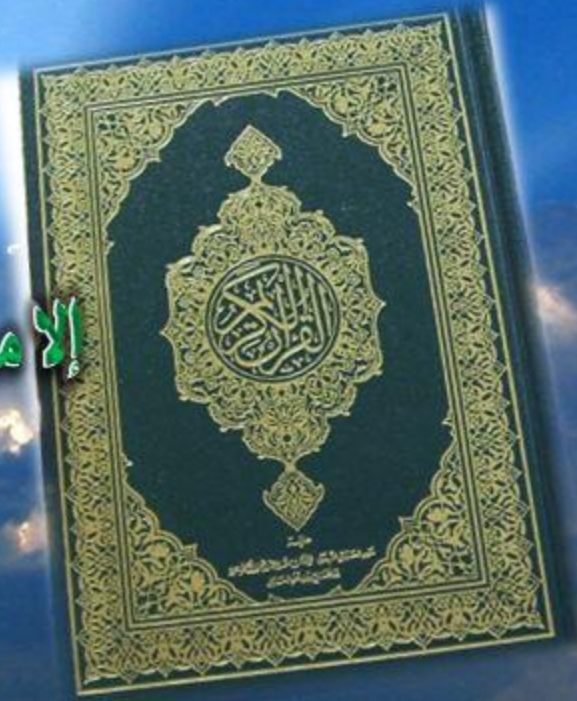


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

صَدَقَ اللَّهُ الْعَظِيمُ



Connective Tissue Fibers with their Stains

By

Aya Abd El-Monem Abo Elyazed Saleh

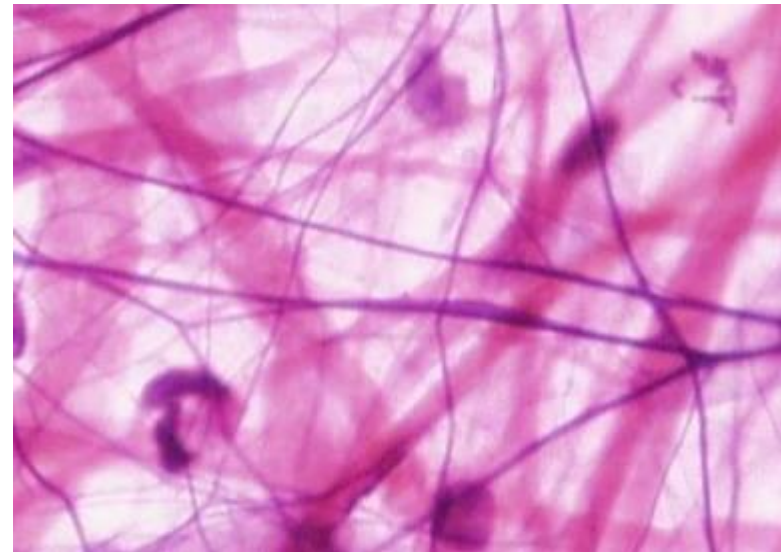


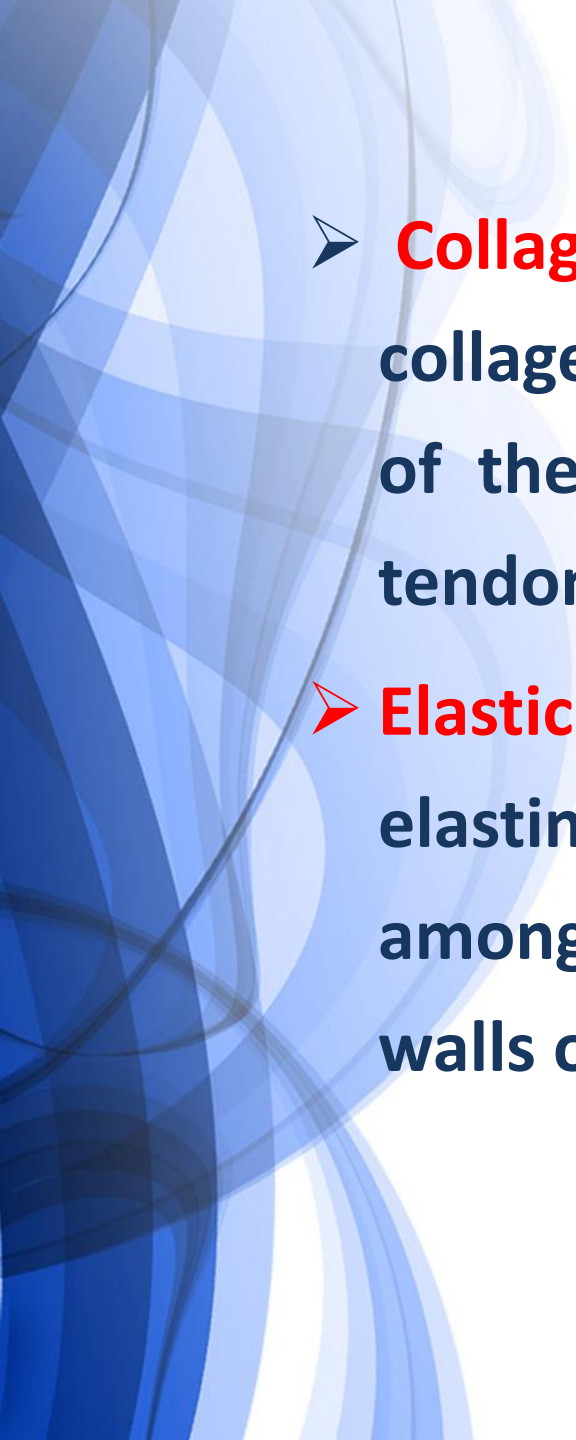
Introduction

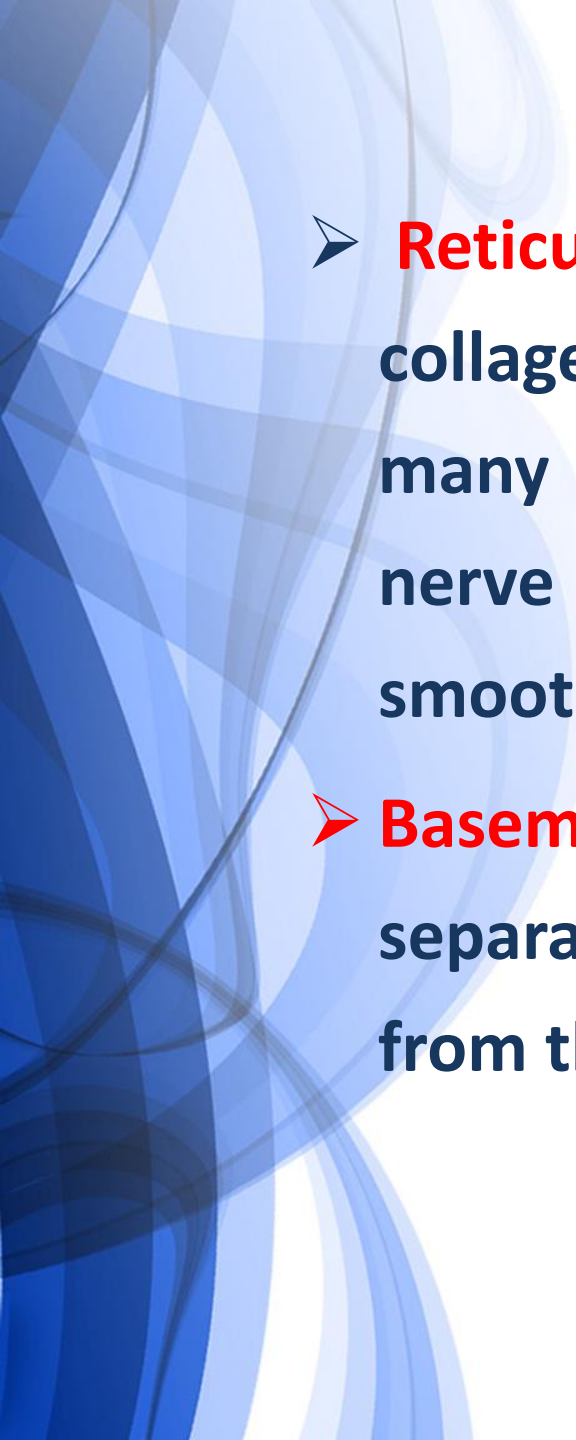
➤ **Connective tissue** is one of the major types of tissue that connects different parts of tissue and supports the body parts.

➤ **The fibrous part of C.T includes:**

- **Collagen fibers**
- **Reticular fibers**
- **Elastic fibers**
- **Basement membrane**



- 
- **Collagen fibers** : composed of the protein collagen and provide the greatest strength of the 3 fiber types. Found in ligaments, tendons, cartilage and bone.
 - **Elastic Fibers**: composed of the protein elastin and provide the greatest flexibility among the fiber types. Found in skin and walls of blood vessels.

- 
- **Reticular fibers** : composed of the protein collagen. They form a delicate network for many soft organs and a network around nerve fibers, fat cells, LNs, skeletal and smooth ms fibers.
 - **Basement membrane**: C.T elements that separate the epithelial and endothelial cells from the underlying connective tissue.



**Staining methods
for demonstrating
fibers of C.T**

Demonstration of Collagen fibers

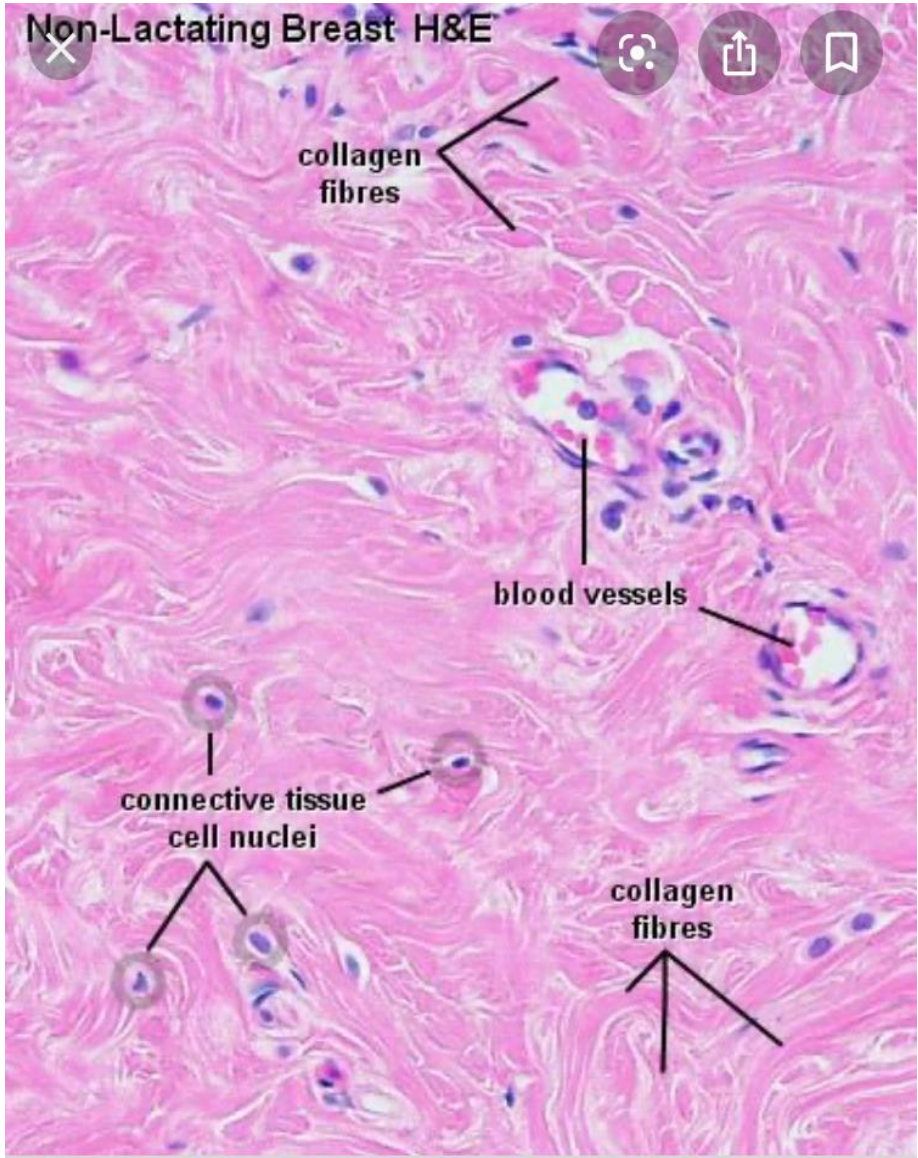
- Collagen fibers demonstrated by:
 - H & E
 - Trichrome Stains
 - PTAH (phosphotungstic acid-hematoxylin)

1- Hematoxylin & Eosin

Collagen fibers



1- Hematoxylin & Eosin



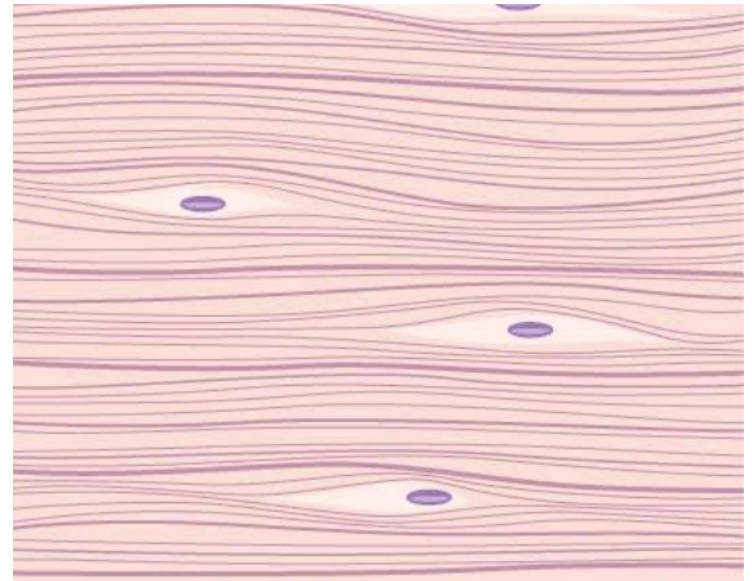
Demonstration of Collagen fibers

➤ Collagen fibers demonstrated by:

➤ H & E

➤ Trichrome Stains

➤ PTAH

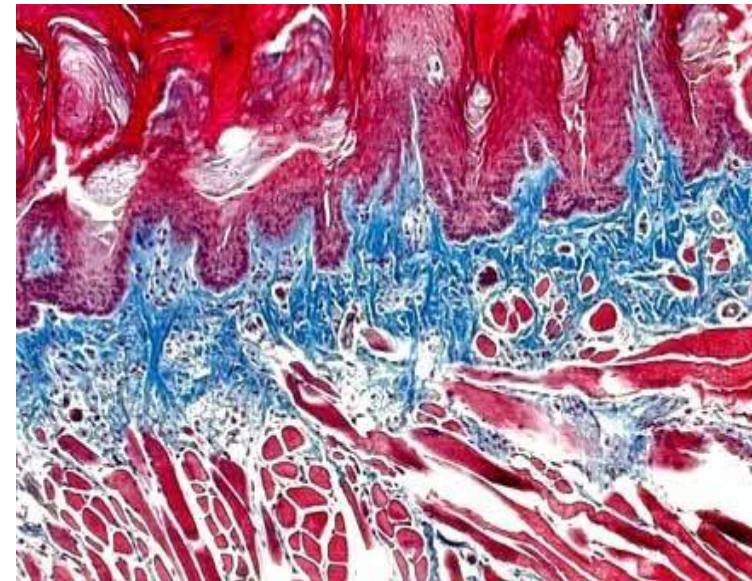


2- Trichrome Stains

➤ **Trichrome stains**: 3 dyes used to distinguish collagen from muscle and aid in the diagnosis of fibrotic changes, neuromuscular diseases and tumors of muscle origin.

