



OPINION ARTICLE



Uses of Significant Histological Stains

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Description

Staining enables the detection of abnormalities in cell count and structure under the microscope; it is frequently used in histopathology and diagnostics. Histology uses a wide variety of stains, including dyes, metals, and tagged antibodies. The process known as metachromatic occurs when certain stains drastically alter the coloration of cells and tissues, making them appear different from the color of the initial dye complex. Paraffin tissue slices are typically used for staining.

In pathological diagnosis and forensic investigations, histological staining is a frequently used medical procedure. Fixation, processing, embedding, sectioning, and staining is the five main steps in the histological staining procedure.

Carmine

Early botanists like John Hill utilized it in histological research in 1770. It is a widely used stain. When the stain was an ammoniacal solution, it was used to examine tiny tissue features, and histologic investigations still utilize it. In particular, Rudolph is regarded as the “father of pathology” since he utilized the stain frequently in microscopic research.

Hematoxylin and Hematin

These are organic compounds that have been utilized throughout the history. Hematoxylin is a weak stain and is used in oxidized form in conjunction with other solutions.

To improve the stain’s ability to distinguish between distinct cell components, an oxidizing mordant is added; this combination is known as hematoxylin solutions. The stain’s adaptability has aided in the advancement of numerous Hematoxylin techniques. Hematoxylin was historically transformed into a nuclear stain with a quicker staining time and resistance to acidic solutions, making it appropriate for histologic staining procedures involving many steps.

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Nickel Silver

In historical staining methods as well as in contemporary pathology, silver nitrate has been utilized for a very long time. In the beginning, early researchers applied solid silver nitrate to a tissue before analyzing it in order to improve the visibility of the tissue structure. Silver nitrate must be used in conjunction with confirmatory tests because many different compounds have been developed stains for. The argentaffin cells present in the epithelium linings of the lungs, intestines, melanin, and other epithelial tissues have also been reported to inhibit the silver nitrate stain.

When using silver nitrate for staining, techniques have been developed to “tailor” these tissues to prevent argyrophilic responses. In particular, techniques like the Grocott-Gomori method and the Gomori reticulin methods were developed to evaluate illnesses and missing tissues in the liver and the rectum.

Other Staining Techniques

Procedures involving hematoxylin and eosin

Hematoxylin stains have undergone significant laboratory alterations while being traditionally utilized; today, almost all tissue specimens are stained with Hematoxylin and Eosin. Numerous Hematoxylin techniques have also been developed, however they all use the same strategy of staining tissue samples in hematoxylin, alcohol, and tap or alkaline water to remove argentaffin agents.

It has been discovered that the Hematoxylin and Eosin techniques can be used to study the majority of histopathological processes. In a similar vein, the approach is easy to use, affordable, and adaptable. Hematoxylin and eosin, however, are ineffective since not all characteristics of a substance may be picked up, necessitating the employment of specific stains.

Giemsa and Romanowsky stains

They were created in 1891 by Dimitri Romanows-

ky and became well-known for their colourful ability to distinguish blood parasites. Giemsa Stains are still employed nowadays. The stains have seen significant progress, and thanks to their varied procedures, they may now be used with bone marrow, paraffin-embedded, and formalin-fixed biopsies.

Ink stain

In order to identify the type of bacterial infection and to make the germs visible on specific lung tissues during testing, Gram developed the staining procedure. Even though some bacterial organisms were found to be unsuitable for this approach, it is still in use today and fairly competes with contemporary molecular histology techniques. However, the Gram technique has a fixed number of applications in environmental microbiology.

Trichrome markers

According to historical analysis of the usage of different stains in histology, pathologists were particularly drawn to stains that produced multicoloured results on tissue specimens. Trichrome stains were consequently created in response to this demand. Different multiple stains, like blue-eosin, "triacid stain," and Masson's trichrome stain, have become common in contemporary histology. Trichrome stains demonstrate how intricate staining techniques have developed in the quest for a reliable stain that will clearly display fine, differentiated tissues.

Improved technological advancements in microscopes and the formation of the histologic stains factory led to a significant shift and development in histologic stains throughout the history of histology.