



# Special Stains

For Automatic and Manual use

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# Special Stains

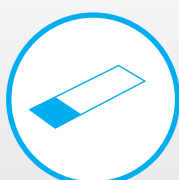
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## - INTRODUCTION -

Special Staining is the most routinely used term to designate stains that allow the recognition of specific chemical groups in the histological structure of tissues and, consequently, to identify their nature on numerous occasions. These histochemical stains are based on the different affinity of the cellular components to fix the chemical groups present in the different staining solutions and constitute complementary tools of the first order for routine staining, so that for many years they have become essential in daily anatomopathological practice. In this sense, the presence of deviations from normal staining in terms of location, quantity, intensity, structure, etc. is associated with numerous specific pathological processes and, likewise, the particular and anomalous location of some chemical groups can identify specific cell types and various pathogenic microorganisms. Due to the fact that the correct assessment of histochemical techniques requires strictly following their technical protocol, which is often quite complicated, with the consequent lack of standardization and reproducibility that always leads to a high degree of uncertainty in the interpretation of histochemical techniques by the pathologist. For this reason, its adaptation, optimization and validation both manually and in an automatic staining instrument as versatile and safe as the MD Stainer contributes to granting a high degree of reproducibility to the processes and likewise provides the Laboratory Technician with great comfort and soundness in handling staining protocols. All the procedures included here have been designed, adapted and validated to be used manually and/or in MD Stainer.



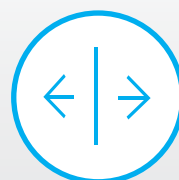
Fully automated protocols which allows overnight processing



36 Determinations in independent and motorized incubation chambers



Minimal residual generation



Separation of dangerous and non-dangerous reagents



Increase laboratory productivity



Reagents in "RTU" format

## - STAINING'S FOR DIFFERENT TYPES OF MICROORGANISMS -

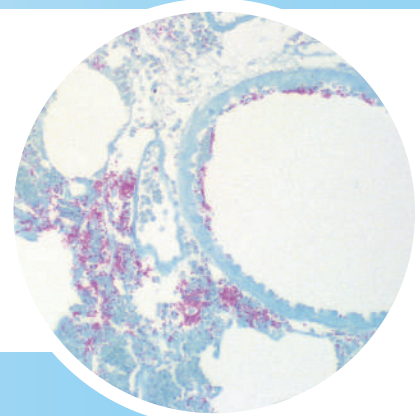
### Acid-Fast Bacillus (AFB) Stain Kit - Ref. Automatic: MAD-103.004 - Ref. Manual: MAD-103.004M

Allows staining of micro-organisms classified as mycobacteria (*Mycobacterium tuberculosis*, *Mycobacterium leprae*, etc...).

The lipid capsule of the acid-fast organism absorbs carbol fuchsin and resists discoloration.

#### RESULTS:

<b>Light red</b>	Ceroid pigment and Acid-fast bacilli
<b>Light green</b>	Nucleus and Background
<b>Control</b>	Positive tissue for tuberculosis bacilli



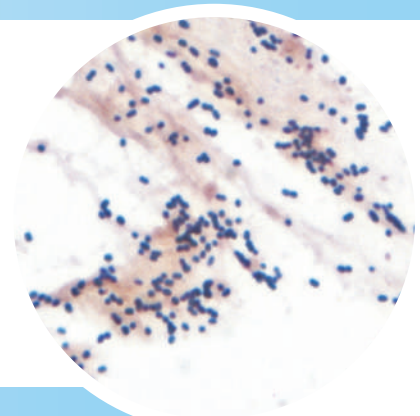
### Gram Stain McDonald's Kit - Ref. Automatic: MAD-103.013 - Ref. Manual: MAD-103.013M

The Gram Stain McDonald's Kit is used to identify two different groups of microorganisms in tissue section.

Gram-positive bacteria possess capsule rich in hydrogen sulphide groups, which are susceptible to form stable bonds with methyl violet prior to Lugol's treatment.

