Tikrit University
College of Veterinary Medicine

Special Stains

Subject name: Practical Pathology

Subject year: 2024-2025

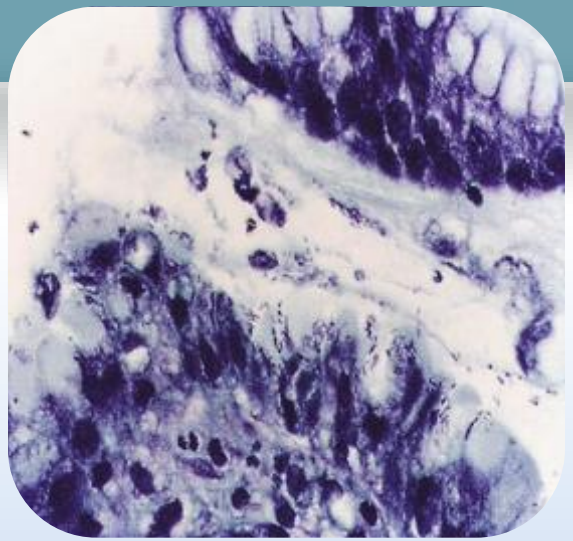
Lecturer name: Thamer J. Shihab

Academic Email:

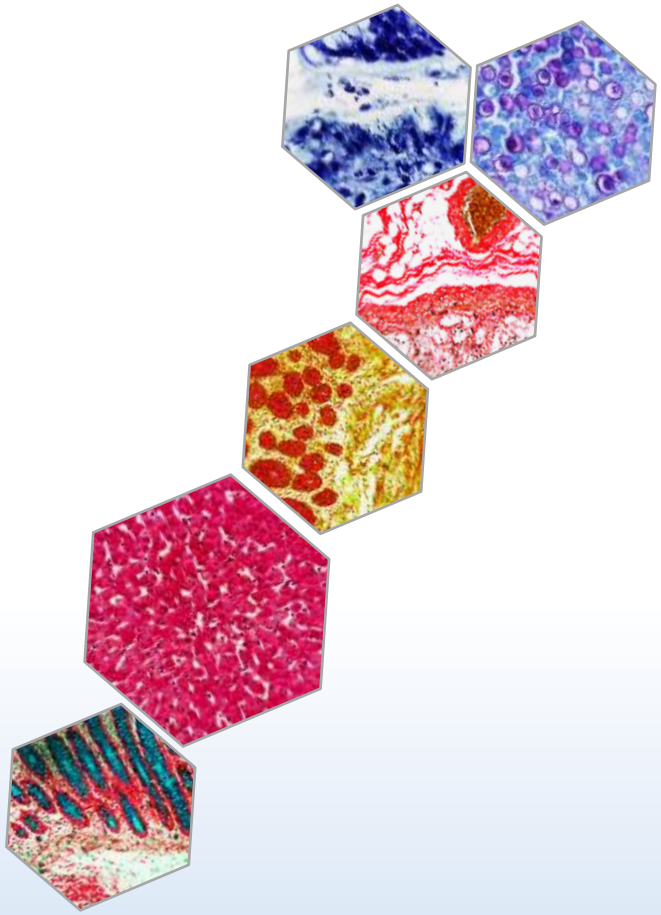
dr.thamer.vet@tu.edu.iq

SCAN ME
Lecturers link

Special Stains

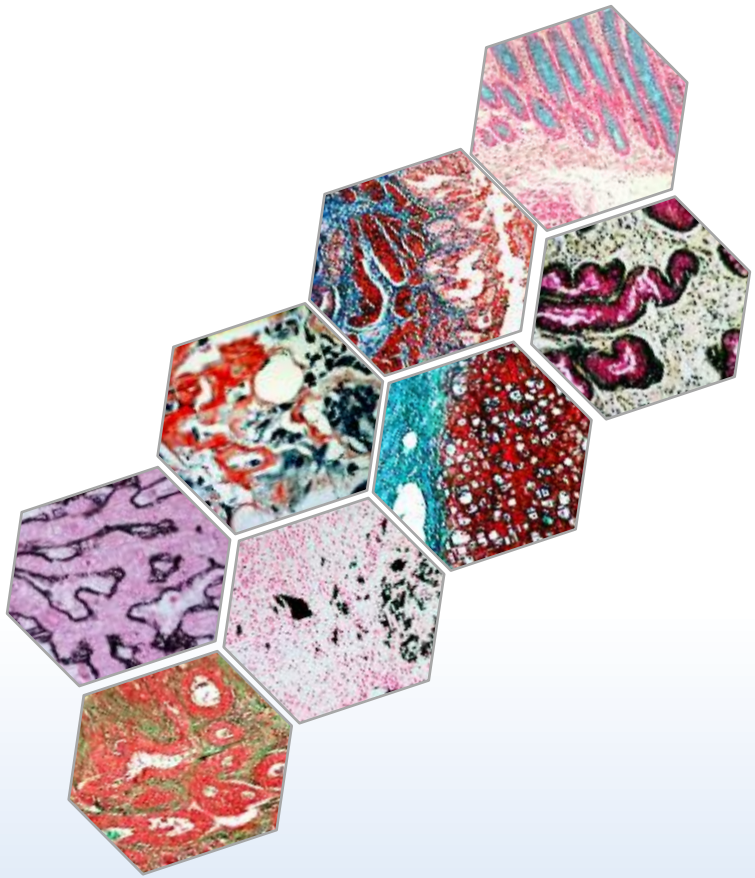


Special Stains



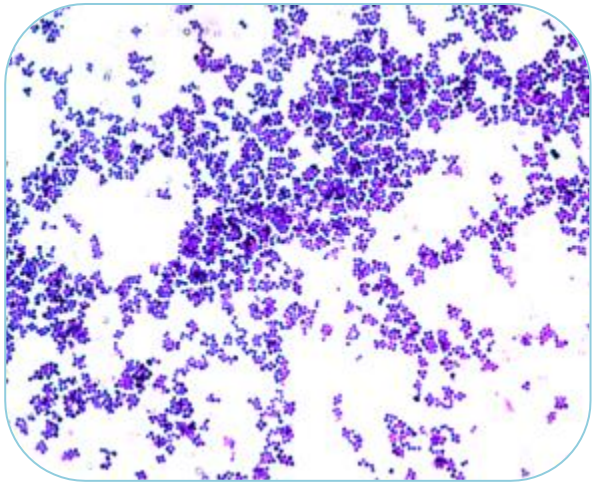
- Used in addition to H & E staining to selectively stain cells and cellular components
- Used when needed
- **Gives information on:**
    - Presence of certain class of molecules
    - Their localization
    - Number of molecules present

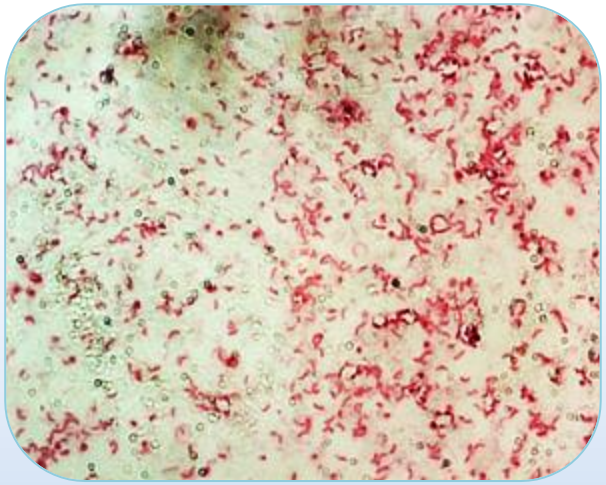