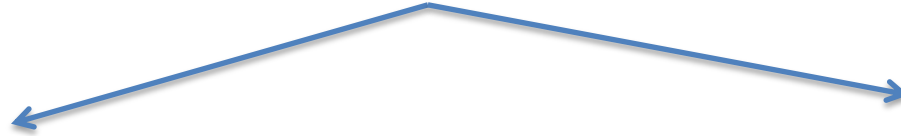
➤ **Result:**

1. Collagen: blue
2. Muscle, Cytoplasm & RBCs: Red
3. Nucleus: blue



2- Trichrome Stains

- The most common techniques for trichrome staining

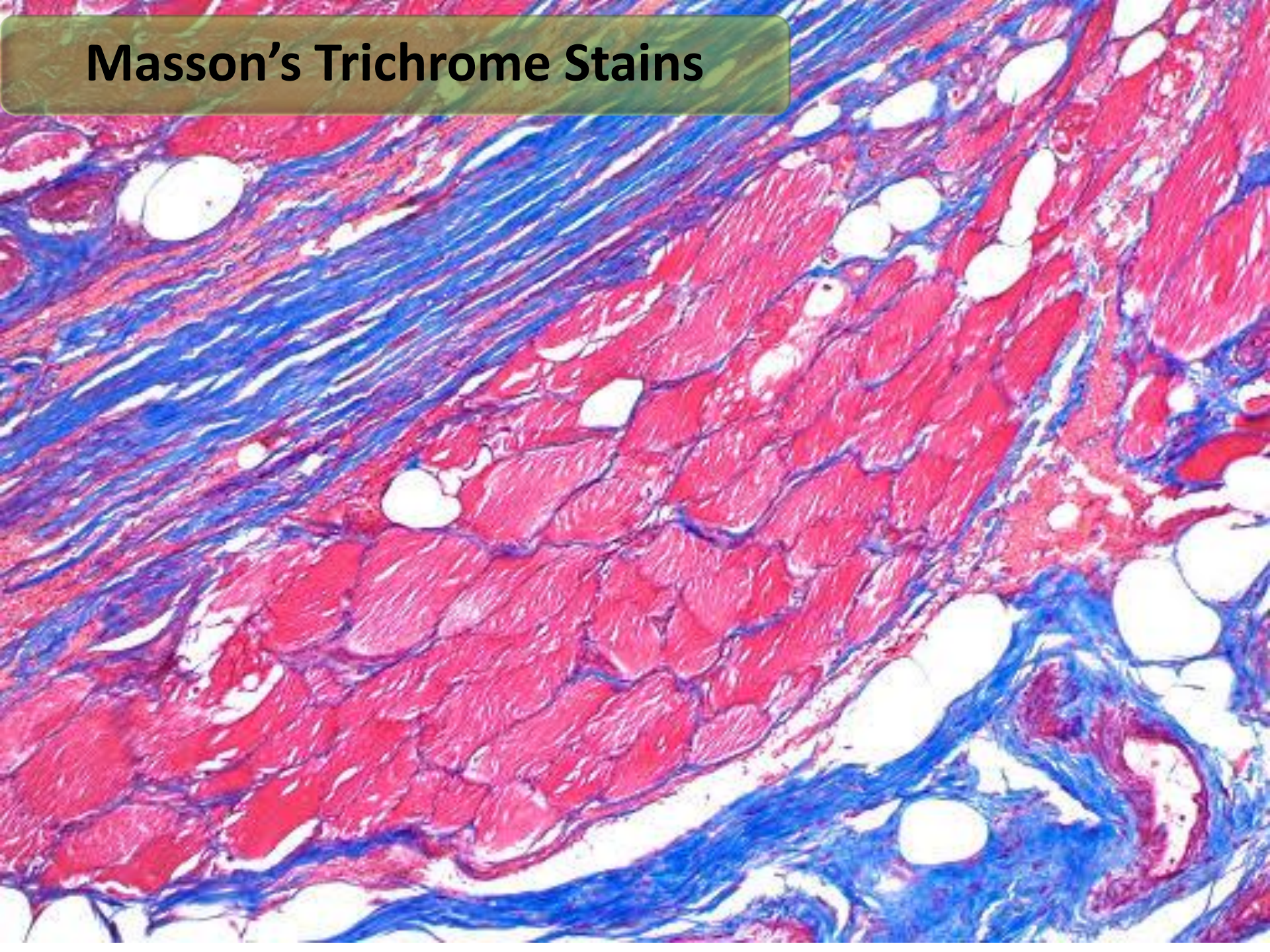


**Masson's
Trichrome**

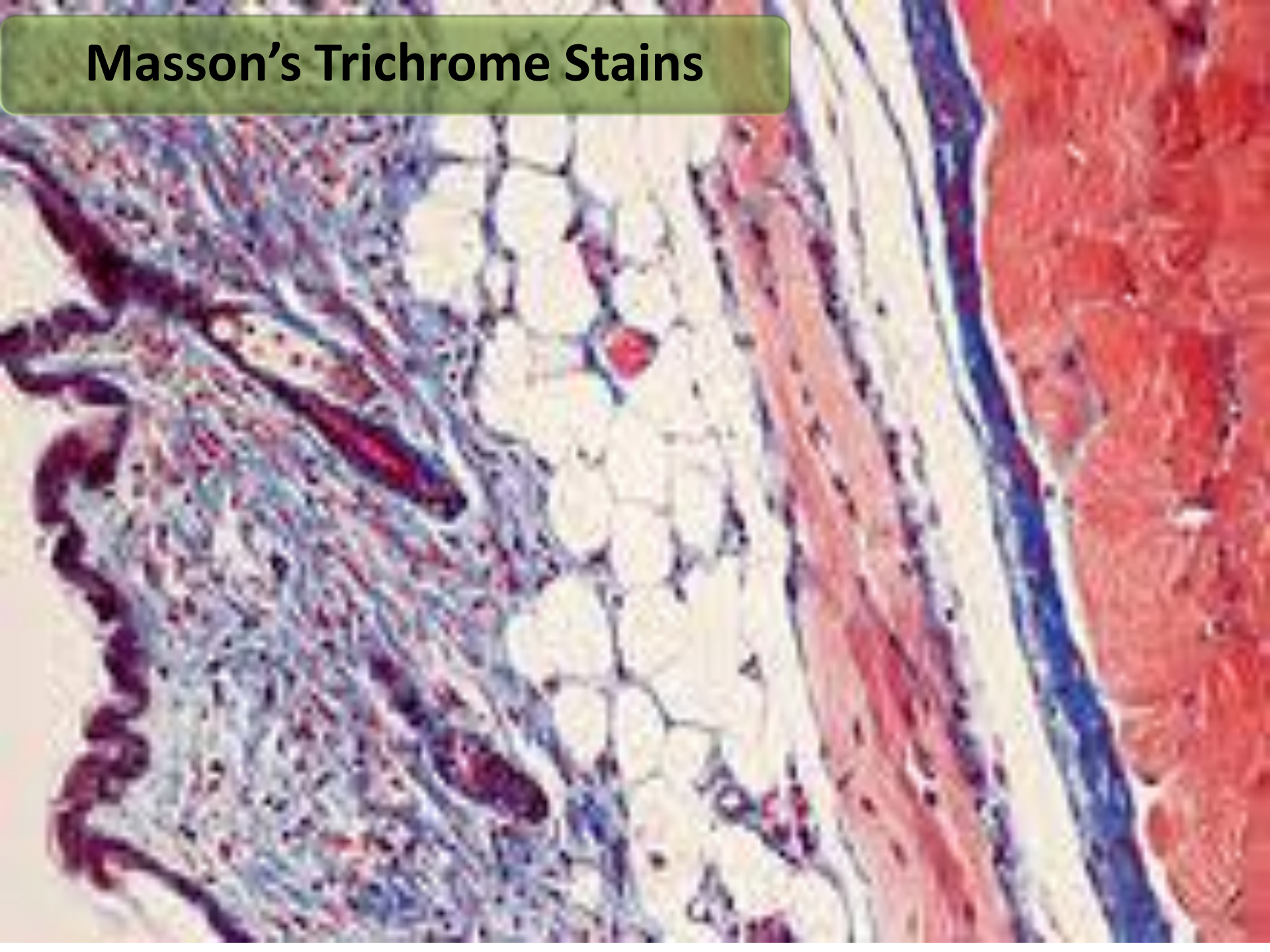
**Gomori's One-Step Trichrome
Stains**

- The Masson utilizes all of the mordanting and staining steps individually , where as the one-step incorporates all of the staining steps in one staining solution except the mordant and nuclear stain.