#### RESULTS:

<b>Blue</b>	Gram-positive Bacteria
<b>Red</b>	Gram-negative Bacteria
<b>Yellow</b>	Another tissue components
<b>Red</b>	Nuclei
<b>Control</b>	Tissues infected with gram-negative or positive bacteria



# Special Stains

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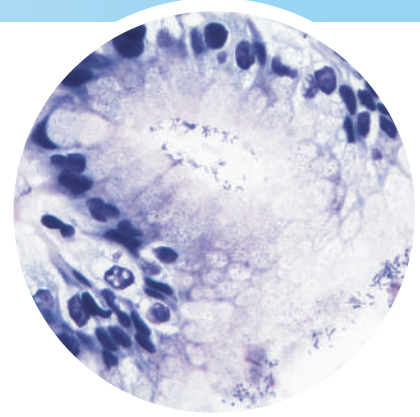
## **Giemsa Stain Kit** - Ref. Automatic: MAD-103.006 - Ref. Manual: MAD-103.006M

Specific staining for phosphate groups in DNA, especially in areas with large numbers of adenine-thymine bonds.

Useful for chromosome staining and localisation of possible translocations and rearrangements.

Can identify various types of bacteria (especially *Chlamydia* and *Helicobacter pylori*), fungi of Histoplasma fungi, spirochetes and protozoa such as *Plasmodium falciparum* and Malaria.

It is also used for staining of peripheral blood smears and bone marrow aspirates and as a marker for mast cells.



### **RESULTS:**

#### **Peripheral Blood**

<b>Pink</b>	Erythrocytes
<b>Blue / Violet</b>	Nuclei
<b>Sky blue</b>	Lymphocytes Cytoplasm
<b>Pale blue</b>	Monocytes Cytoplasm
<b>Magenta</b>	Nuclear Chromatin Leukocytes
<b>Light pink</b>	Plasma cells, Muscle fiber and Collagen
<b>Pink</b>	Bacteria's
<b>Blue</b>	<i>Helicobacter Pylori</i>
<b>Dark blue</b>	Mastocytes
<b>Control</b>	Bone Marrow, skin or stomach with <i>Helicobacter Pylori</i>

# Special Stains

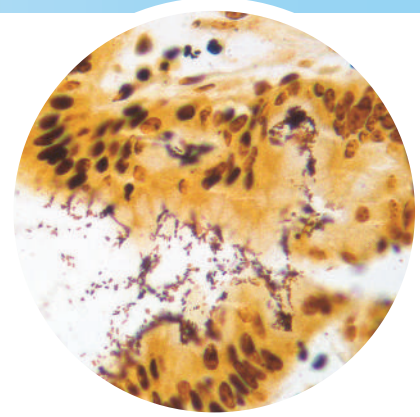
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## Warthin-Starry Stain Kit - Ref. Automatic: MAD-103.014 - Ref. Manual: MAD-103.014M

It is a stain based on Silver Nitrate.

It allows visualisation of spirochaetal bacteria, *Helicobacter pylori*, *Legionella pneumophila*.

It is also important for the confirmation of *Bartonella henselae*, an organism causing cat scratch disease.



### RESULTS:

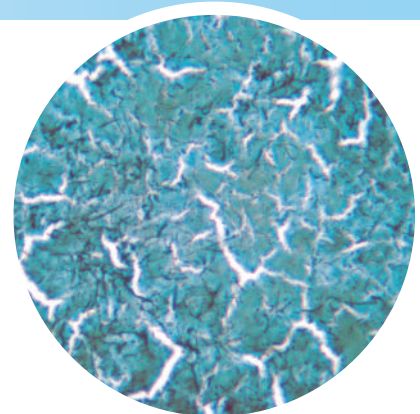
<b>Black</b>	<i>Helicobacter pylori</i>
<b>Black</b>	<i>Legionella pneumophila</i>
<b>Black</b>	Spirochetes
<b>Black</b>	<i>Bartonella henselae</i>
<b>Brown / Black</b>	<i>Klebisella</i>
<b>Brown</b>	Nuclei
<b>Yellow</b>	Brown Background
<b>Control</b>	Any tissue infected with spirochetes. Tissue infected with <i>H. Pylori</i>

## Grocott's Methenamine Silver (GMS) Stain Kit - Ref. Automatic: MAD103.007 - Ref. Manual: MAD103.007M

The Grocott-Gomori, Gomori or GMS, is a staining method based on silver with methenamine.