Classification



- **Can be grouped into:**
  - Stains for detection of microorganisms
  - Connective tissues and lipids
  - Carbohydrates
  - Amyloid
  - Minerals, pigments and miscellaneous

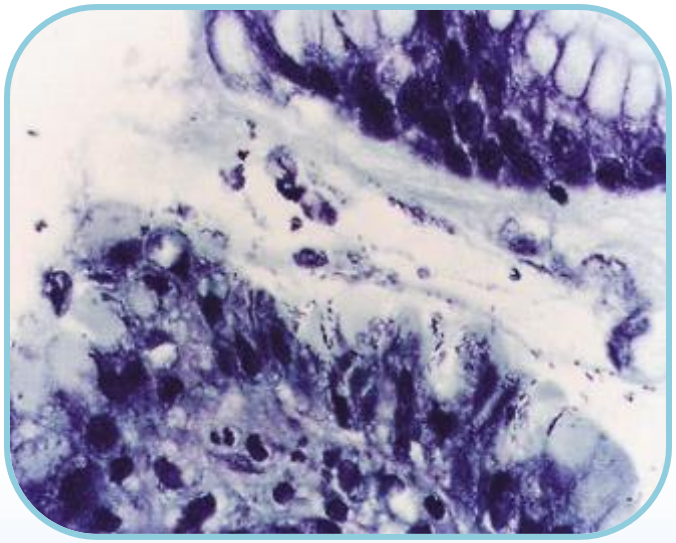
Stains for the detection of Microorganisms





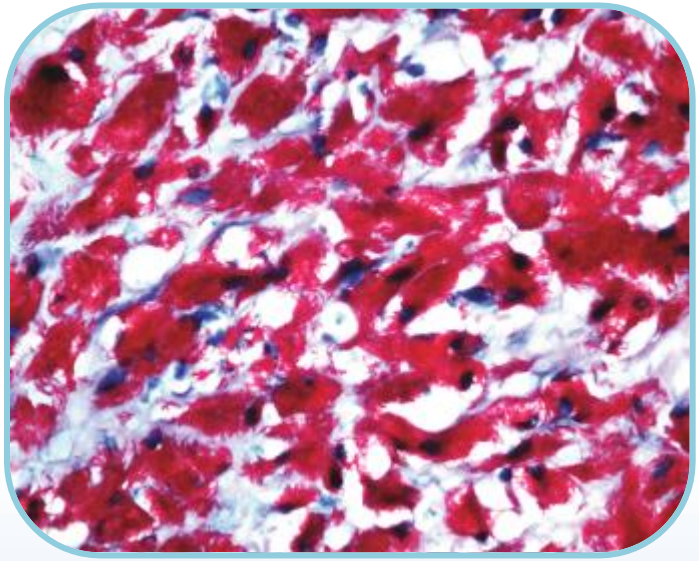
- **Gram Staining :**
  - Used to stain both bacilli and cocci
  - Basic classification of bacteria are based on this staining
    - Bacteria with large deposits of peptidoglycan in their cell walls retain methyl violet and are termed Gram positive
    - Bacteria with large deposits of lipids and lipopolysacharrides are termed Gram negative