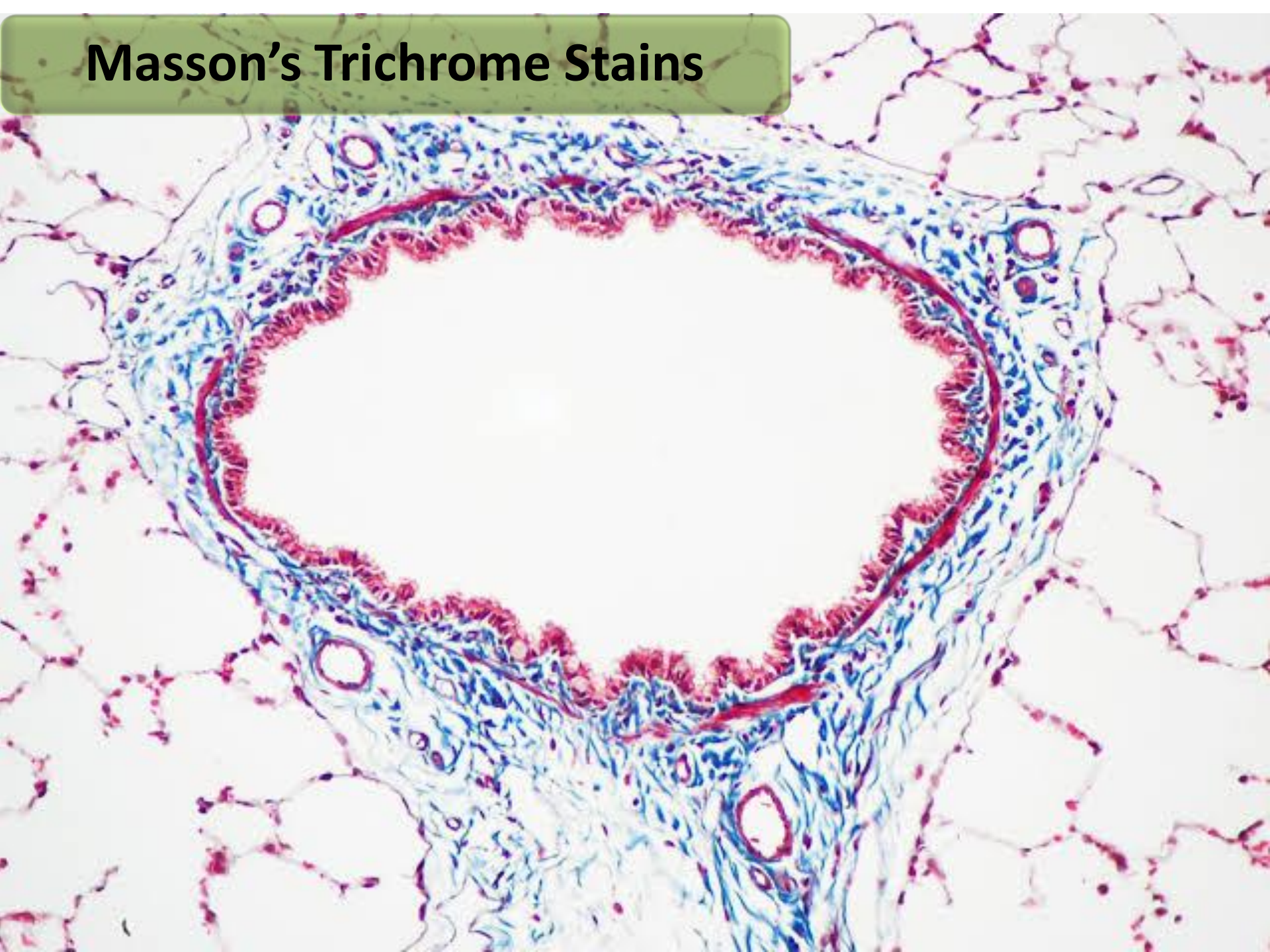
Masson's Trichrome Stains



Masson's Trichrome Stains

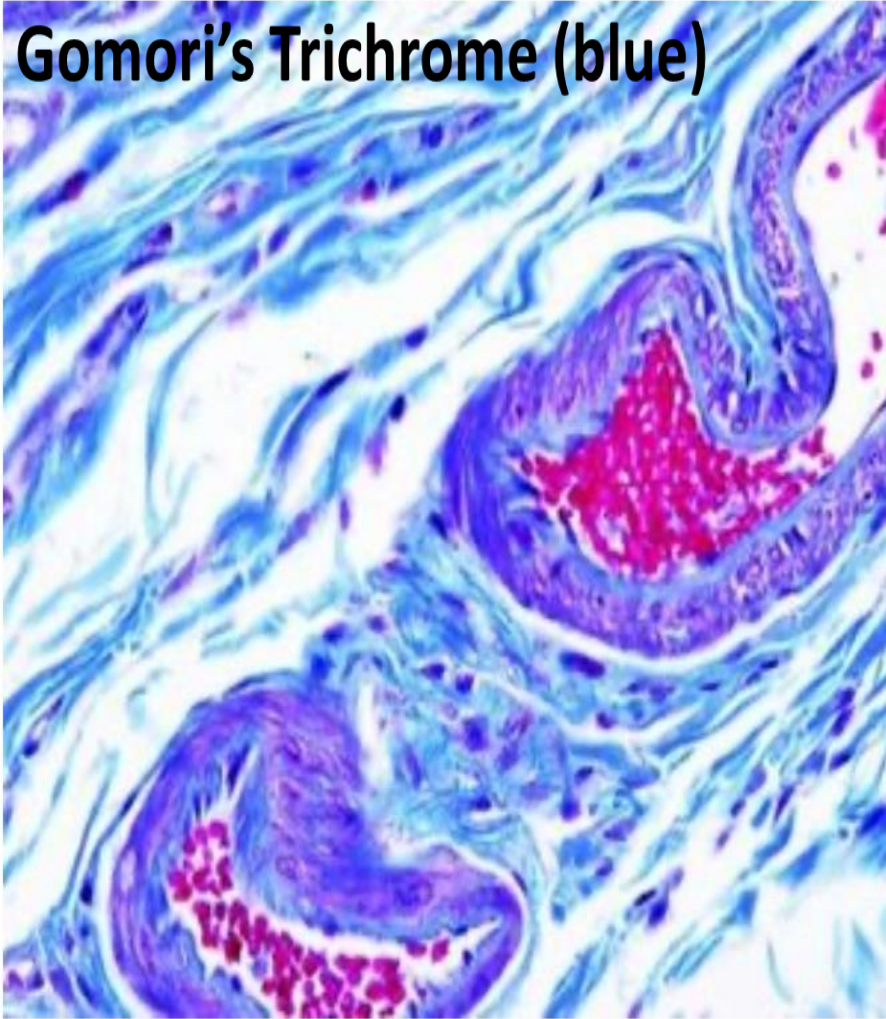


Masson's Trichrome Stains

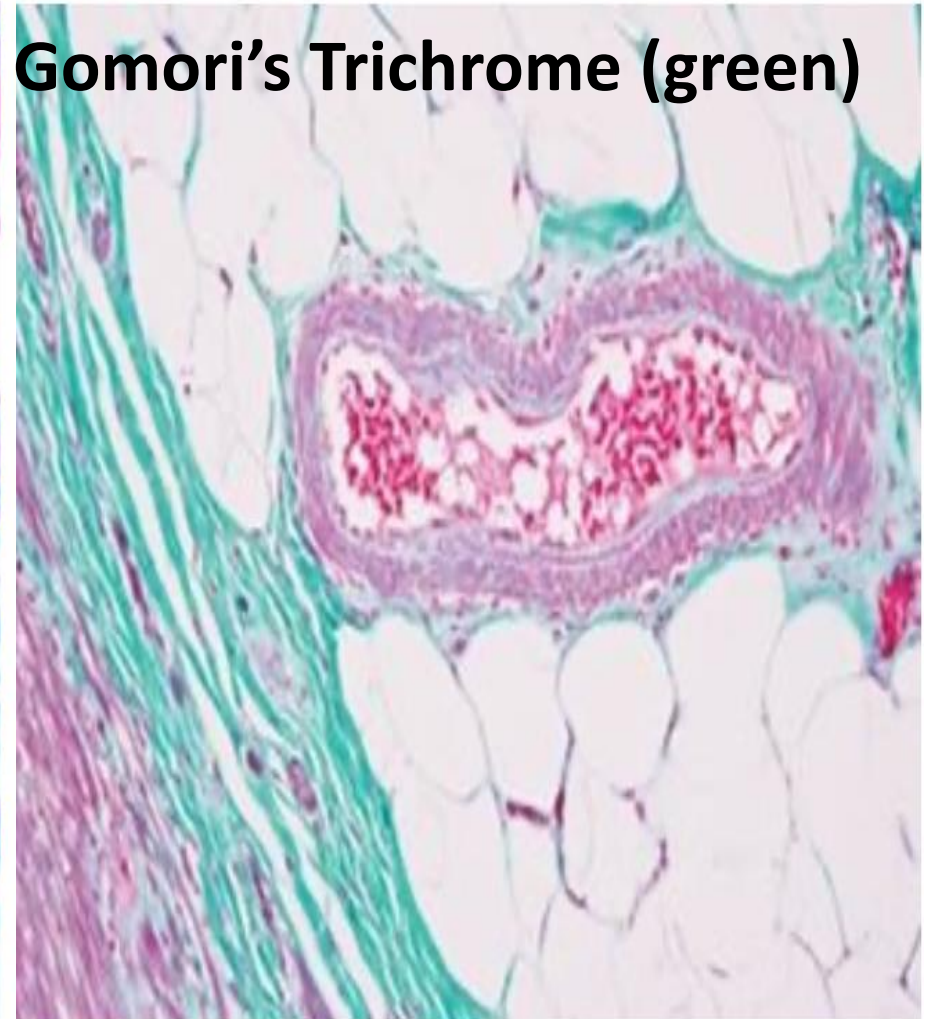


Gomori's One-Step Trichrome Stains

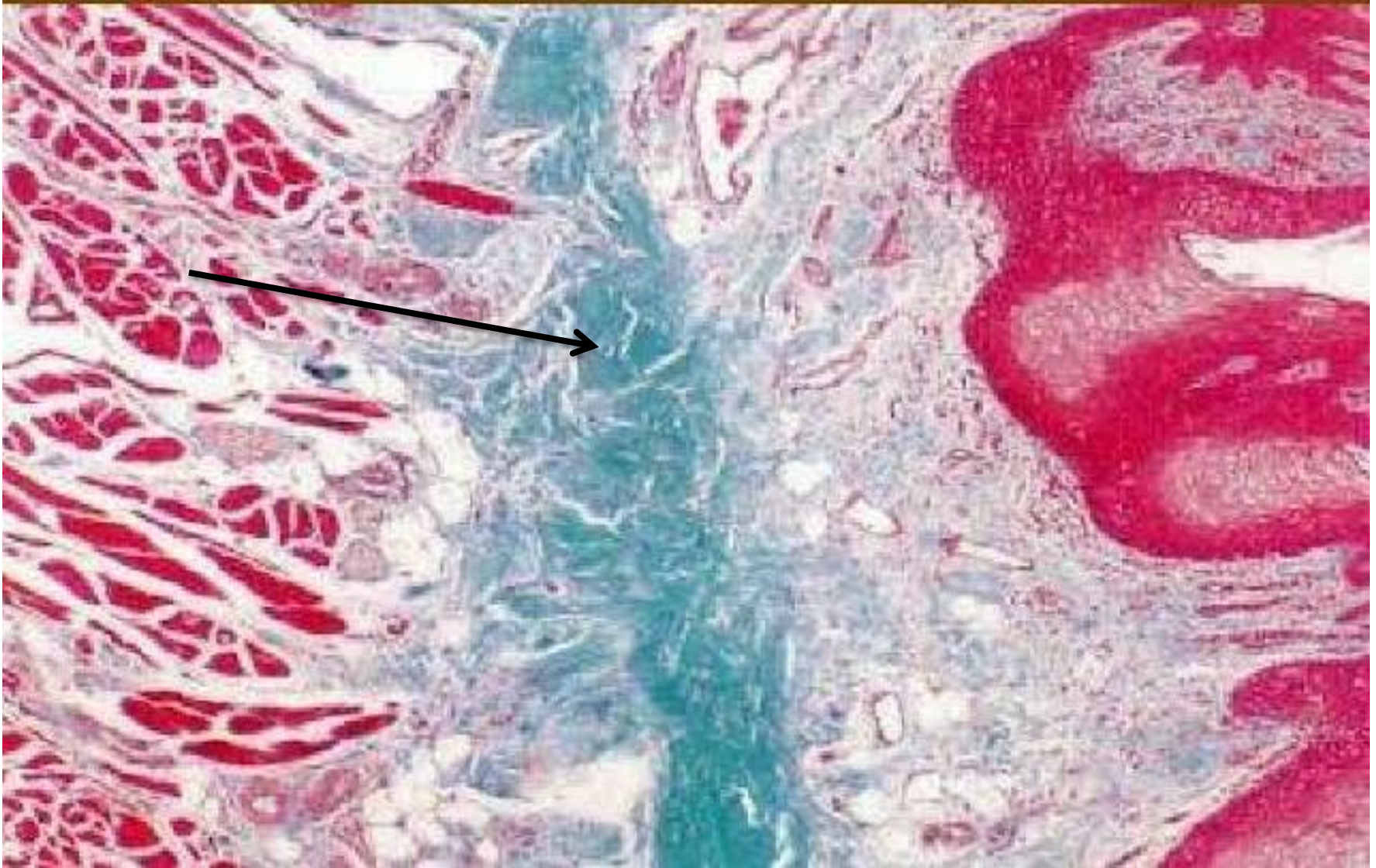
Gomori's Trichrome (blue)



Gomori's Trichrome (green)



Gomori's One-Step Trichrome Stains



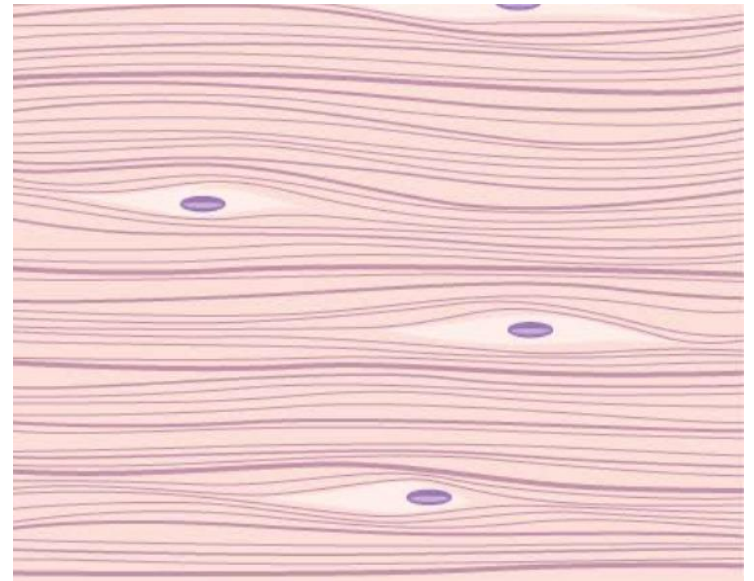
Demonstration of Collagen fibers

➤ Collagen fibers demonstrated by:

➤ H & E

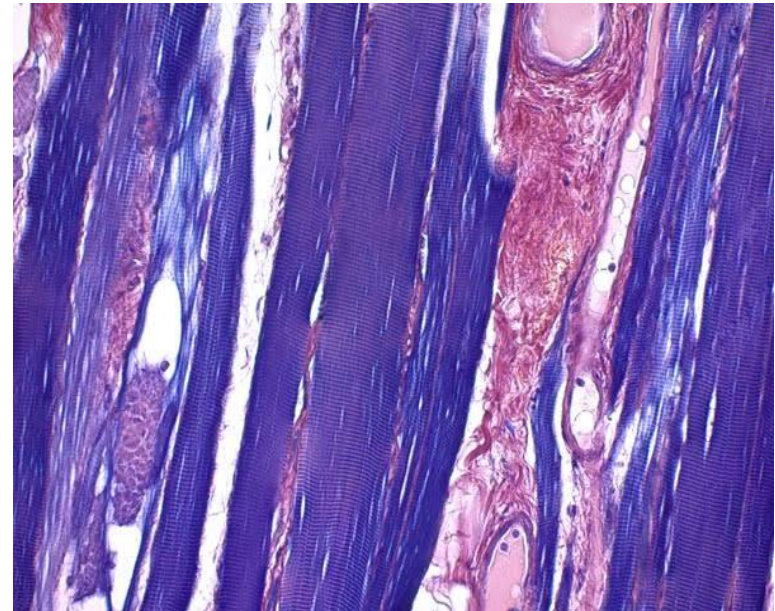
➤ Trichrome Stains

➤ PTAH

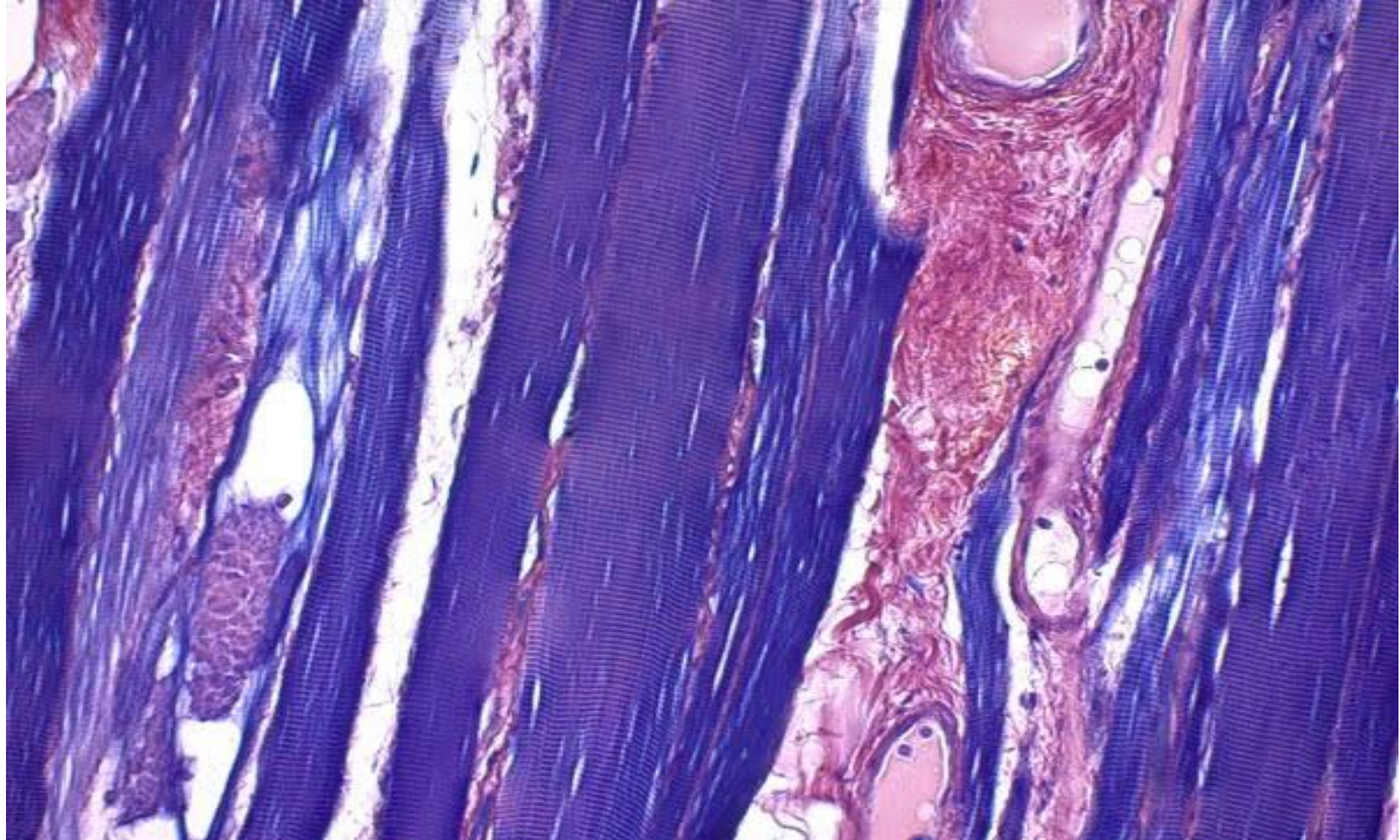


3- phosphotungstic acid-hematoxylin (PTAH)

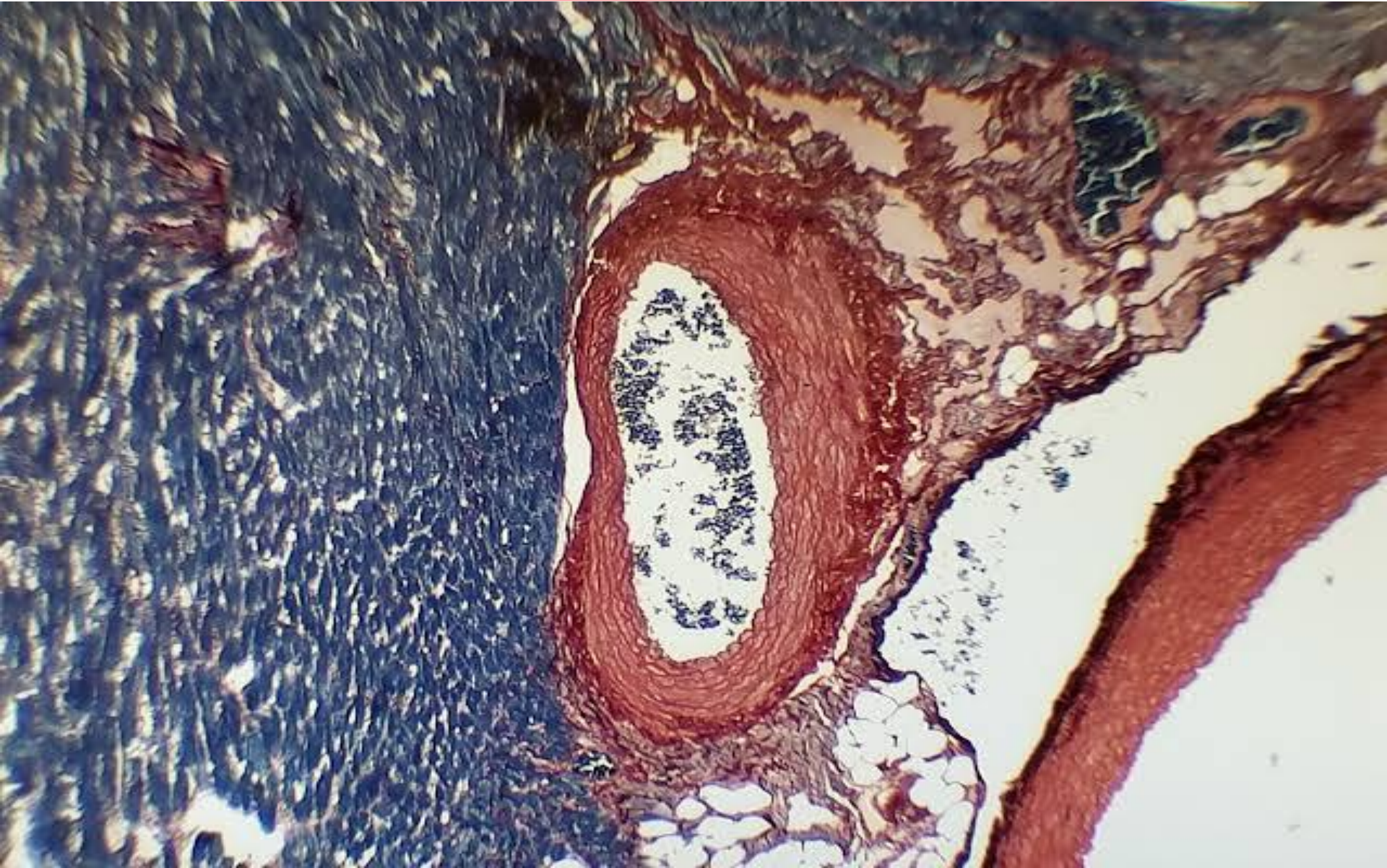
- PTAH is preferred for demonstrating cross-striations of skeletal muscle.
- **Muscle, cytoplasm, fibrin:** Various shades of blue
- **Nuclei:** Various shades of blue
- **Collagen** Red-brown