It is widely used for the detection of fungal organisms such as *Pneumocystis jiroveci* among others.

It is also particularly useful in the identification of bacteria of the genus *Actinomyces* as well as allowing the staining of carbohydrates.



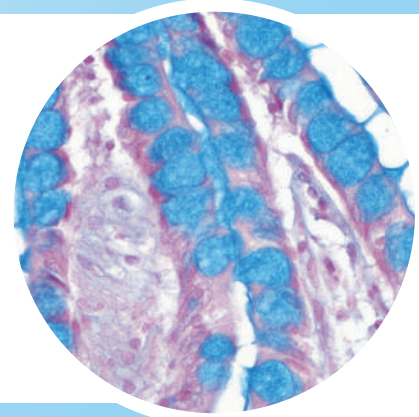
### RESULTS:

<b>Black</b>	Fungi
<b>Black</b>	<i>P. jiroveci</i>
<b>Gray</b>	Mucin
<b>Gray to black</b>	Mycelium (interior)
<b>Gray to black</b>	Hyphae (interior)
<b>Green</b>	Background
<b>Control</b>	Any tissue infected with fungi

## - STAINING'S FOR MUCOPOLYSACCHARIDES AND OTHER CARBOHYDRATES -

### Alcian Blue pH2.5 Stain Kit - Ref. Automatic: MAD-103.018 - Ref. Manual: MAD-103.018M

Based on the use of soluble basic indole chromogens of the phthalocyanine group, which contain a copper nucleus and, on binding to the acid mucopolysaccharides of the tissues, are transformed into insoluble blue pigment. At pH around 2.5 the staining is less specific than at other pH(s), so sulphated acid mucopolysaccharides are stained, but also uronic acids.

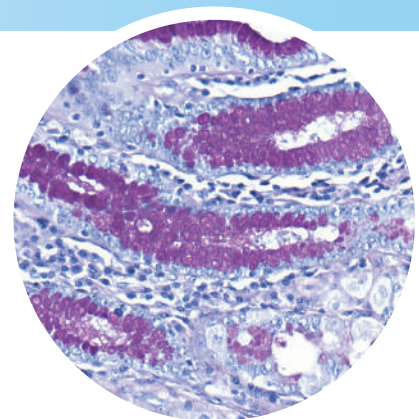


#### RESULTS:

<b>Blue</b>	Acid mucopolysaccharides
<b>Red</b>	Nuclei
<b>Pink</b>	Background
<b>Control</b>	Appendix, Small Intestine

### PAS Stain Kit - Ref. Automatic: MAD-103.015 - Ref. Manual: MAD-103.015M

Staining to demonstrate the presence of simple polysaccharides, neutral mucopolysaccharides, mucoproteins, serum glycoproteins, basement membrane and reticulin fibres in the tissues. Glycolipids (gangliosides and cerebrosides), ceroid pigment and certain lipofuscins are also PAS positive. Acid mucopolysaccharides are negative.



It can also be used for the demonstration of fungal organisms in tissue sections.