Stains for the detection of Microorganisms



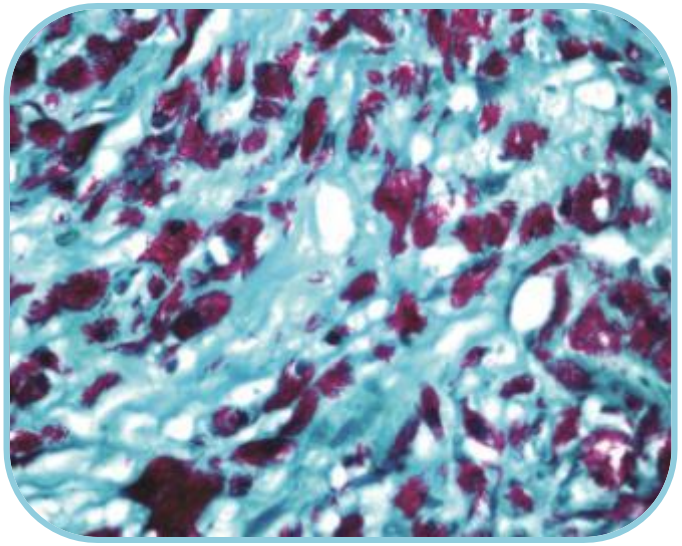
- **Giemsa Stain :**
  - Used to stain bacteria and protozoa, H. pylori, rickettsia and chlamydiae
- **Type of staining:**
  - Bacteria stains blue
  - cytoplasm stains from pink to rose and nuclei blue
  - Eisonophils are also easily detected

Stains for the detection of Microorganisms



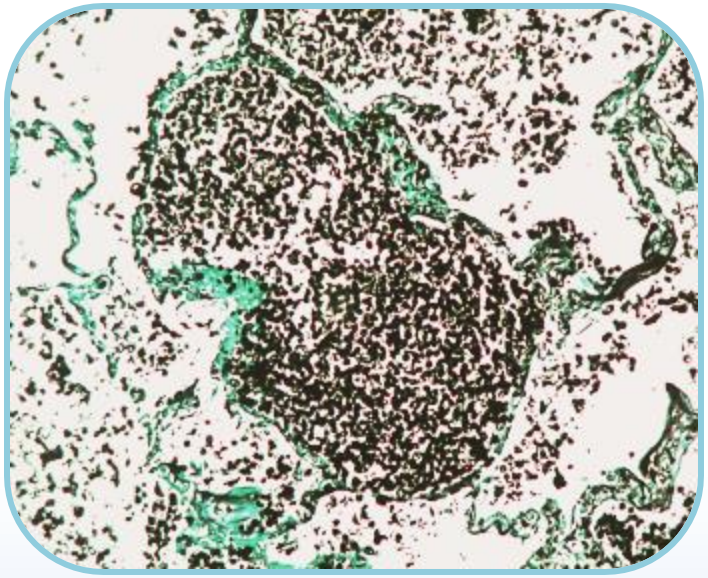
- **Acid Fast Blue**
  - Acid fast refers to cell walls containing high lipid content (mycolic acid and long chain fatty acids)
  - These bind to Carbol-fuchsin dye after decolorization
  - Used to stain Mycobacteria, oocysts of Cryptosporidium parvum, Cyclospora, Isospora; also hooklets of cysticerci
  - Acid fast cells stain Red and non acid fast cells stain Blue

Stains for the detection of Microorganisms



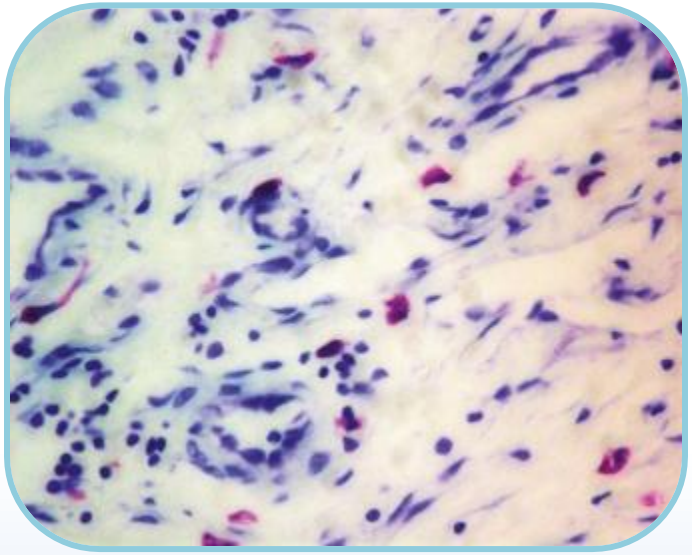
- **Acid Fast Green**
  - Used for the detection of Mycobacterium spp
  - Stains Acid fast bacteria red while the background Stains green