3- phosphotungstic acid-hematoxylin (PTAH)

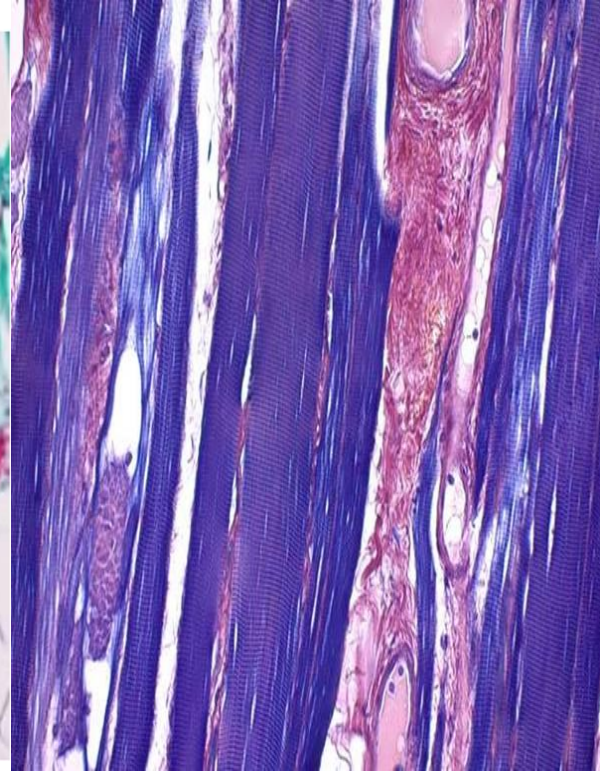
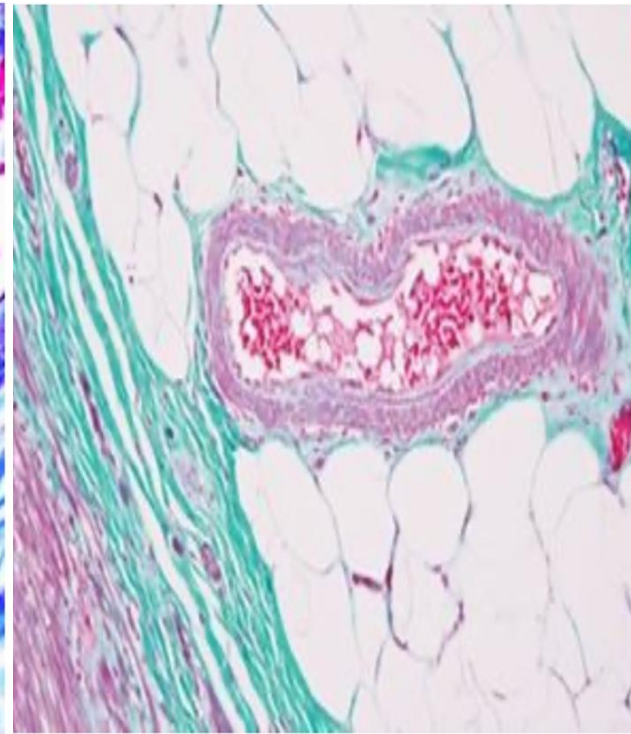
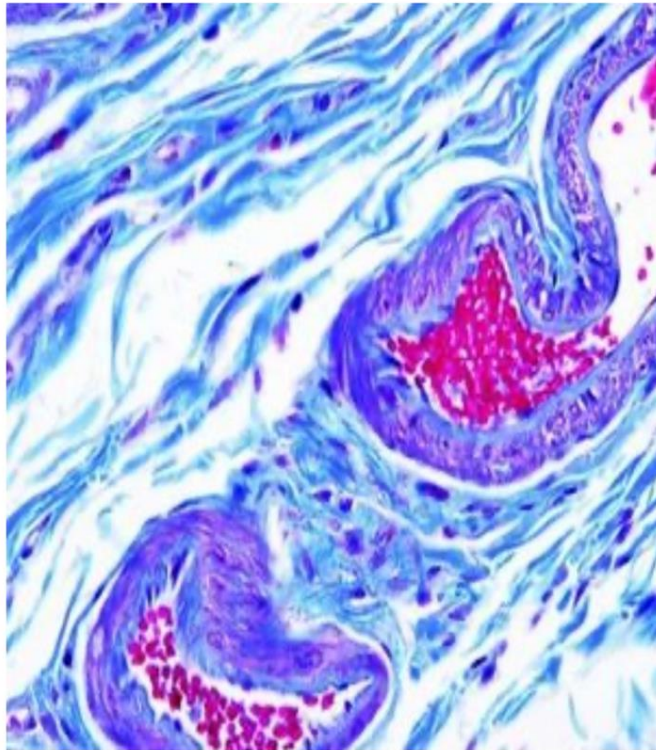
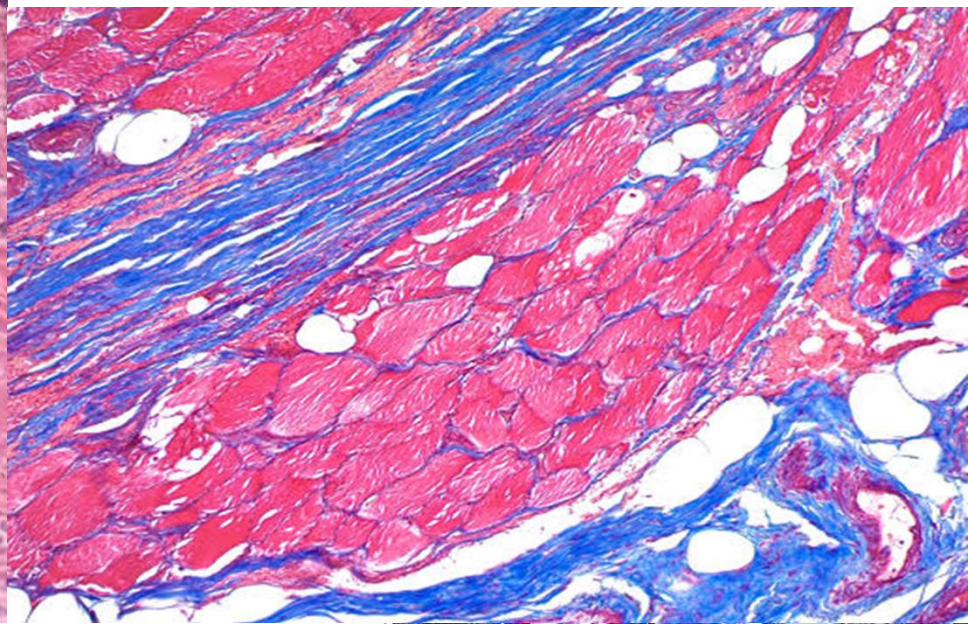
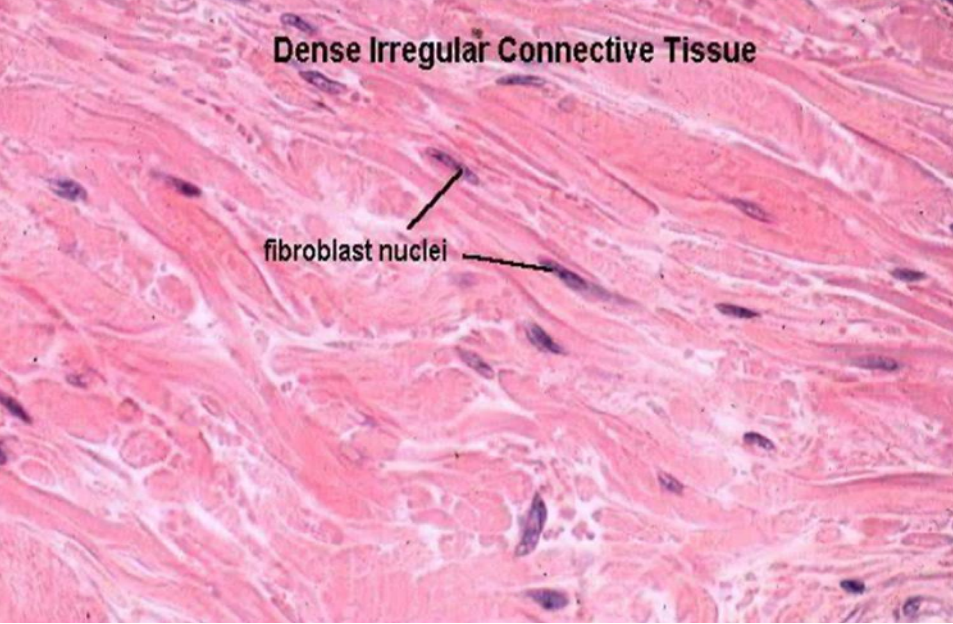


3- phosphotungstic acid-hematoxylin (PTAH)



