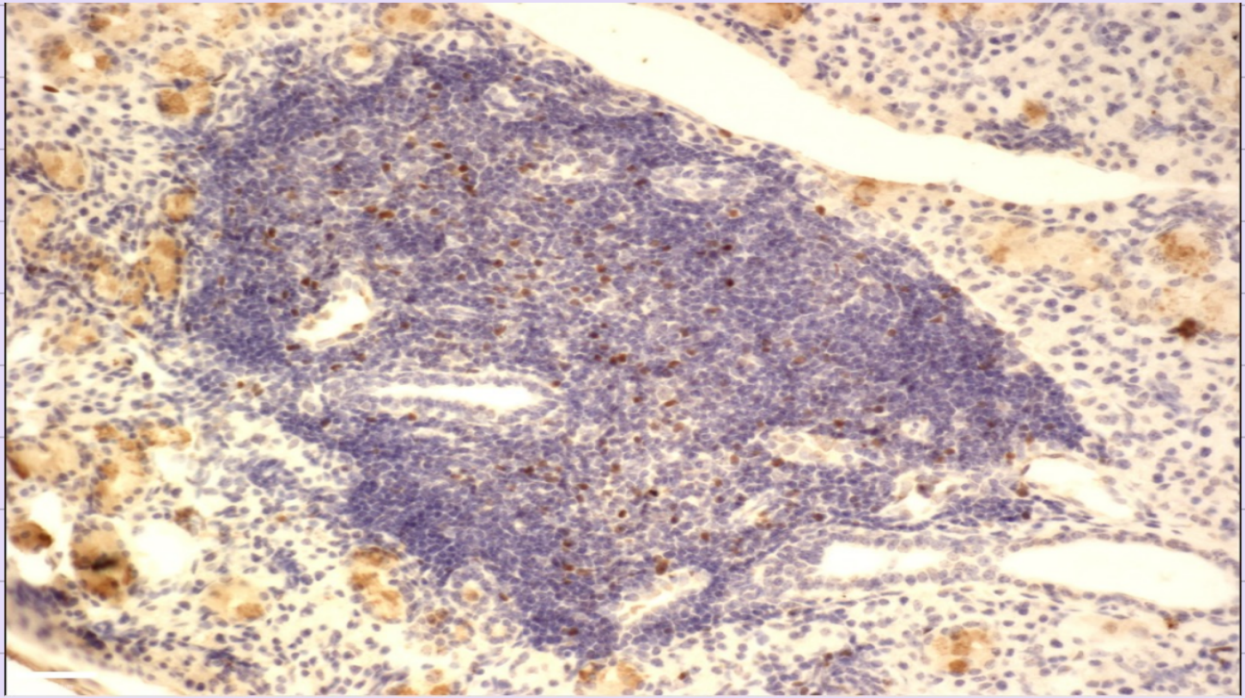
②

certain ECM fibers and specific cellular elements in nervous tissue.

[5] Immunostaining: Antigen-Antibody specificity
A-Immunofluorescence (IF)

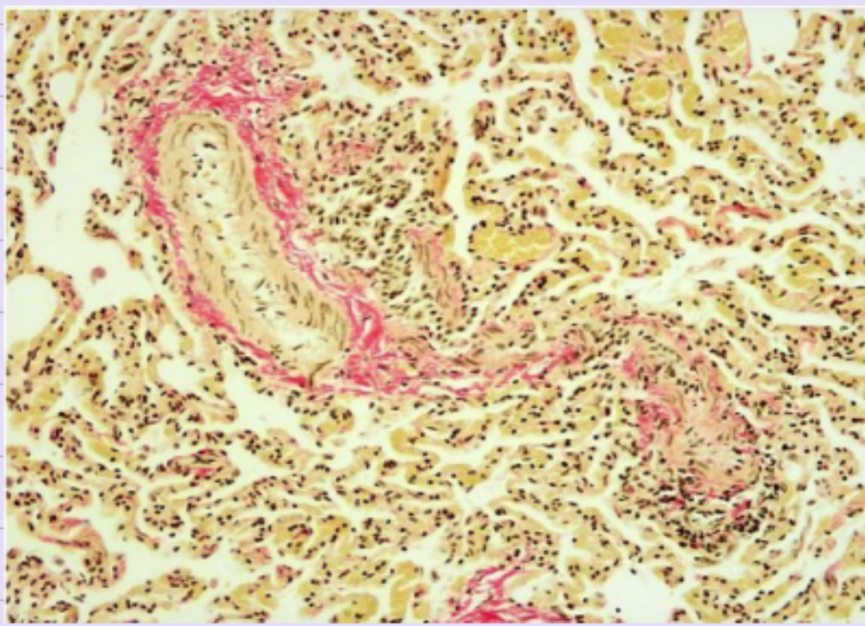


B- Immunohistochemistry



Staining and stains-special stains

- 1 Another type of stain is Toluidine Blue which is used for nerve tissue sections. It helps distinguish the myelinated parts of the nerve, which cannot be clearly seen with Hematoxylin and Eosin (H&E) staining. Since H&E does not highlight myelin effectively, Toluidine Blue is used instead
- 2 Another special stain is Alcian Blue, which is used to identify a specific type of protein called mucin (or mucus). Mucin is a sticky, gel-like substance found in glands and certain epithelial tissues. H&E staining does not highlight mucin, so Alcian Blue is used to specifically stain and identify it



Van Gieson

method:

collagen/pink,

muscle/yellow.

Important notes:-

- 1 Collagen can be distinguished using various stains like:
 - Hematoxylin and Eosin
 - Picrosirius Red
 - Immunofluorescence
 - Trichrome stains
- 2 Hoechst and DAPI $\rightarrow$ Blue stains are fluorescent dyes specifically used to stain (DNA).
- 3 Phalloidin is a fluorescent dye used to stain actin. (Green)