Stains for the detection of Microorganisms



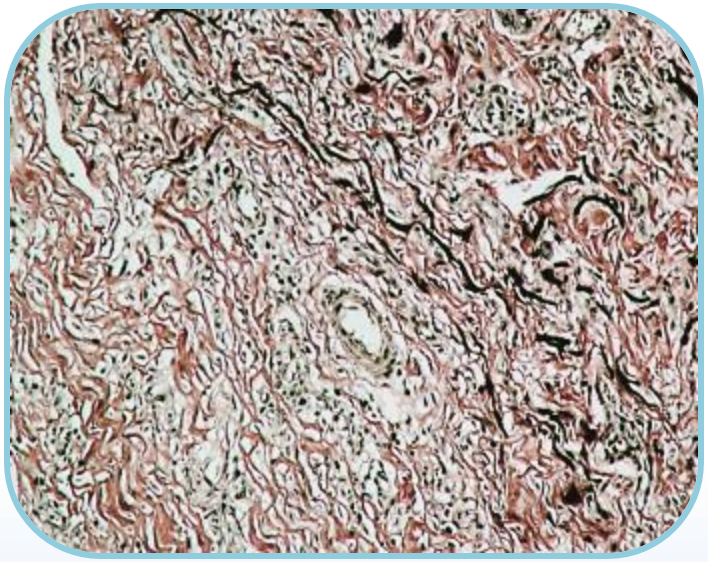
- **GMS Staining**
  - Used for the detection of fungi in tissue sections
  - Argentaffin reaction forms the basis for the identification of fungi
  - Stains fungi, Pneumocystis carnii, histoplasma spp Black, inner parts of mycelia and hyphae old rose, leishmania spp, toxoplasma spp negative, mucin dark grey, background pale green

Stains for the detection of Connective Tissue



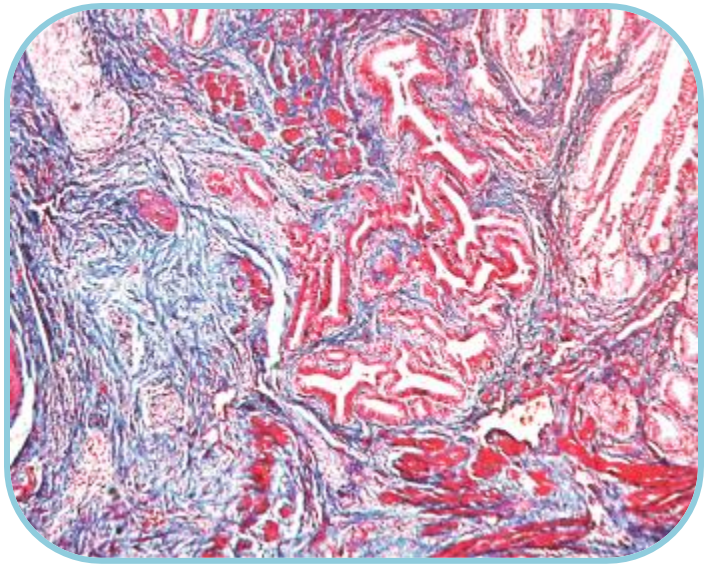
- **Toluidine Blue**
  - Used to stain mast cells
  - These cells are widely distributed in connective tissue
  - Mast cells stain Red-purple (Metachromatic staining) and the background stain blue (orthochromatic staining)

Stains for the detection of Connective Tissue



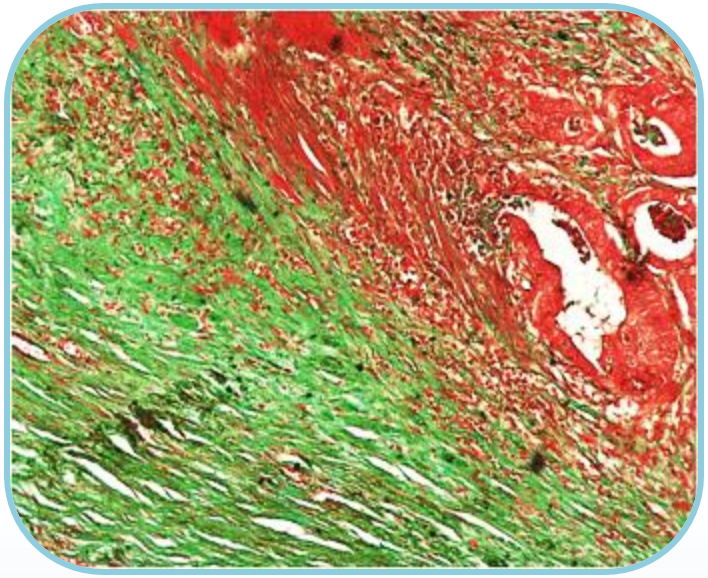
- **Elastic Stain**
  - Used to stain elastic fibers
  - Based on the affinity of elastin for hematoxylin complex
  - Retains dye longer than other tissues elements
  - Elastin stains dark brown/ black where as nucleus stains black