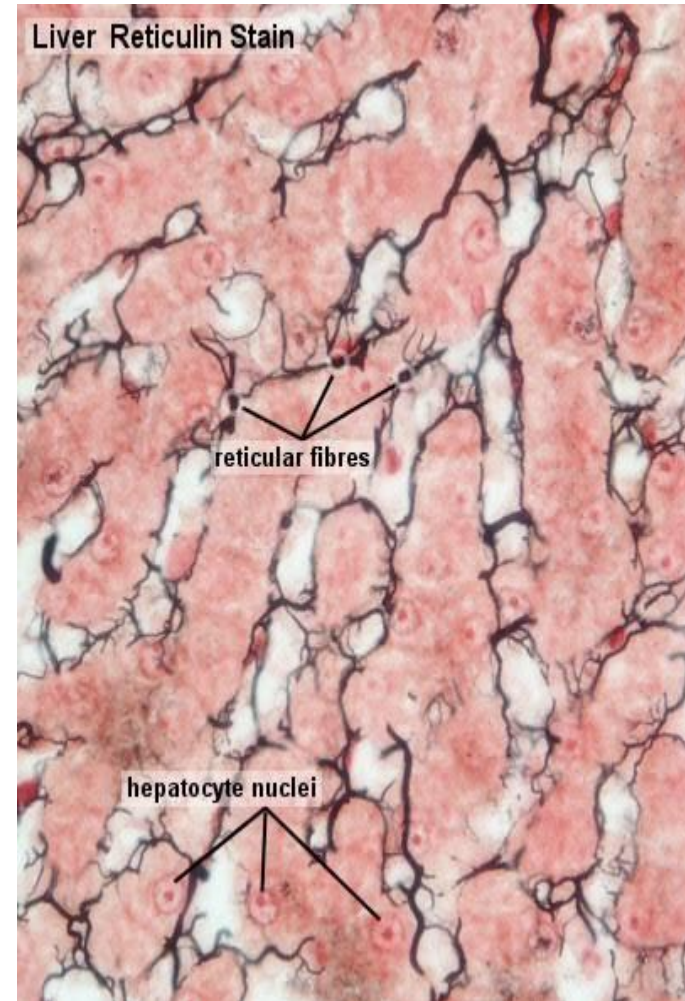
Dense Irregular Connective Tissue

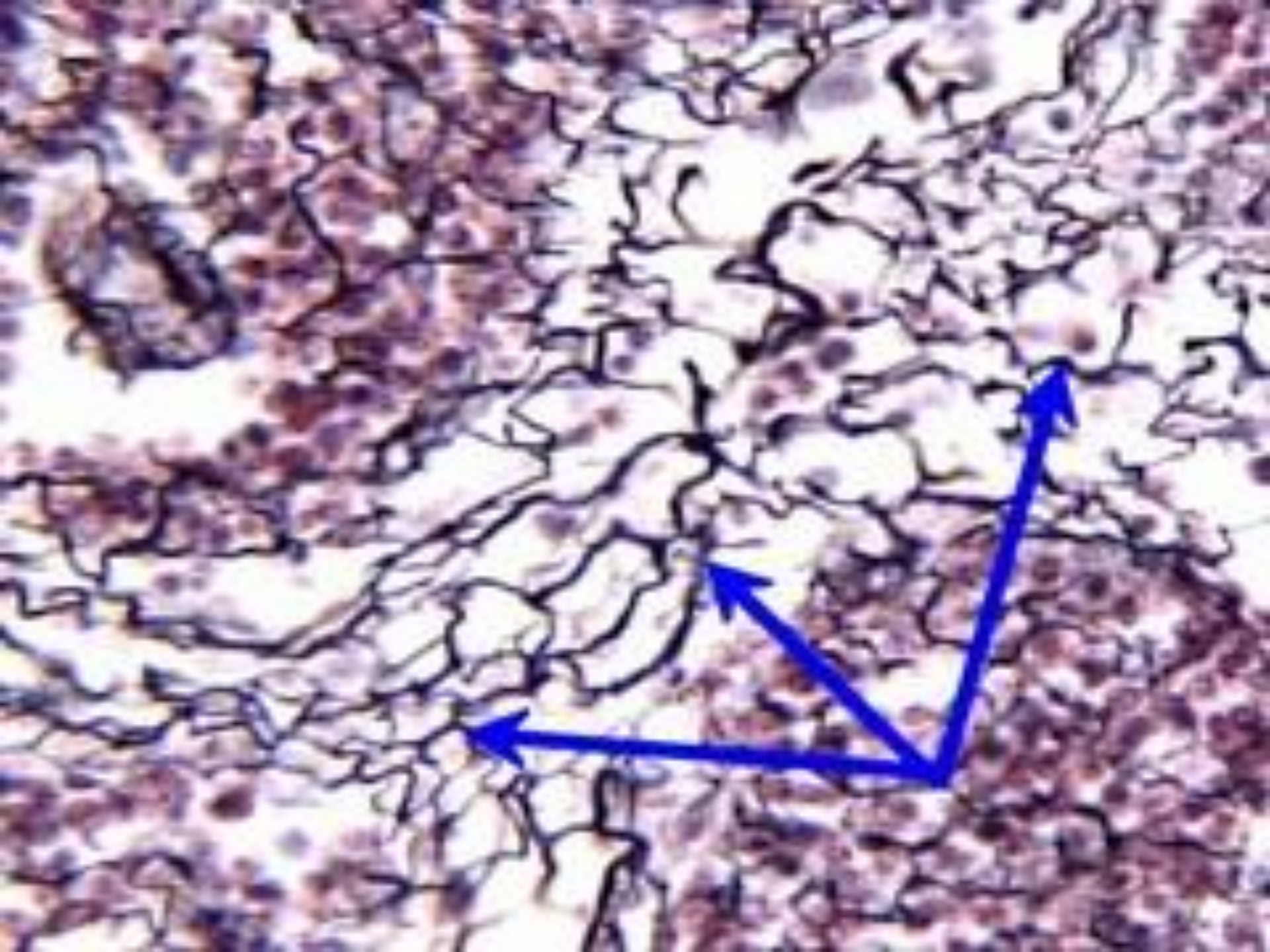
fibroblast nuclei

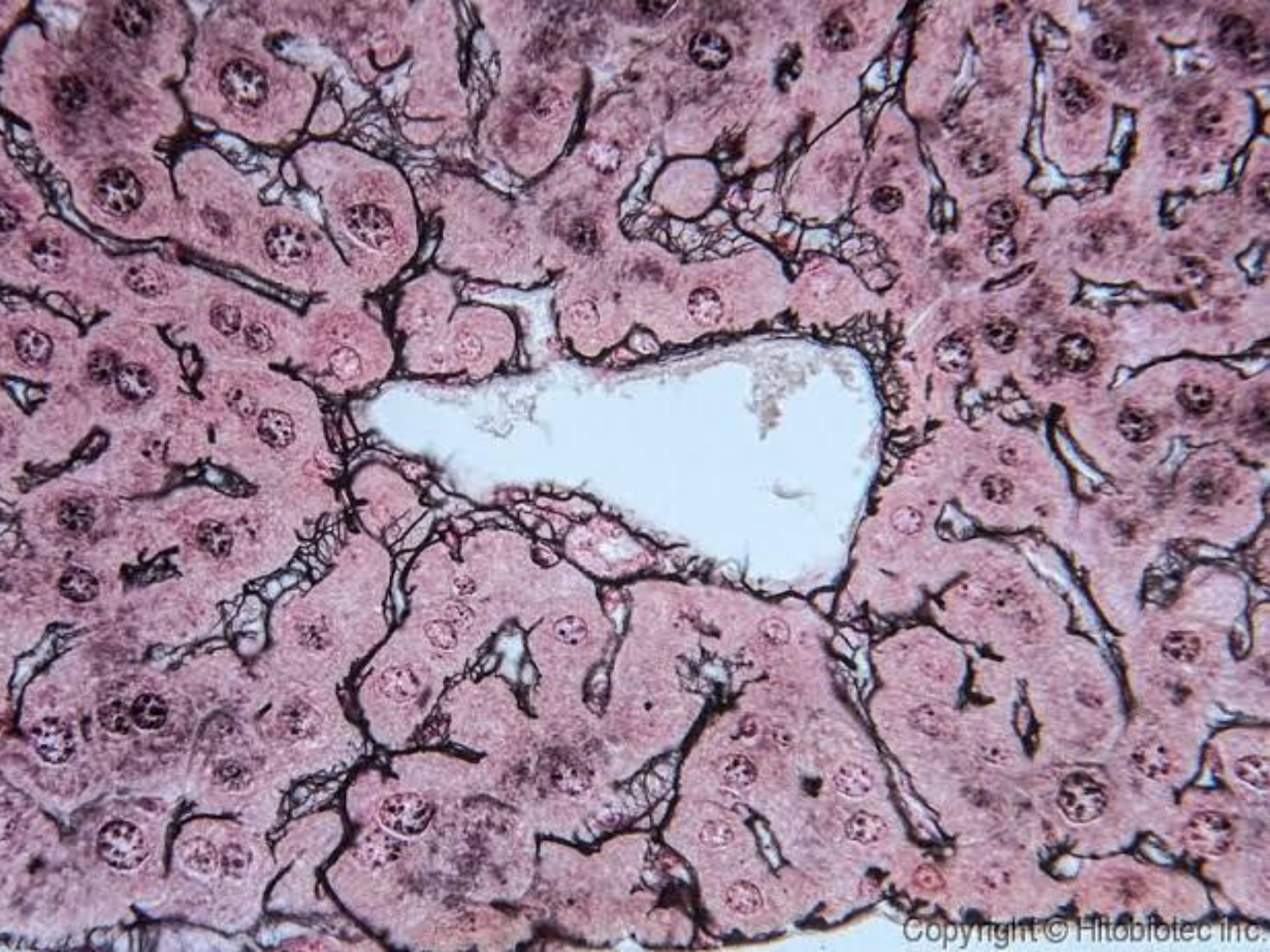


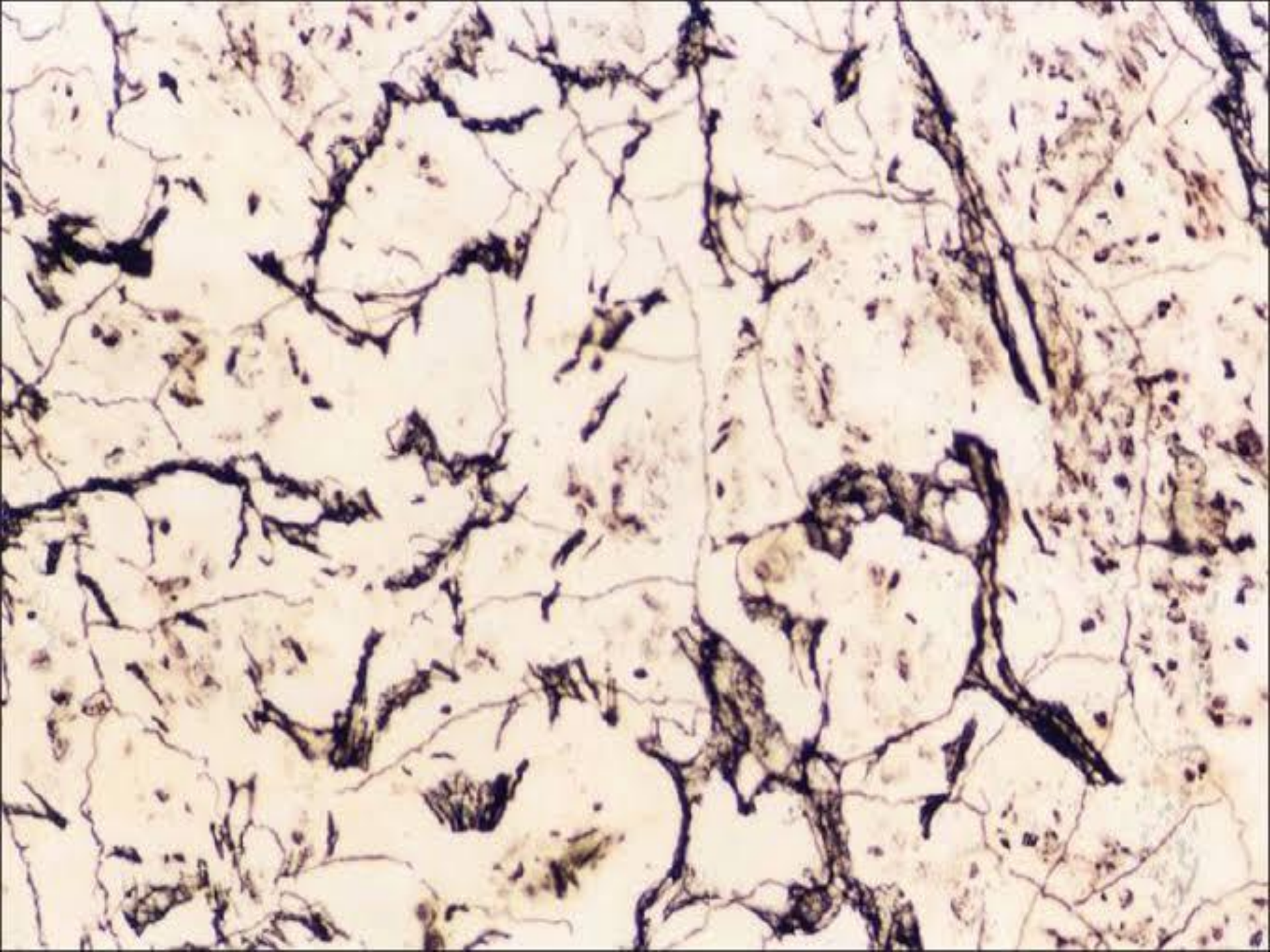
Demonstration of reticular fibers

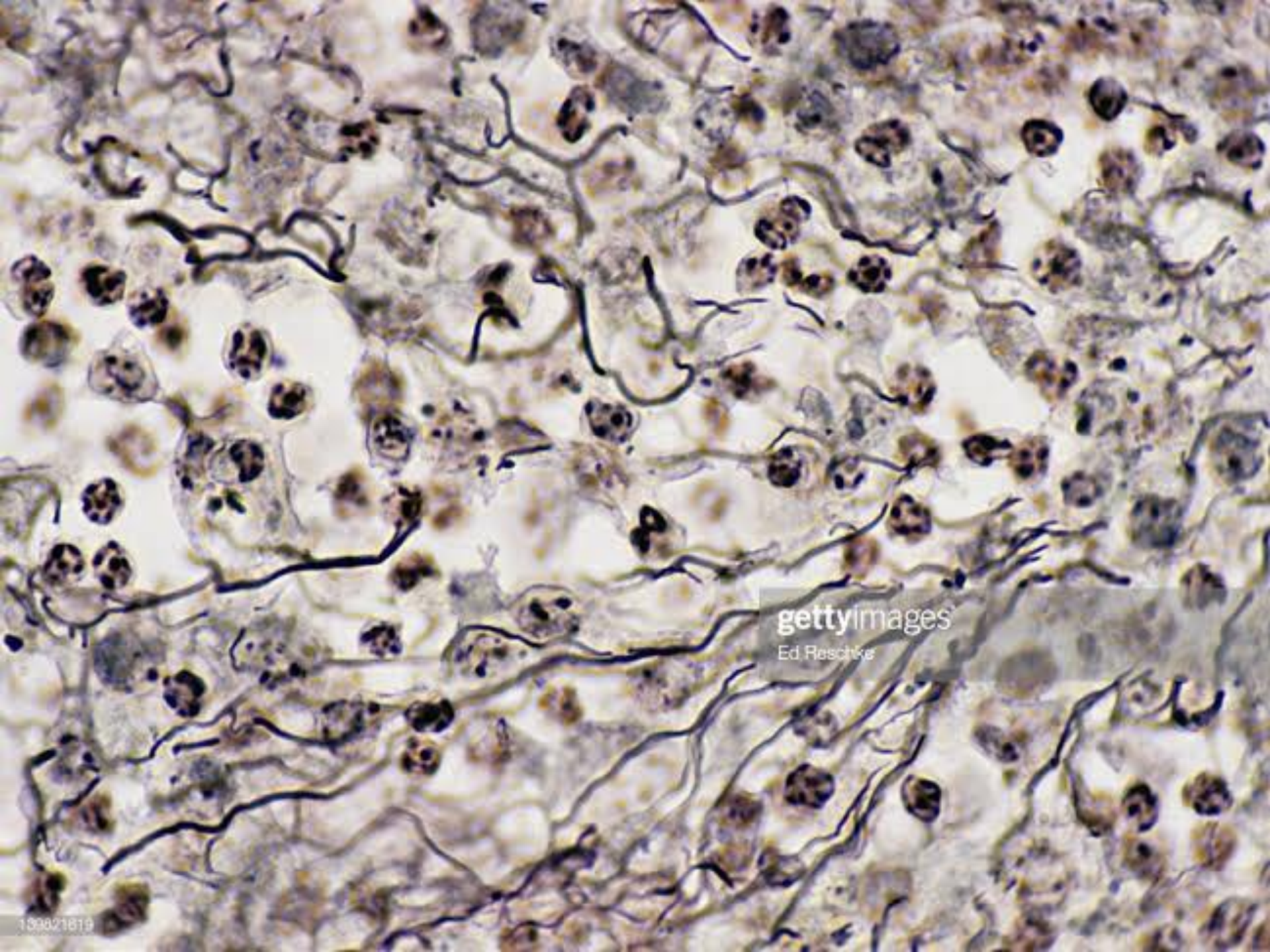
- Not visualized by **H&E**.
- commonly demonstrated by the use of stains involving **silver solutions**.
- Impregnation of silver ions to the fibers and subsequent reduction of those silver ions to their visible metallic form (**argyrophilic**).












gettyimages

Ed Reschke

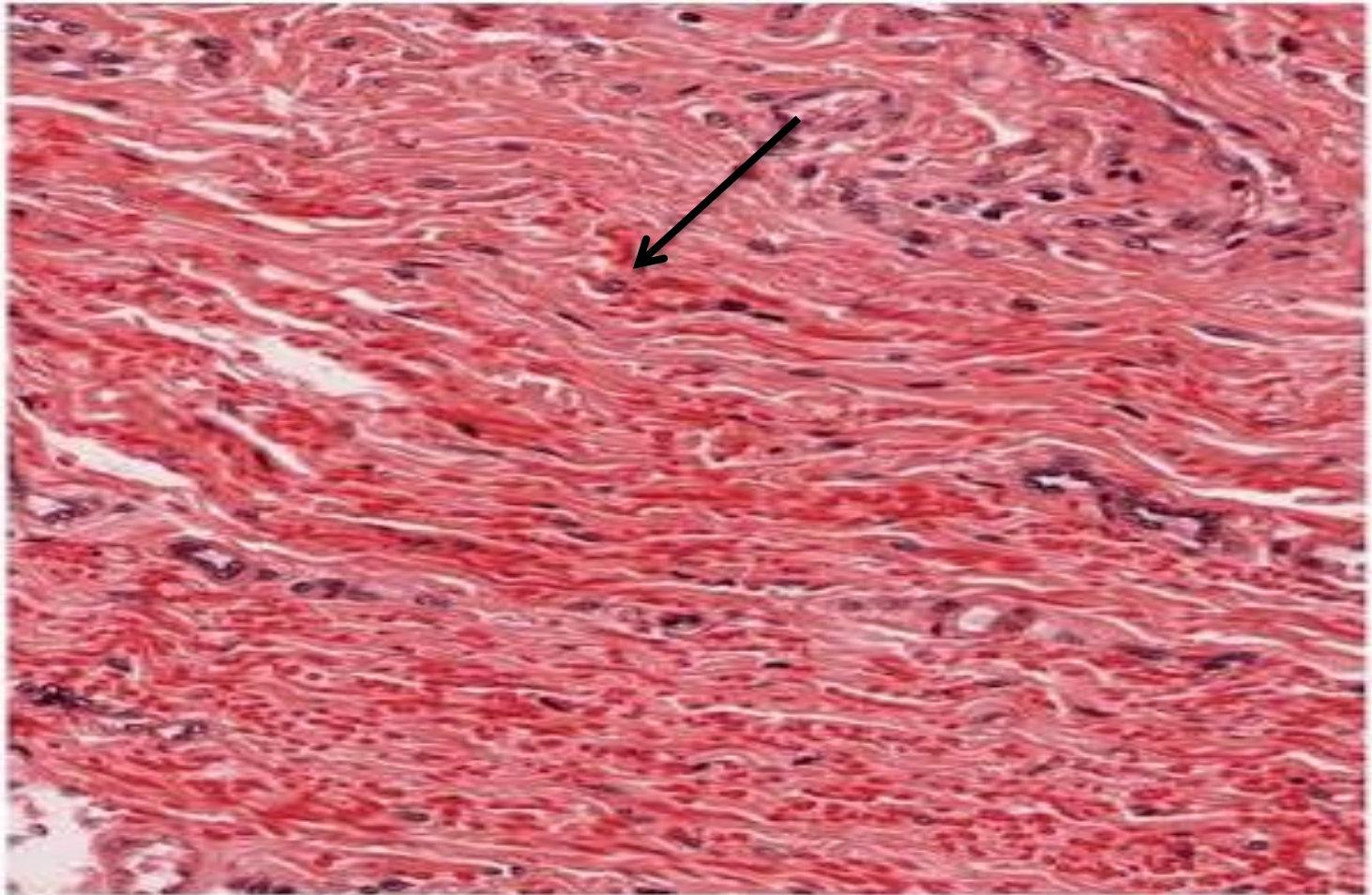
Demonstration of Elastic fibers

- **H & E**
- **The Verhoeff-Van Gieson (VVG) stain.**
- **Orcein technique.**
- **Aldehyde fuchsin method.**



