OPEN ACCESS Freely available online

Journal of Medical Diagnostic Methods

Opinion Article

Essential Role of Histopathology in Cancer, Infections and Inflammatory Diseases

Tang Geng*

Department of Pathology, University of Medical College, Shantou, China

DESCRIPTION

Histopathology is an important branch of pathology that focuses on the microscopic examination of tissue samples to study the manifestations of disease. This field combines principles of both biology and medicine to understand the cellular and tissue changes that occur in response to disease processes. With its ability to diagnose a wide range of conditions, from cancers to infections, histopathology is indispensable in modern medicine. Histopathology refers to the study of tissue changes at a microscopic level, specifically in the context of disease. It involves the examination of tissue samples obtained from various organs and body parts to determine whether they are normal or have been affected by disease processes. This discipline helps in the diagnosis, prognosis, and treatment planning for many illnesses, particularly cancer. The key function of histopathology is to interpret the patterns of cell injury and alterations in the architecture of tissues. By evaluating these patterns, pathologists can identify diseases, understand their stages, and assess their severity, which is critical for guiding therapeutic decisions. Histopathology begins with the acquisition of tissue samples, known as biopsies. These samples can be obtained through various methods, including surgical procedures, endoscopic techniques, or Fine Needle Aspiration (FNA). Once the tissue is collected, it undergoes several preparation steps before it is examined under a microscope: The first step in tissue processing is fixation, which involves preserving the tissue by immersing it in a fixative solution, such as formalin.

Fixation helps prevent decomposition and preserves the structural integrity of cells and tissues. After fixation, the tissue is dehydrated and embedded in paraffin wax. This allows the tissue to become firm and easy to section. The wax blocks are then cut into thin slices, typically between 3 to 5 micrometers thick, using a microtome. Since tissue samples are transparent and colorless, they are stained with specific dyes to enhance contrast and allow different cellular components to be visualized. The most common staining technique is Hematoxylin and Eosin (H&E), which highlights cell nuclei and cytoplasm. Special stains, such as Immune Histo Chemistry (IHC), may also be used to target specific proteins or antigens within the tissue. Once stained, the tissue sections are placed on glass slides and examined under a microscope. Pathologists examine the cellular structure, architecture, and the presence of abnormalities such as tumors, inflammation, or necrosis. Based on the microscopic findings, the pathologist makes a diagnosis. The report will describe the tissue's characteristics, including the nature of any abnormality, its location, and its degree of severity. Histopathology is particularly critical in the diagnosis of cancer. By examining tissue samples from tumors, pathologists can determine whether the tumor is benign or malignant, the type of cancer, and its histological grade. This information is crucial for determining the prognosis and treatment options. For example, in breast cancer, histopathological examination can help identify whether the tumor is hormone receptor-positive, Human Epidermal growth factor Receptor (*HER2*) positive, or triple-negative, each of which has different therapeutic implications.

Many infectious diseases, including bacterial, viral, fungal, and parasitic infections, can be diagnosed through histopathological examination. Tissue samples from infected areas can reveal the presence of pathogens, inflammatory responses, and tissue damage. For example, histopathology can be used to identify granulomatous inflammation in tuberculosis or the presence of viral inclusions in cytomegalovirus infections. Histopathology is essential in diagnosing and understanding autoimmune diseases, where the immune system mistakenly attacks the body's tissues. Examples include diseases like lupus erythematosus, rheumatoid arthritis, and vasculitis. Tissue samples from affected organs can reveal characteristic immune deposits, tissue destruction, or chronic inflammation. With ongoing advancements in technology and molecular techniques, histopathology will continue to evolve and remain an indispensable part of modern medicine.

Correspondence to: Tang Geng, Department of Pathology, University of Medical College, Shantou, China, E-mail: gaolin88@gmail.com

Received: 25-Sep-2024, Manuscript No. JMDM-24-35139; **Editor assigned:** 27-Sep-2024, PreQC No. JMDM-24-35139 (PQ); **Reviewed:** 11-Oct-2024, QC No. JMDM-24-35139; **Revised:** 18-Oct-2024, Manuscript No. JMDM-24-35139 (R); **Published:** 25-Oct-2024, DOI: 10.35248/2168-9784.24.13.497

Citation: Geng T (2024). Essential Role of Histopathology in Cancer, Infections and Inflammatory Diseases. J Med Diagn Meth. 13:497.