Stains for the detection of Connective Tissue



- **Gomoris Trichrome Blue**
  - Used to distinguish collagen from muscle tissue
  - Stains nucleus collagen blue, muscle, keratin and cytoplasm red and nuclei grey/blue/black

Stains for the detection of Connective Tissue

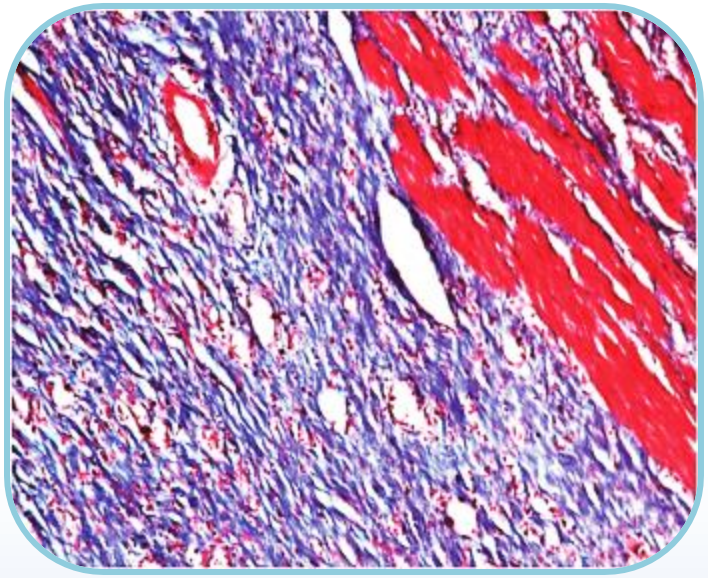


- **Gomoris Trichrome Green**
  - Useful in the study of diseases of connective tissue and muscle characterized by fibrotic and dystrophic changes and to differentiate between collagen and smooth muscle in tumors
  - Stains Nuclei(Blue), Collagen(Green), Muscle Fiber(Green)

Stains for the detection of Connective Tissue

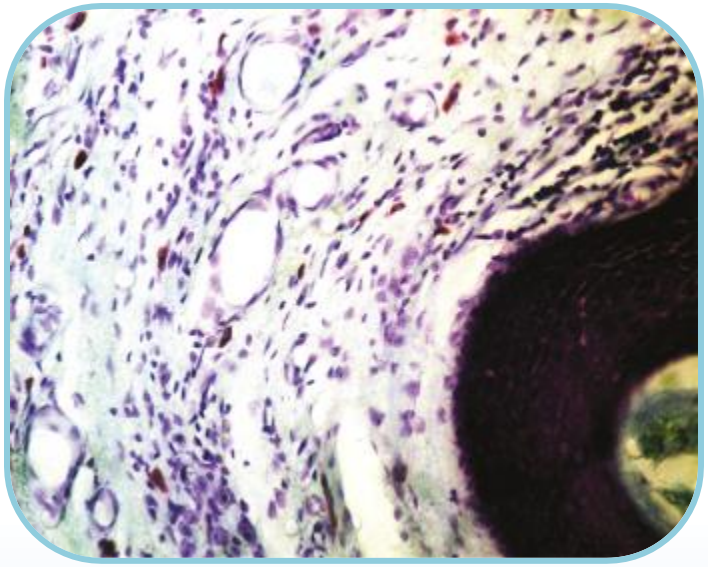
- **Reticulin no counter stain**
  - Used for the identification of Reticular fibers
  - Used for the diagnosis of carcinomas, Sarcomas, lymphosarcomas
  - Reticulin stains black with out any counter stain

Stains for the detection of Connective Tissue



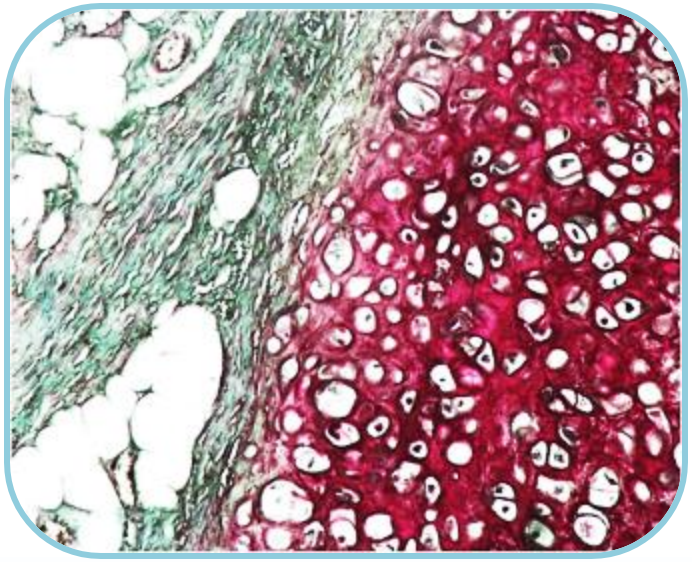
- **Massons Trichrome Stain**
  - Used to differentiate between collagen and smooth muscle in tumor
  - Increase of collagen in diseases such as Cirrhosis.
  - Stains Nuclei black, cytoplasm, muscle, erythrocytes red and collagen Blue