1- Hematoxylin & Eosin

1- Hematoxylin & Eosin

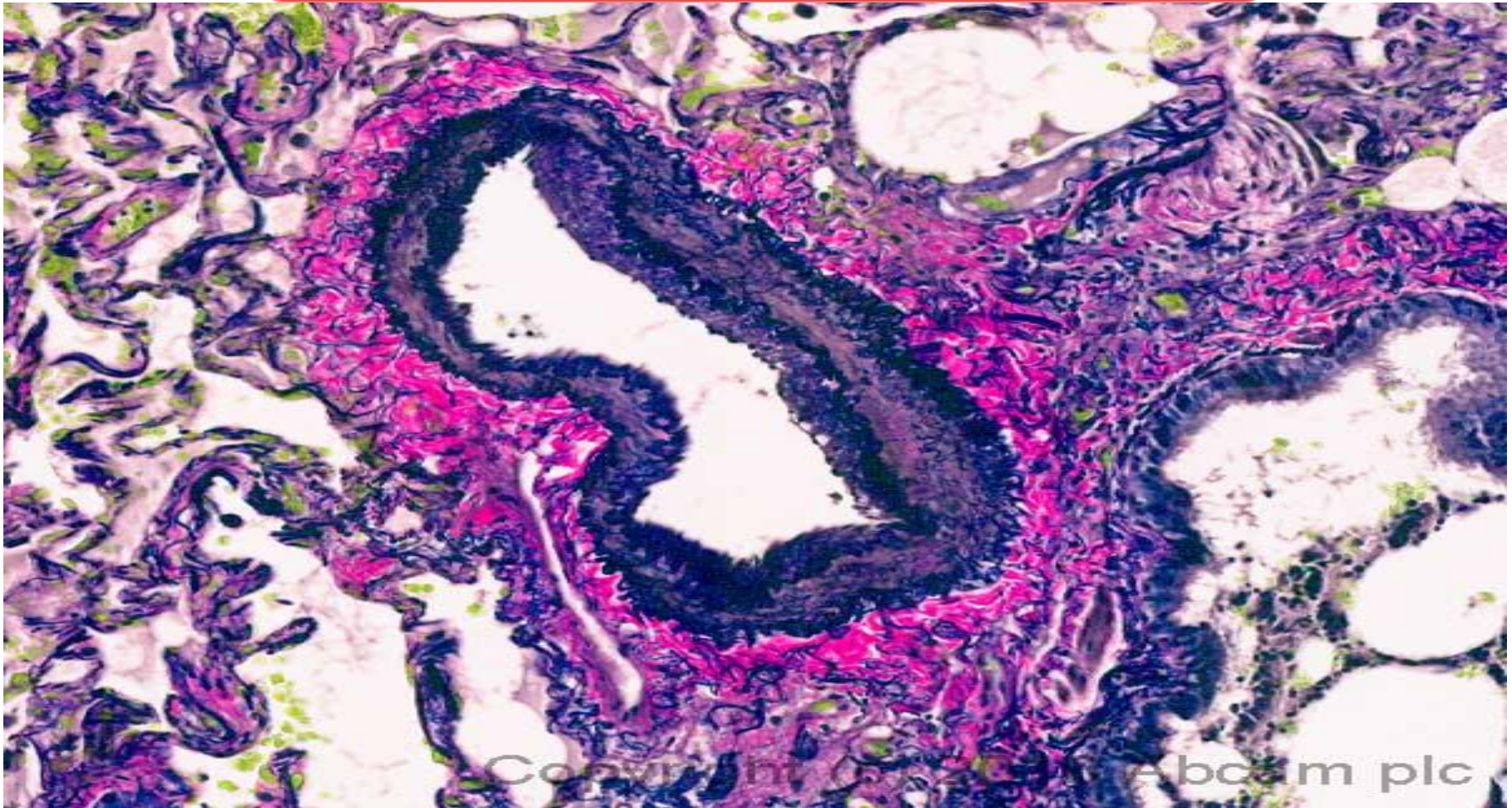


H&E stain: collagen stains *orange/pink*; elastic fibers stain *glassy red*
(generally only visible if in HIGH abundance)



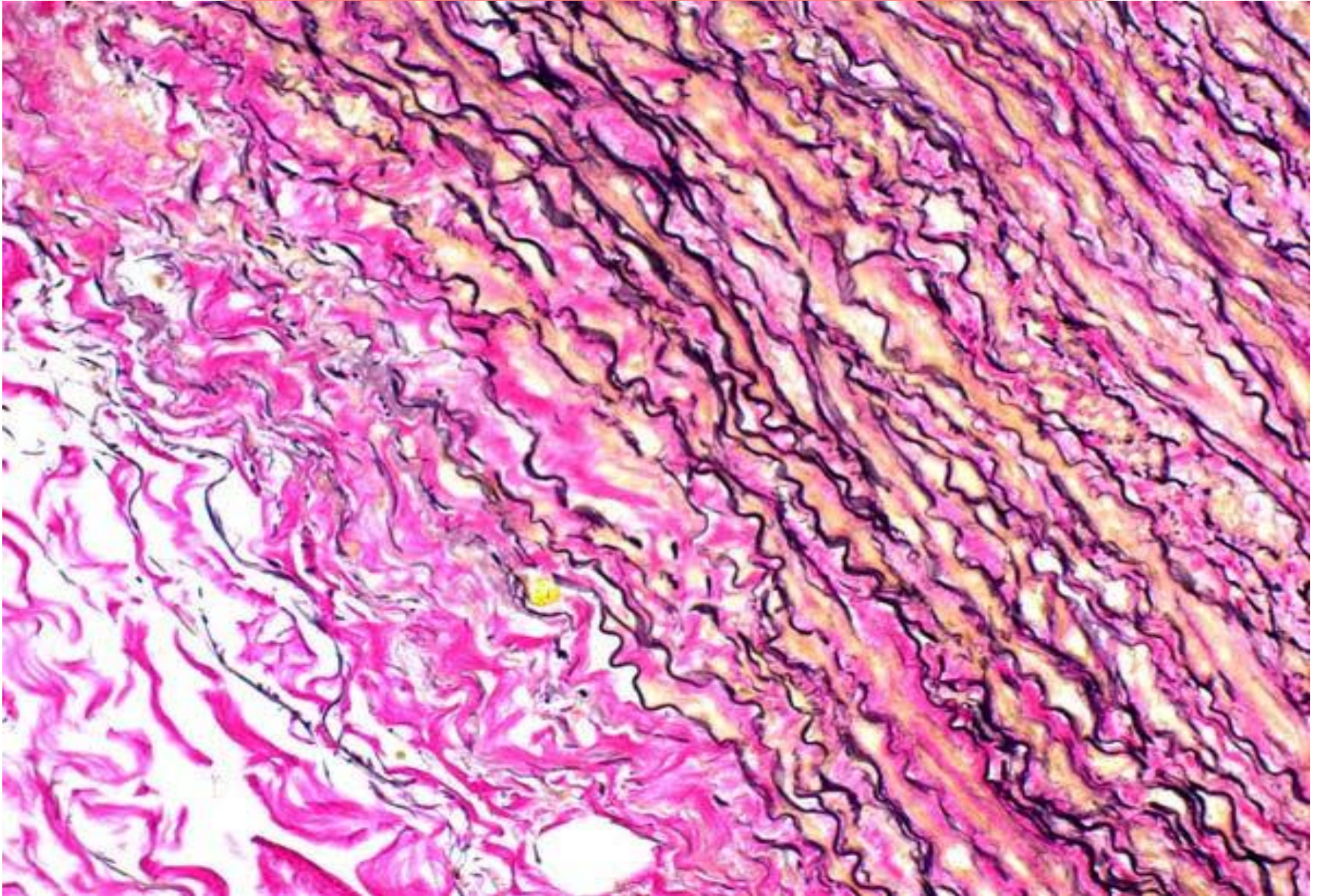
**2-The Verhoeff-Van
Gieson (VVG) stain**

1- Verhoeff-Van Gieson stain

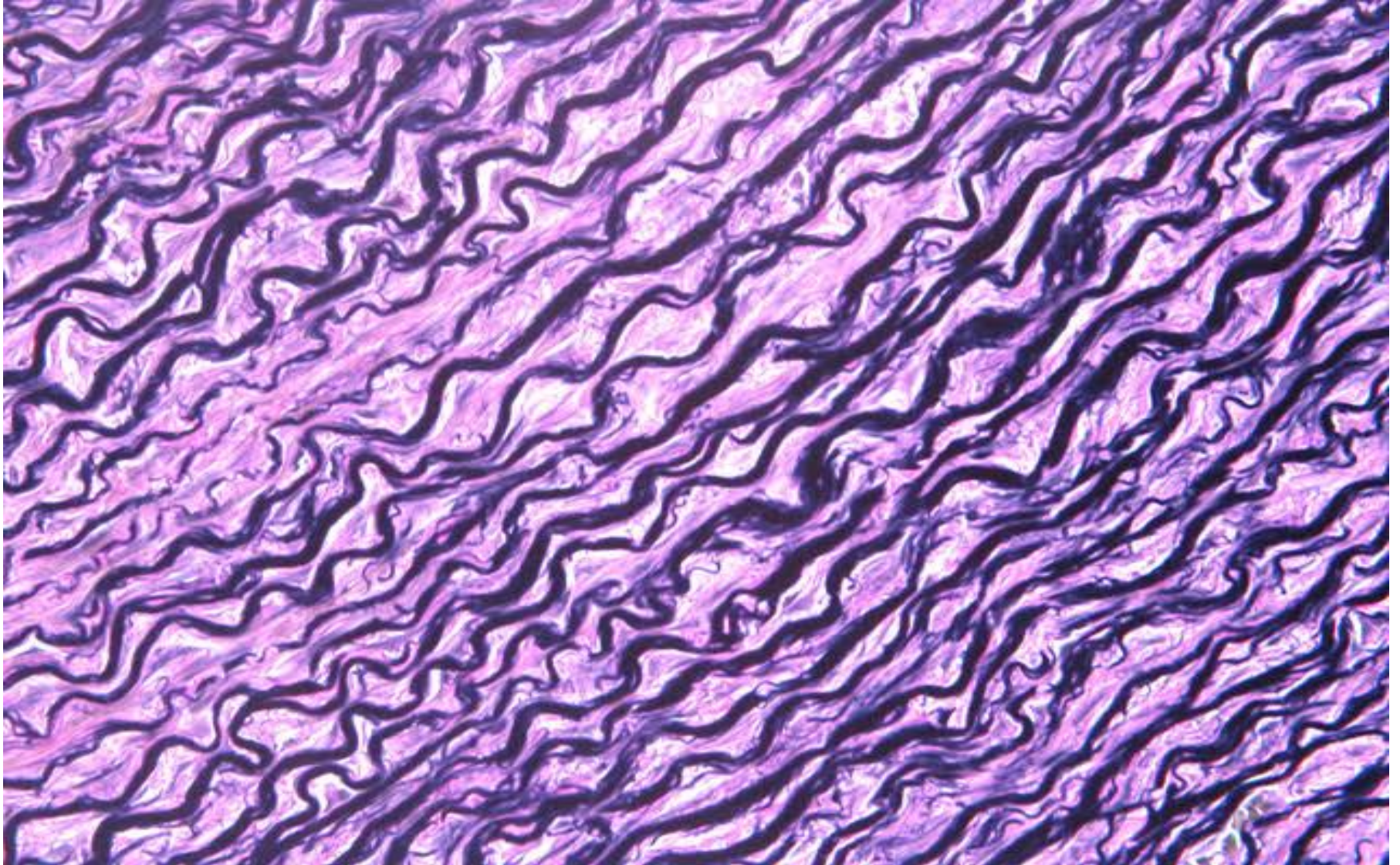


Elastic fibres (blue/black) , collagen (red/pink) Muscle and other tissues appear yellow. (Normal human lung).