#### RESULTS:

<b>Magenta</b>	Positive PAS material
<b>Black / Blue</b>	Nuclei
<b>Control</b>	Kidney, Intestine, Liver

# Special Stains

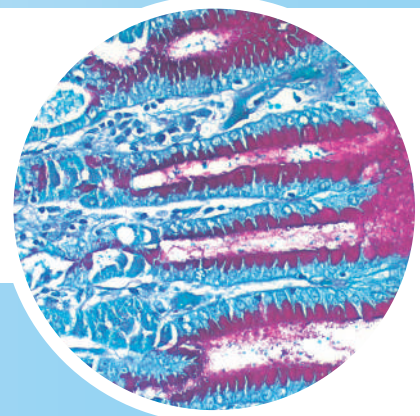
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## PAS Light Green Stain Kit - Ref. Automatic: MAD-103.010 - Ref. Manual: MAD-103.010M

Allows the identification of glycoproteins and other PAS-positive tissue structures, however the main application of this stain is the identification of fungi in skin infections.

### RESULTS:

<b>Magenta</b>	Fungal organisms
<b>Magenta</b>	PAS positive material
<b>Black / Blue</b>	Nuclei
<b>Green / Blue</b>	Other components of the tissue
<b>Control</b>	Kidney, Intestine and Liver



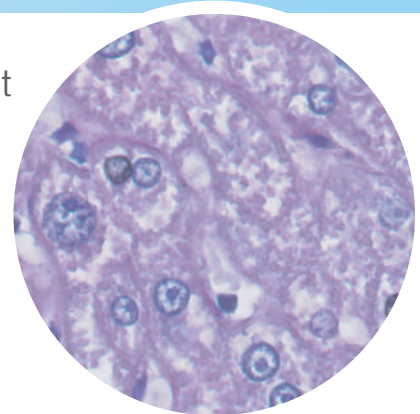
## PAS- Amylase Stain Kit - Ref. Automatic: MAD-103.019 - Ref. Manual: MAD-103.019M

The PAS stain that is used in combination with Amylase, an enzyme that breaks down glycogen. PAS staining typically gives a magenta color in the presence of glycogen. When PAS and amylase are used together, a pink color replaces magenta. Differences in the intensities of the two stains (PAS and PAS-A) can be attributed to different glycogen concentrations and can be used to semiquantify glycogen in samples.

A common use of the PAS-A is to show gastric/duodenal metaplasia in duodenal adenomas.

### RESULTS:

<b>Pink</b>	Material positive for PAS
<b>Black / Blue</b>	Nuclei
<b>Control</b>	Kidney, Intestine, Liver





# Special Stains

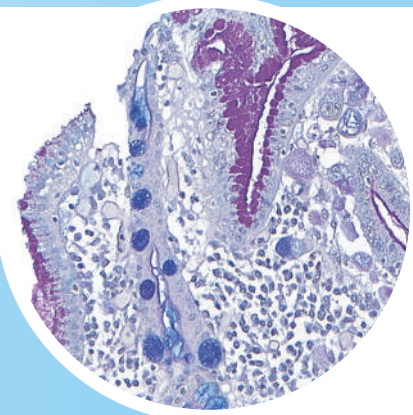
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## Alcian Blue-PAS Stain Kit - Ref. Automatic: MAD.103.016 - Ref. Manual: MAD.103.016M

Mixed staining for the detection of acidic, neutral and carbohydrate mucins.

### RESULTS:

<b>Red or Magenta Blue</b>	Material positive for PAS
<b>Blue</b>	Acid mucopolysaccharides
<b>Blue</b>	Some epithelial mucins and cartilage
<b>Control</b>	Small Intestine, appendix and Colon



## Mucicarmine Stain Kit - Ref. Automatic: MAD-103.009 - Ref. Manual: MAD-103.009M

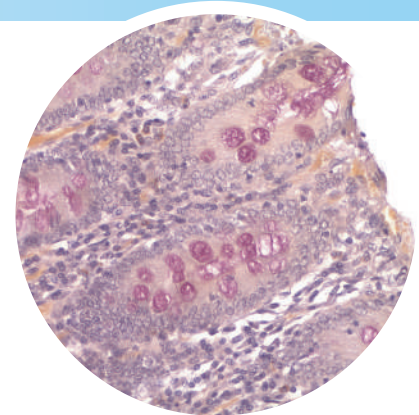
Used to test the presence of mucopolysaccharides of epithelial origin in normal and/or tumour tissues.