Stains for the detection of Connective Tissue



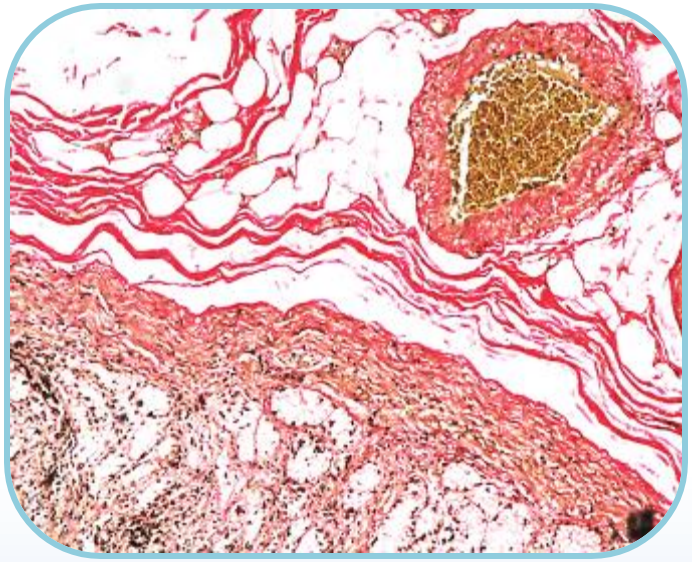
- **Azure A stain**
  - Used for the visualization of mast cells basophils and eisonophils
  - Stains Mast cell granules, sulphated and carboxylated mucins purple and Nuclei blue

Stains for the detection of Connective Tissue



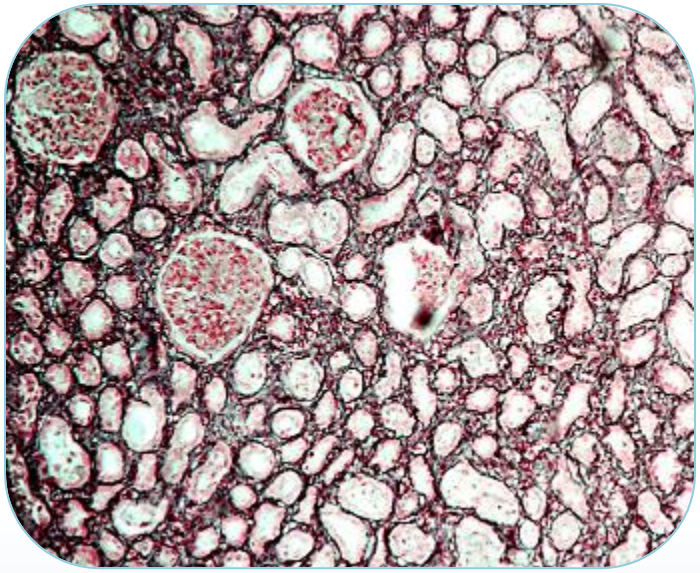
- **Safranin O staining**
  - Used for the detection of cartilage, mucin and mast cell granules
  - Stains Nuclei black, Cytoplasm bluish green, Cartilage, mucin, mast cell granules orange to red

Stains for the detection of Connective Tissue



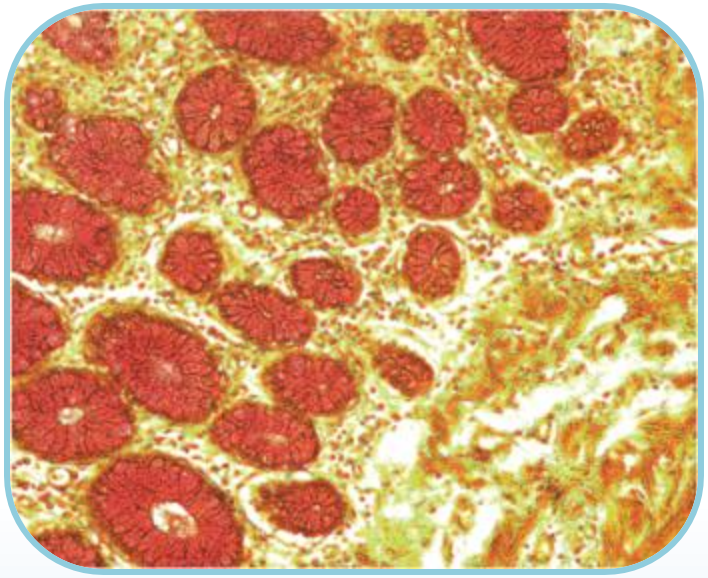
- **Van Gieson Stain:**
  - Used to differentiate collagen and smooth muscle
  - Can be used to demonstrate the presence of collagen in pathological conditions
  - Stains nuclei blue, Collagen bright red, Cytoplasm, muscle, fibrin and red blood cells yellow