1- Verhoeff-Van Gieson stain



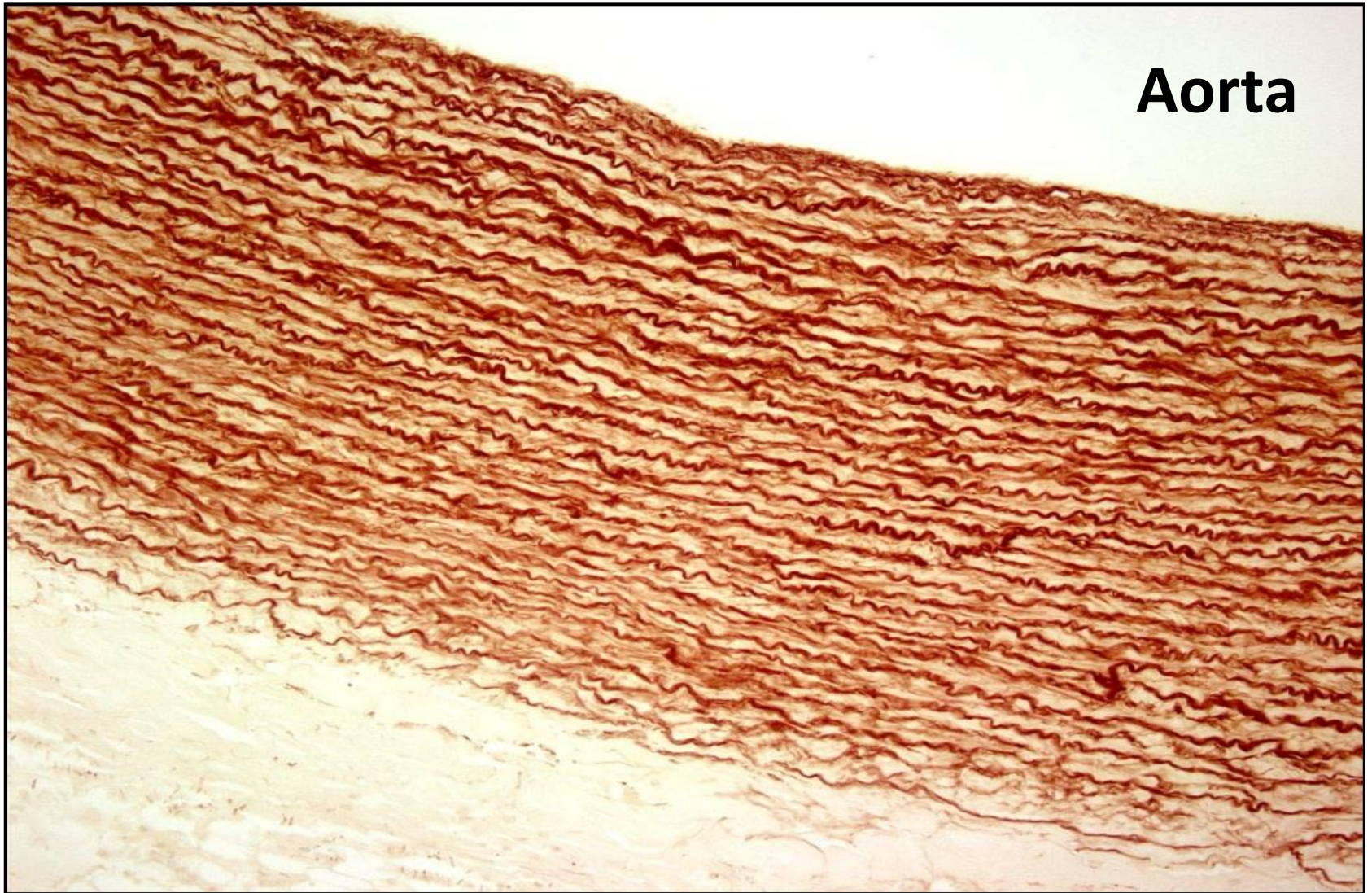
1- Verhoeff-Van Gieson stain



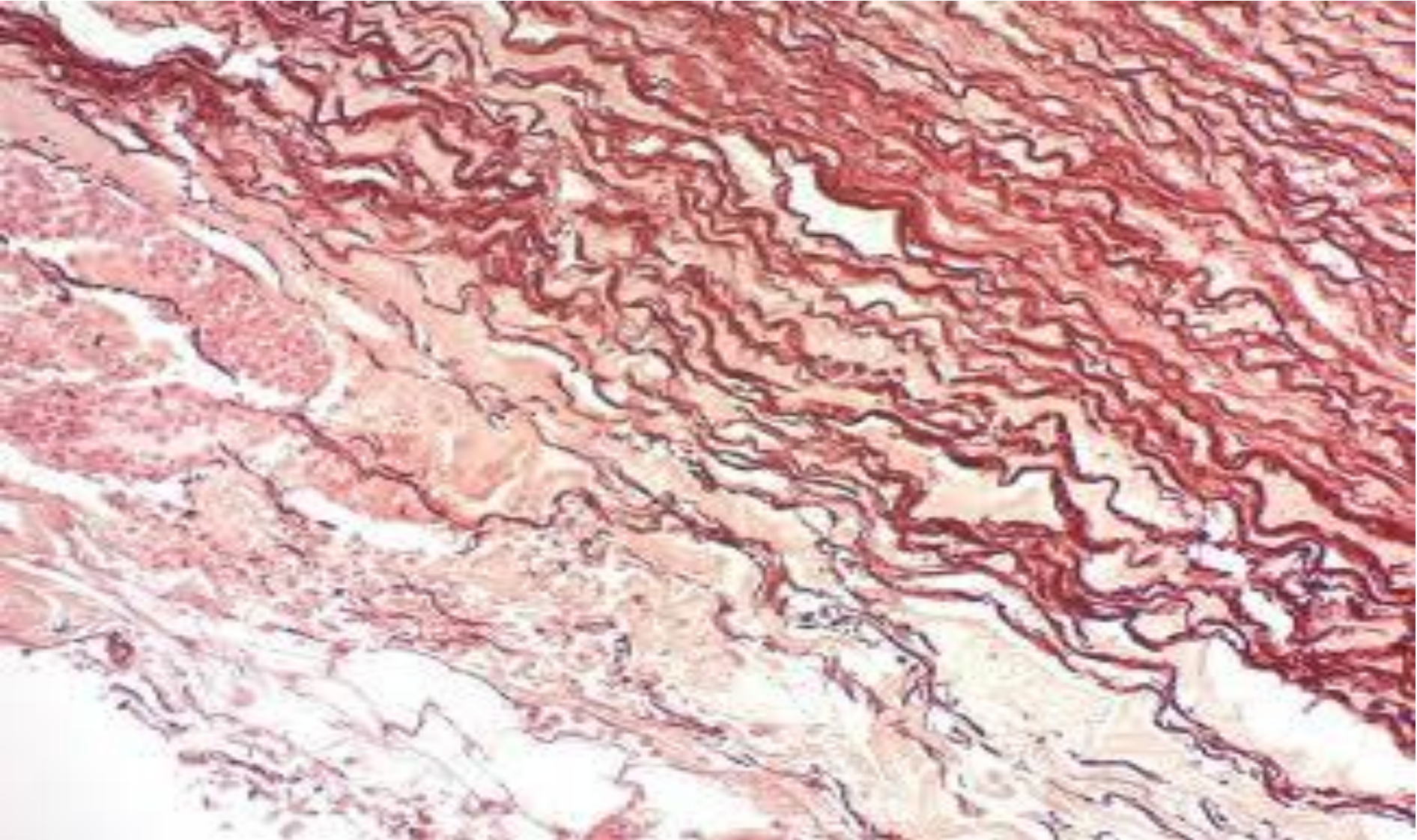
An illustration of a man in a dark suit, blue shirt, and black tie, standing to the left of a large whiteboard. He has his arms outstretched in a presenting gesture. The whiteboard is on a black stand and has the text '3- Orcein technique' written on it in a bold, black, sans-serif font. The background is a solid orange color, and there are yellow rectangular shapes at the bottom of the frame.


3- Orcein technique

3- Orcein technique



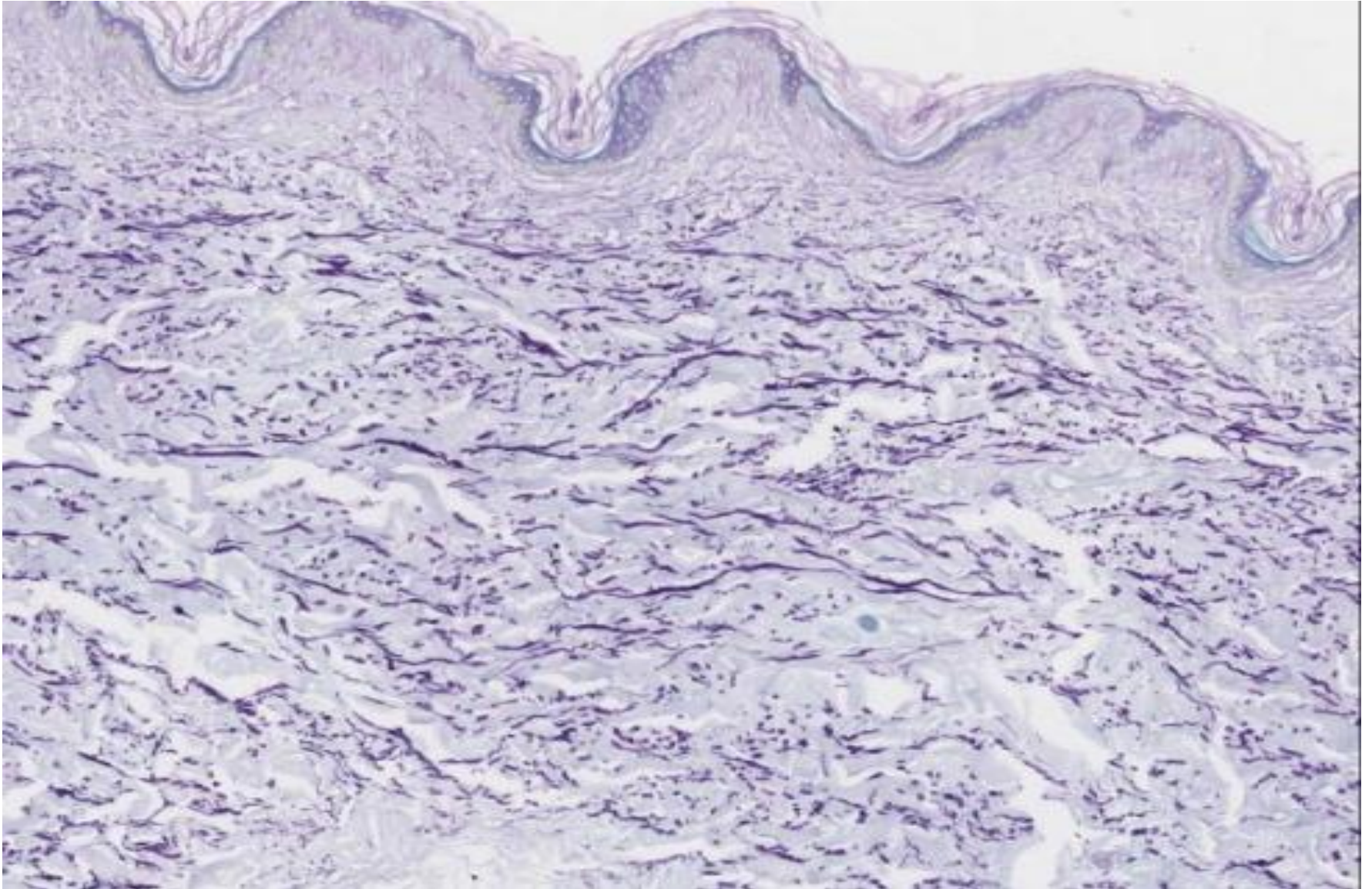
2- Orcein technique



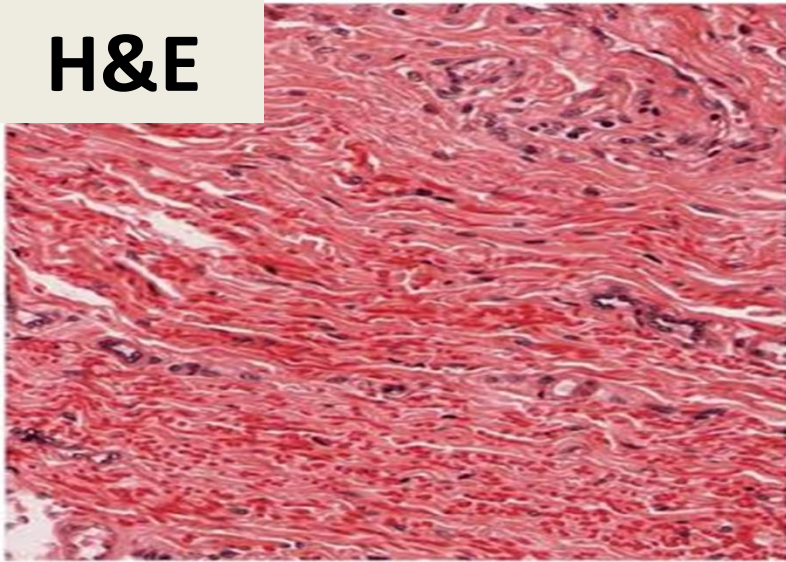
A man in a dark suit, blue shirt, and black tie stands to the left of a large whiteboard. He has his arms outstretched towards the board. The whiteboard has a black border and contains text. The background is orange, and there are yellow rectangular shapes at the bottom.

**4- Aldehyde
fuchsin method**

4- Aldehyde fuchsin method

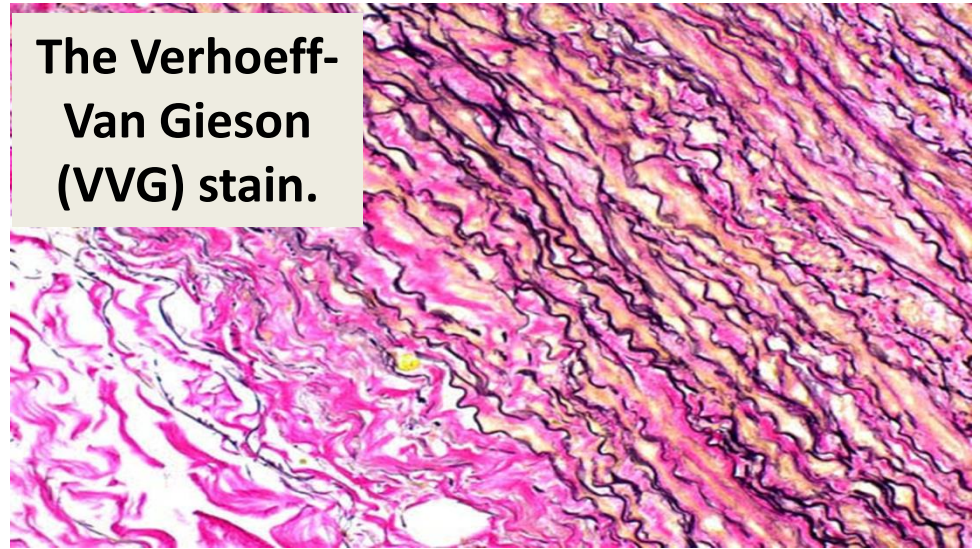


H&E

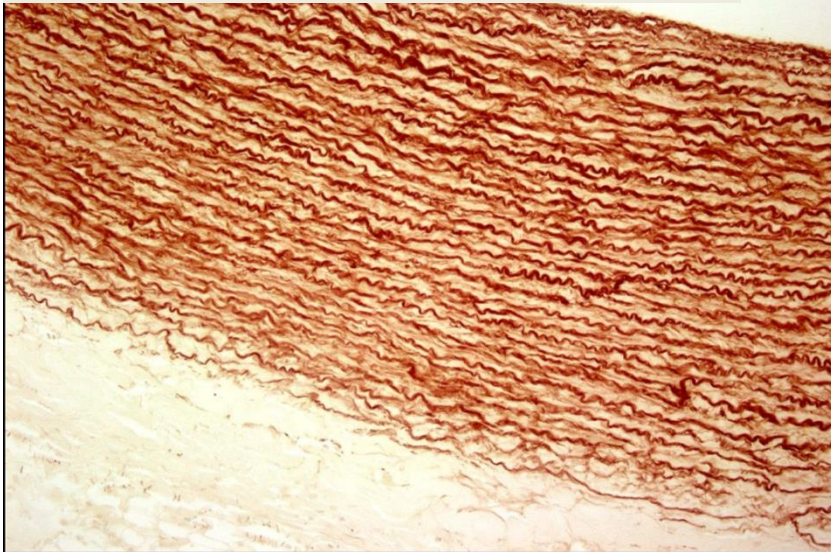


H&E stain: collagen stains *orange/pink*; elastic fibers stain *glassy red* (generally only visible if in HIGH abundance)

The Verhoeff-Van Gieson (VVG) stain.



Orcein technique.



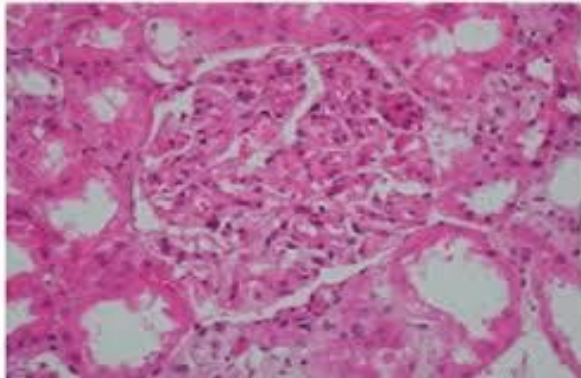
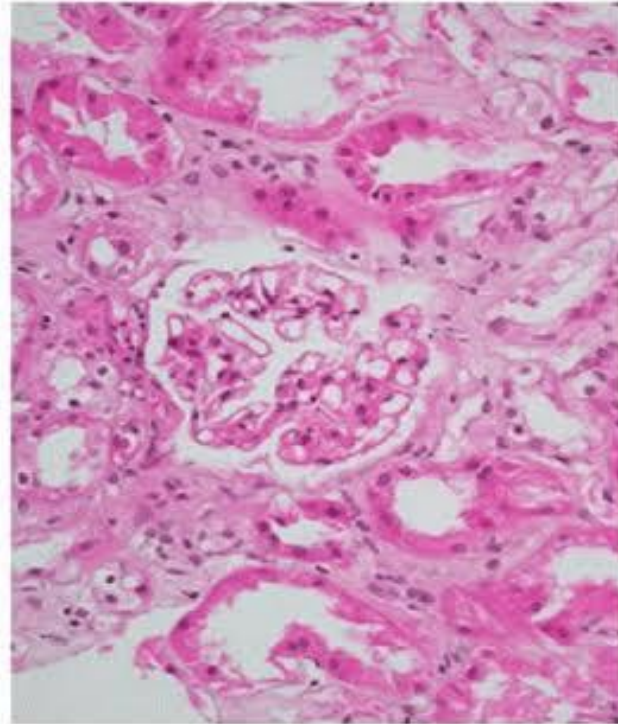
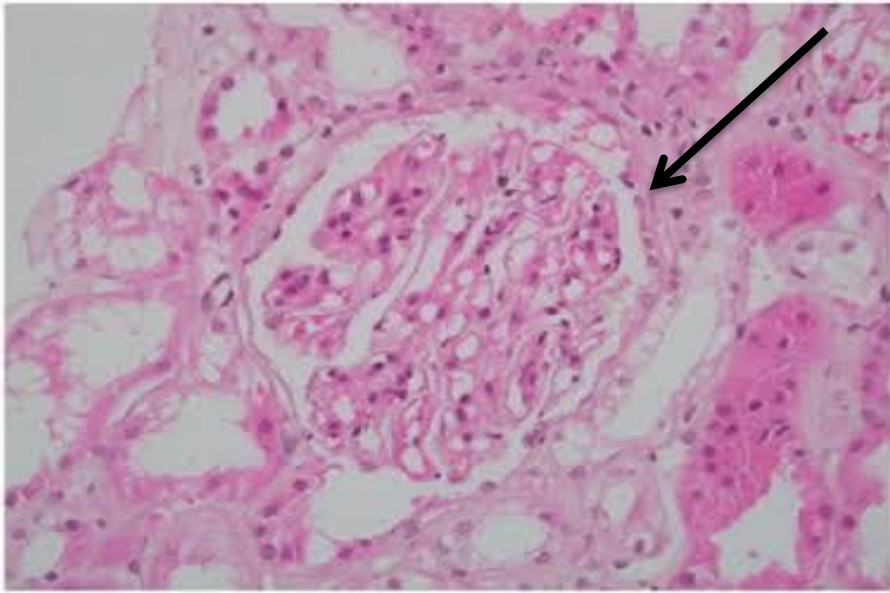
Aldehyde fuchsin method.