This technique can also be used to identify micro-organisms with polysaccharides in the wall, such as *Cryptococcus neoformans*.

In connective tissue, mild non-specific staining occurs.

### RESULTS:

<b>Pink / Red</b>	Mucin
<b>Red</b>	Capsule of <i>Cryptococcus</i>
<b>From blue to green</b>	Nuclei
<b>Yellow</b>	Other components of the tissue
<b>Control</b>	Colon, Intestine



# Special Stains

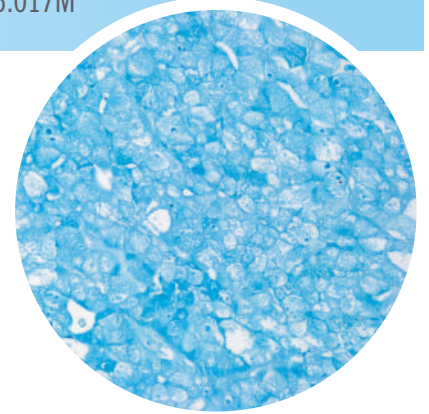
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## Colloidal Iron Stain Kit - Ref. Automatic: MAD-103.017 - Ref. Manual: MAD-103.017M

Identification of carboxylated and sulphated mucopolysaccharides and glycoprotein mucin in colloidal ferric ions, which at low pH, are absorbed mainly by carboxylated and sulphated mucosubstances that stain dark blue.

Collagen and nuclei are marked pink to red by Van Gieson counterstaining.

It is a very useful tool to distinguish chromophobe renal cell carcinoma (intensely positive in a large percentage of cells with reticular staining) from oncocytoma (usually negative; if positive, fewer cells with lower intensity and staining in small grains).



### RESULTS:

<b>Blue</b>	Acid mucopolysaccharides
<b>Red-Purple</b>	Collagen
<b>Control</b>	Chromophobe Renal Cell Carcinoma

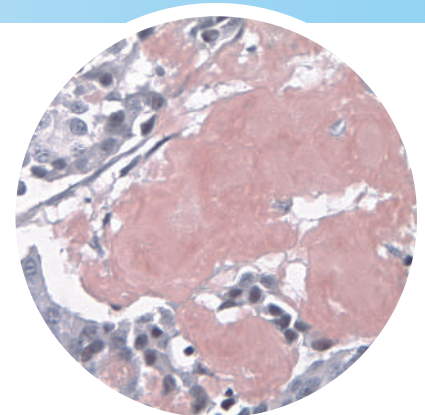
## - STAINING'S FOR DIFFERENT DEPOSITS -

## Congo Red Amyloid Stain Kit - Ref. Automatic: MAD-103.012 - Ref. Manual: MAD-103.012M

Help in the identification of the amyloid in tissue sections.

Based on the use of a tetrazoic dye which stains collagen and elastic fibres (especially in an acid medium) well, variably and unspecifically.

On the other hand, it shows intense apple-green specific birefringence under polarised light when bound to amyloid substance.



### RESULTS:

<b>Red to pink</b>	Amyloid (under white light)
<b>Bright apple green</b>	Amyloid (under polarized light)
<b>Light orange</b>	Elastic fibers
<b>Blue</b>	Nuclei
<b>Control</b>	Tissue with amyloid or heart tissue

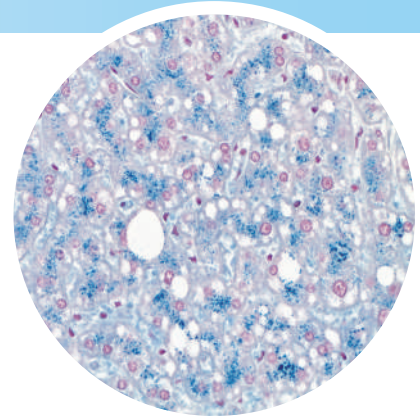
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## Iron Stain Kit - Ref. Automatic: MAD-103.008 - Ref. Manual: MAD-103.008M

The Iron Stain Kit is design to aid in the identification of ferric iron in tissue sections.