Stains for the detection of Connective Tissue



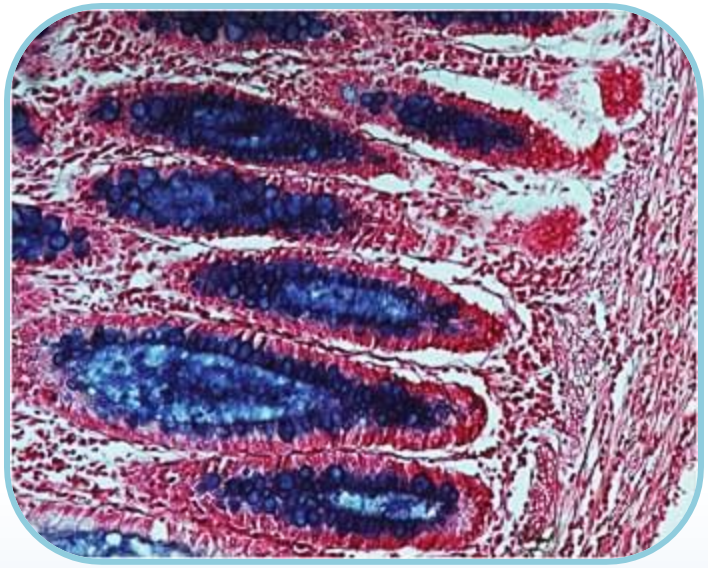
- **Reticulin Nuclear Fast Red:**
  - Used to identify reticulin fibers
  - Can be used for differential diagnosis of tumors such as carcinomas, sarcomas and lymphosarcomas
  - Stains reticulin black with a pink to rose background

Stains for the detection of Carbohydrates



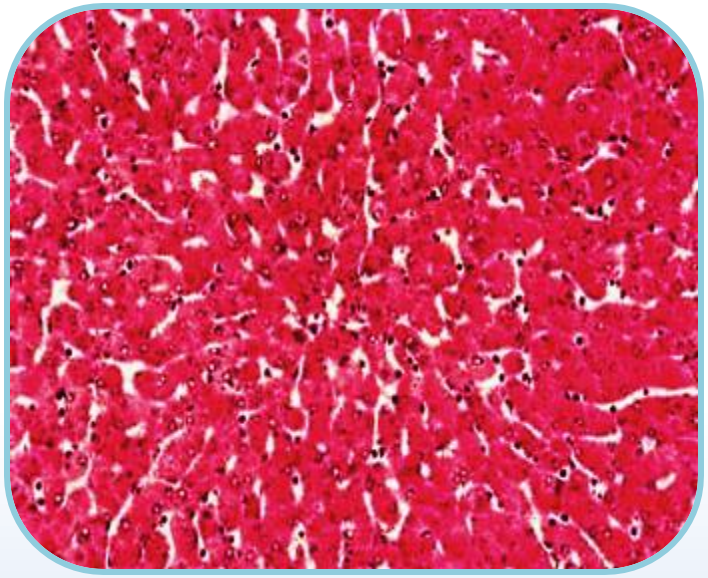
- **Mucicarmine Stain**
  - Used to detect epithelial mucin
  - Exhibits strong staining of epithelial mucins where as fibroblastic mucin show a poor staining
  - Stains mucin in shades of red

Stains for the detection of Carbohydrates



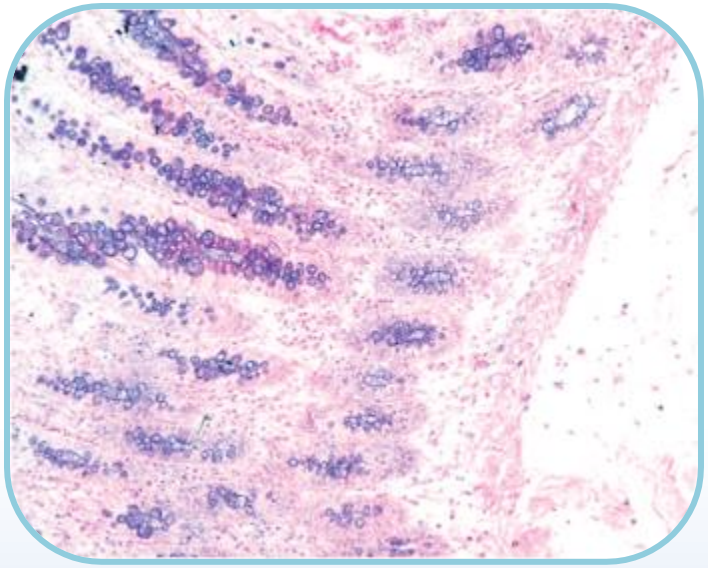
- **Alcian Blue**
  - Stains acid mucins and mucopolysaccharides
  - Copper in the stain is responsible for the blue stain
  - Strongly acidic muco substances stain blue, nuclei pink to red and cytoplasm pale pink