Demonstration of basement membrane

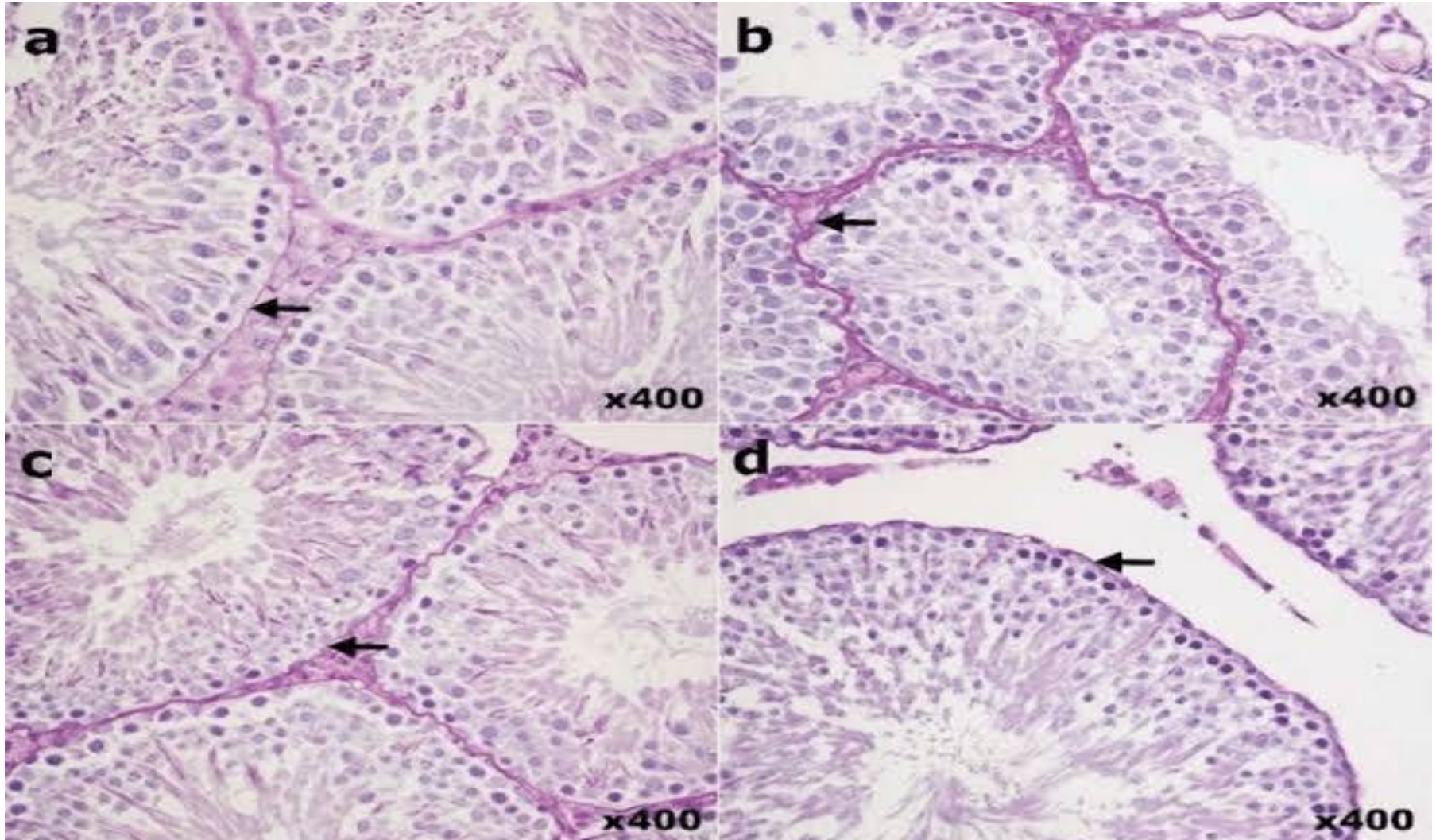
- **H & E**
- **Silver stain**
- **PAS technique**

1- Hematoxylin & Eosin

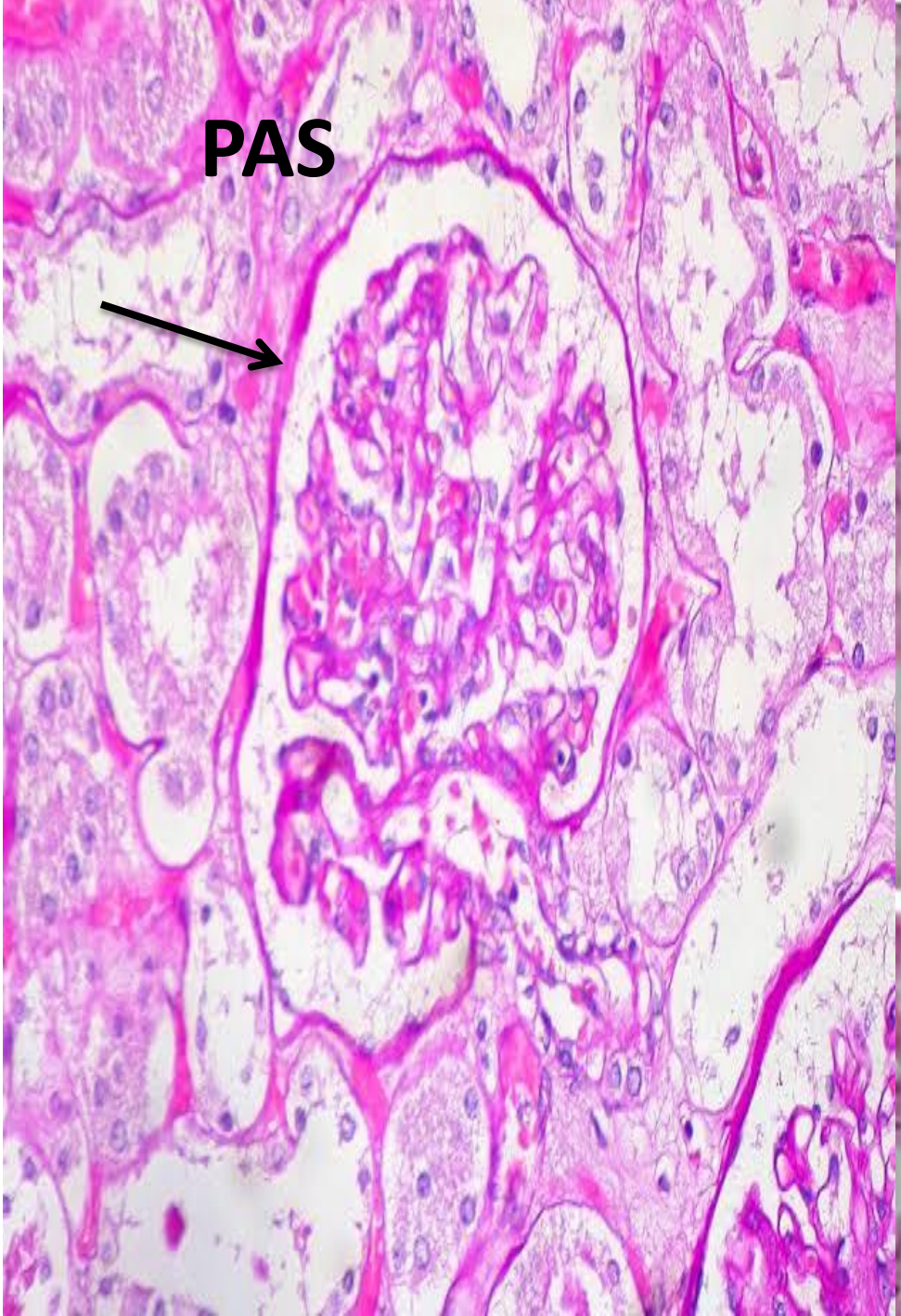


Demonstration of basement membrane

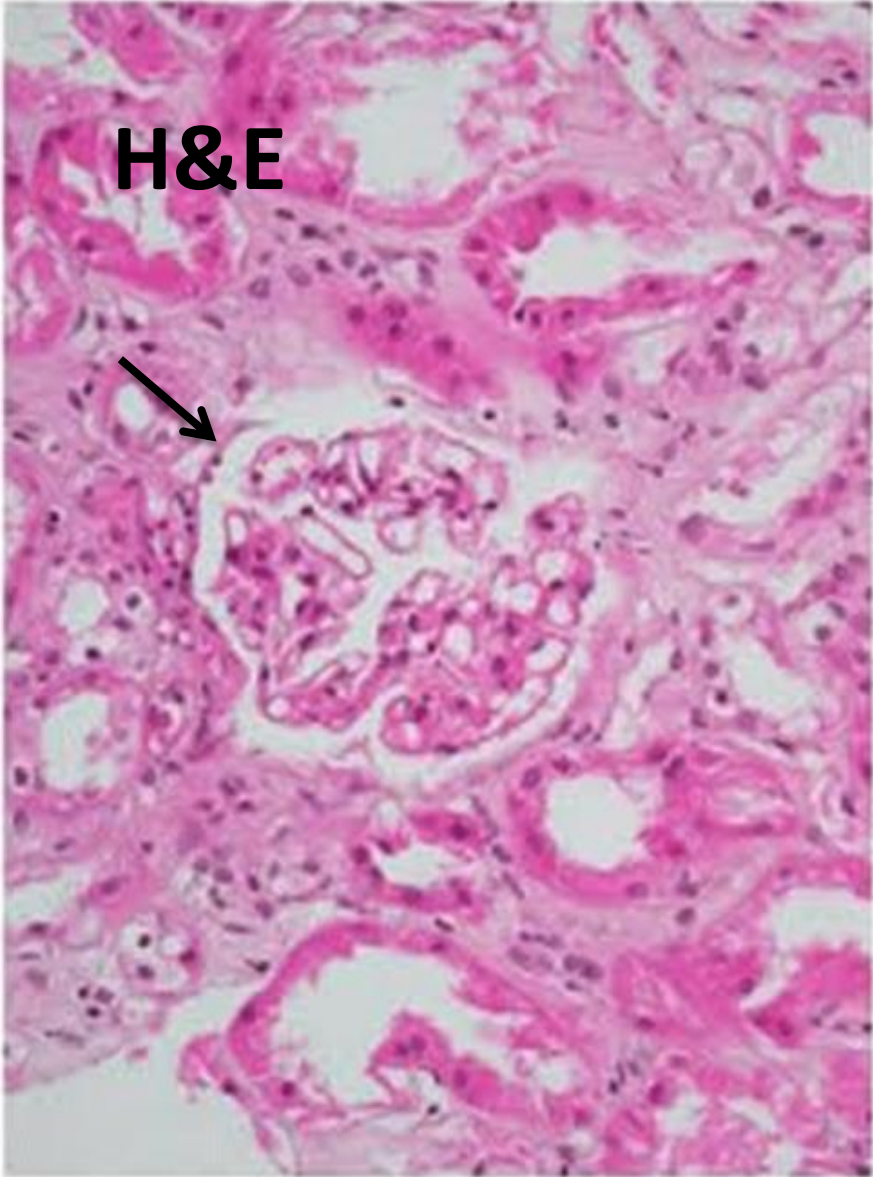
BM may also be demonstrated using the Periodic Acid-Schiff (PAS) technique.



PAS

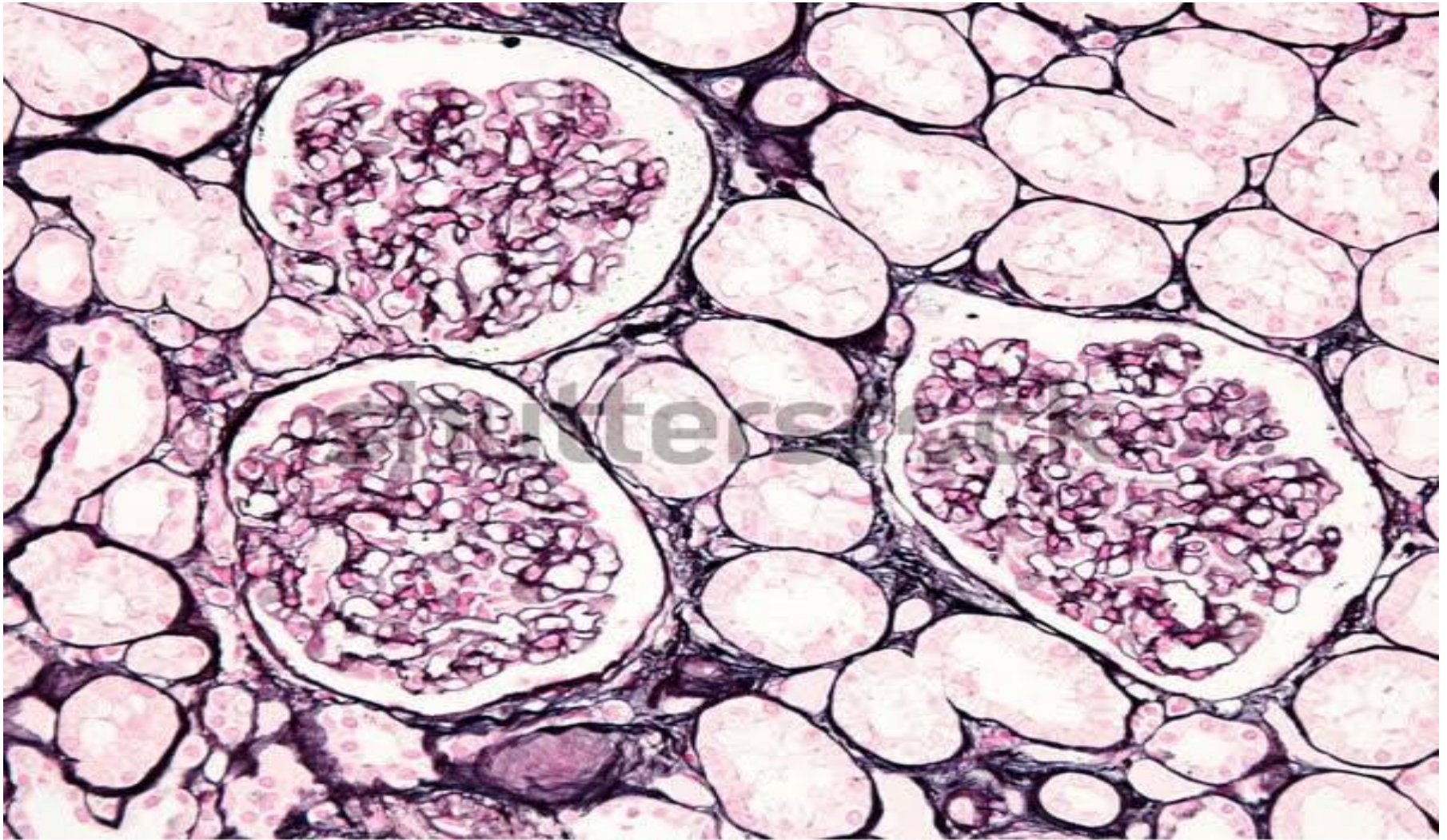


H&E



Demonstration of basement membrane

BM are commonly demonstrated with a silver stain



Thank
You!