Stain for oxidised tissue iron deposits based on the property of potassium ferrocyanide (yellow prussiate) to transform into ferric ferrocyanide or Prussian blue in its presence.



### RESULTS:

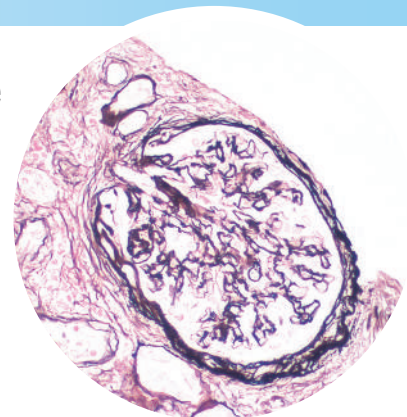
<b>Bright blue</b>	Iron including hemosiderin
<b>Red</b>	Nuclei
<b>Pink</b>	Background
<b>Control</b>	Spleen or Liver

## - ARGENTIC IMPREGNATIONS -

## Jones Methenamine Silver Stain Kit - Ref. Automatic: MAD-103.002 - Ref. Manual: MAD-103.002M

It is based on the ability of the periodic acid to oxidise the carbohydrate components of the basement membrane to produce aldehydes. The aldehydes released reduce the silver and convert it into a visible metallic silver.

It is a very useful stain in renal pathology in the demonstration of the basement membrane of glomeruli.



### RESULTS:

<b>Black</b>	Basement Membranes
<b>Black</b>	Reticulin Fibers
<b>Red</b>	Nuclei and background
<b>Control</b>	Normal or Pathologic kidney

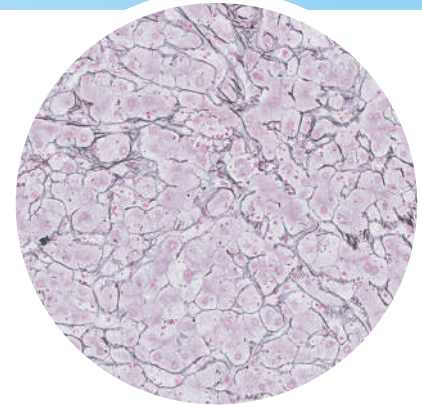
# Special Stains

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## Gordon and Sweet for Reticulum - Ref. Automatic: MAD-103.021 - Ref. Manual: MAD-103.021M

Identification of argyrophilic reticular fibres in connective tissue, especially for differentiating collagen fibres from connective tissue.

Preliminary impregnation with an iron salt and as silver source uses an unstable di-aminic complex (ammonium solution), which is more reactive than silver nitrate.



### RESULTS:

<b>Black</b>	Reticular and nerve fibers
<b>Brown</b>	Connective tissue
<b>Golden yellow</b>	Collagen
<b>Pink</b>	Background
<b>Control</b>	Liver, Bone Marrow

## - TRICHROME STAINING'S -

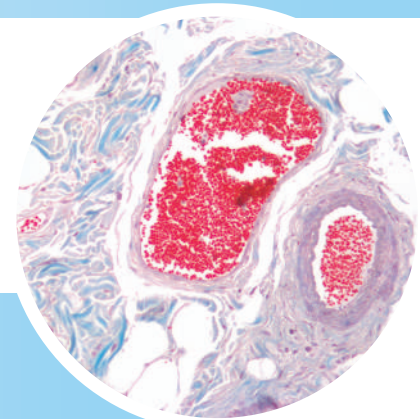
Trichrome staining is based on the same theoretical principles. After staining the nuclei with haematoxylin, the nuclei are treated with acid dyes, which differ in their physico-chemical properties. The most important differentiating factor in staining is the degree of permeability of the structures to the passage of the dyes used.