Stains for the detection of Carbohydrates



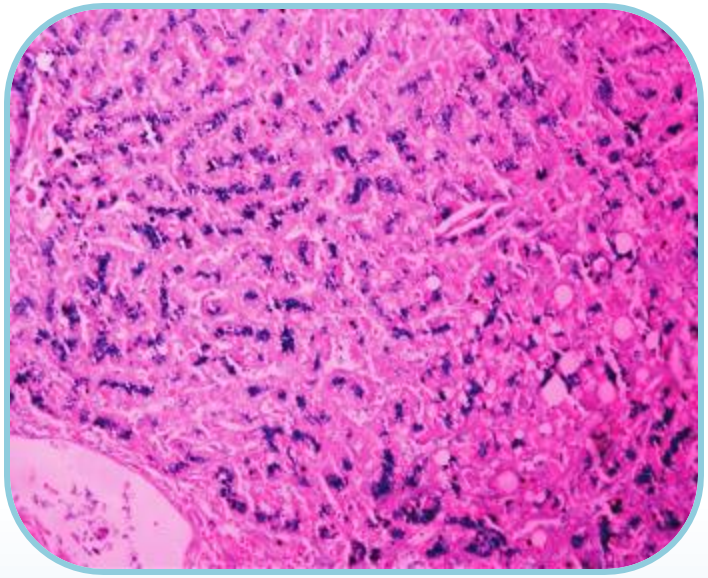
- **Acid-Schiff**
  - Used to detect glycogen, glycoproteins, mucopolysaccharides, basement membrane and mucin
  - Based on the reaction of the free aldehyde group of monosaccharrides with Schiff's reagent
  - PAS stains glycogen, mucin, mucoprotein, and glycoproteins magenta. The nuclei will stain blue. Collagen will stain pink.

Stains for the detection of Carbohydrates



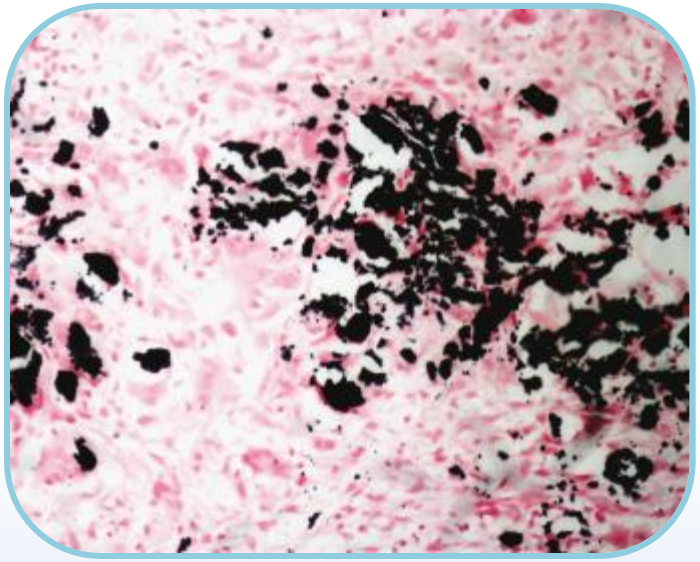
- **Alcian Blue PAS**
  - Combination of Alcian Blue and PAS technique
  - Demonstrates both acidic- neutral and mixtures of acidic and neutral mucins
  - Stains acid mucopolysaccharides blue and Neutral polysaccharides magenta

Stains for the detection of Minerals



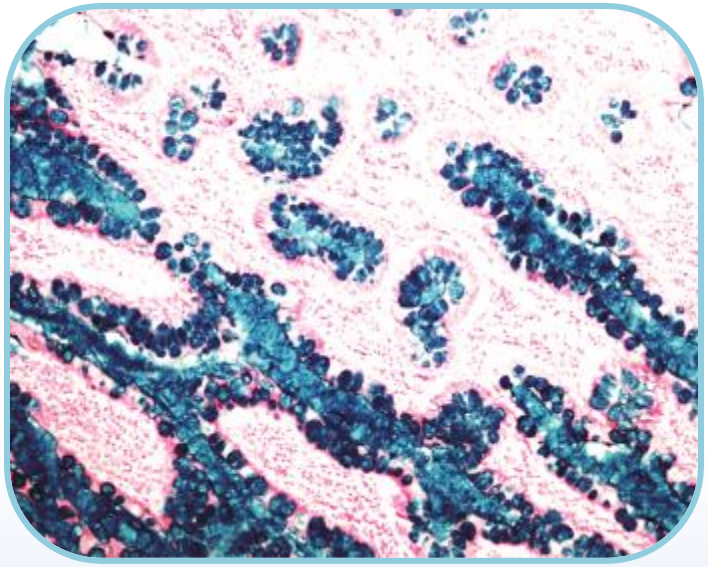
- **Iron Stain**
  - Used to detect iron in specimens
  - Ferric iron present in tissues react with ferrocyanide to form insoluble prussian blue dye
  - Ferric iron stains bright blue, nuclei Red and cytoplasm stains pink

Stains for the detection of Minerals



- **von Kossa Stain:**
  - Used for demonstrating calcium or its Salts and is not specific for calcium
  - Tissue sections are treated with silver nitrate solution, the calcium is reduced by the strong light and replaced with silver deposits, visualized as metallic silver
  - Stains Calcium salts black, Nuclei red, Cytoplasm pink

Stains for the detection of Minerals



- **Colloidal Iron:**
  - Used demonstrate carboxylated and sulfated mucopolysaccharides and glycoproteins.
  - Stains Acid mucopolysaccharides and sialomucins deep blue, Nuclei Pink-red and Cytoplasm pink

BioGenex

Molecular Pathology Workflow Solution

Please visit www.biogenex.com for more details on our product portfolio