## Trichrome Gomori Stain Kit - Ref. Automatic: MAD-103.001 - Ref. Manual: MAD-103.001M

A trichrome that allows differentiated staining of fibrin, muscle tissue and cell cytoplasm. It is a one-step staining method.

### RESULTS:

<b>Different blue tones</b>	Nuclei
<b>Green</b>	Myofibrils
<b>Red</b>	Intermyofibrillar material
<b>Light green</b>	Interstitial connective tissue
<b>Control</b>	Skin, Kidney, Liver



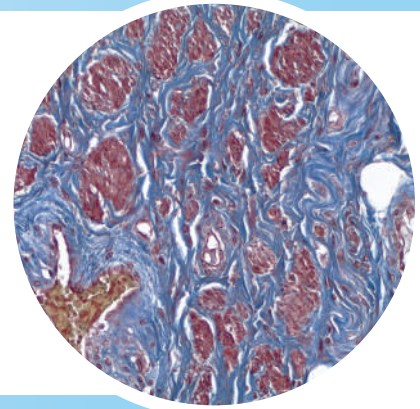
# Special Stains

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## Masson's Trichrome 2000 Stain Kit - Ref. Automatic: MAD-103.011 - Ref. Manual: MAD-103.011M

Masson's trichrome is often used to demonstrate increased collagen deposition that is associated with replacement of functional tissue with scar tissue.

Useful to diagnose sclerosis of the liver in which thickened collagen replaces normal tissue causing liver dysfunction.



### RESULTS:

Blue	Collagen
Red	Muscle fibers
Dark red to black / blue	Nuclei
Control	Lung, liver, colon, stomach

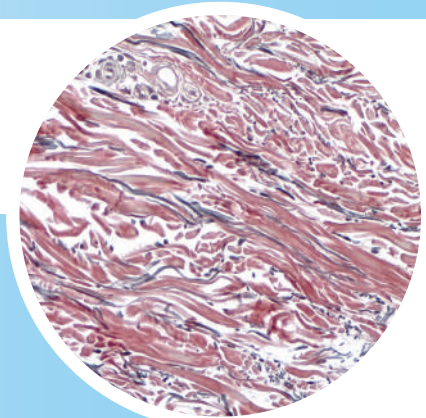
## - ELASTIC FIBERS AND OTHER APPLICATIONS -

## Elastic Verhoeff's Stain Kit - Ref. Automatic: MAD-103.005 - Ref. Manual: MAD-103.005M

Elastic Stain Kit is used to identify elastin fibers.

### RESULTS:

Black to blue / black	Elastic fibers
Blue to black	Nuclei
Red	Collagen
Yellow	Muscle and others
Control	Skin or any vascular tissue



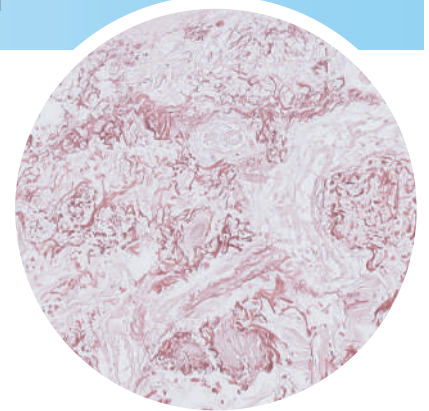
# Special Stains

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**Orceine Stain Kit** - Ref. Automatic: MAD-103.020 - Ref. Manual: MAD-103.020M

This method is used for the visualisation of hepatitis B surface antigen (HBsAg), elastic fibres and copper-associated proteins.

HBsAg appears as irregularly shaped aggregates in the cytoplasmic region of the cells.



## RESULTS:

<b>Dark Red/ Brown</b>	Hepatitis B surface antigen
<b>Dark Red/ Brown</b>	Elastic fibres
<b>Dark Red/ Brown</b>	Copper associated proteins
<b>Light Red / Purple</b>	Background
<b>Control</b>	<b>Known positive hepatitis</b>



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