

Biopsy

Biopsy procedures are integral in the diagnostic process for various medical conditions, including cancers, dermatological disorders, and other tissue abnormalities. By obtaining a tissue sample for laboratory examination, a biopsy enables healthcare professionals to determine the nature of the condition, facilitate appropriate treatment, and monitor disease progression. The types of biopsies vary depending on the lesion's location, the suspected condition, and the method of obtaining tissue.

Types of Biopsies

Biopsy procedures are performed using different techniques, each suited for specific clinical circumstances. The choice of biopsy method depends on the lesion's characteristics, such as its size, location, and the need for a definitive diagnosis.

- **Excisional Biopsy:** An excisional biopsy involves the complete removal of the lump or tumor. This procedure is typically employed when a lesion is small and accessible, allowing for the entire tissue to be excised for further examination. Excisional biopsies are useful for obtaining a comprehensive tissue sample, which is crucial for diagnosing malignant or benign tumors and determining the scope of the disease.
- **Incisional Biopsy:** In an incisional biopsy, only a portion of the tumor or lump is removed for analysis. This technique is often used when the tumor is large or in a location that is difficult to access or excise fully. Incisional biopsies are commonly performed for diagnosing skin cancers and distinguishing between benign and malignant conditions. This method may be conducted using different tools, such as "shave," "curette," or "punch" biopsies.
 - **Shave Biopsy:** In a shave biopsy, a thin layer of the surface of the lesion is removed using a scalpel blade. This method is effective for superficial lesions and is commonly used for small skin growths.
 - **Curette Biopsy:** The curette biopsy involves scraping off the lesion's surface using a spoon-shaped instrument. This technique is typically used for removing small, raised growths and can confirm the nature of the lesion.
 - **Punch Biopsy:** A punch biopsy uses a circular blade, often 1 to 4 mm in diameter, to extract a cylindrical sample of tissue. This technique is typically used by dermatologists to sample rashes or small masses. After local anesthesia is administered, the tissue is excised, and the wound may be sutured for closure. This method provides a deeper tissue sample and typically results in minimal scarring.
- **Fine Needle Aspiration (FNA):** FNA is a minimally invasive technique used to obtain cells from a mass or tumor. A fine, hollow needle, often the size used for injections, is inserted

into the lesion, and a small sample of cells is aspirated into a syringe. FNA is commonly used for diagnosing tumors located in organs such as the breast, lymph nodes, and thyroid. This technique is often chosen when a rapid diagnosis is needed and is especially useful for assessing nodules or masses that are not easily accessible.

Specimen Processing

Once a biopsy specimen is obtained, it is processed in the laboratory for microscopic examination. The processing steps ensure that the tissue sample is preserved, prepared, and stained for analysis. The specimen is typically sliced into thin sections, which are mounted on glass slides and examined under a microscope.

- **Frozen Section:** In some cases, a frozen section technique may be used, especially when an immediate diagnosis is required. This process involves freezing the tissue quickly and slicing it into thin sections. A pathologist then examines these sections while the patient is still under anesthesia, often during surgery. While this method provides a rapid diagnosis, it does not offer the same level of detail and quality as permanent slides, which are processed through formalin fixation and paraffin embedding.
- **Permanent Section:** For more accurate results, specimens are usually processed into permanent slides. The tissue is fixed with formalin, embedded in paraffin wax, and sectioned into extremely thin slices for staining. This method provides a high-quality sample that allows for a more detailed examination of the tissue structure and cellular characteristics, making it the standard for most biopsy specimens.

Pathologic Examination

The pathologic examination of a biopsy specimen is a fundamental step in diagnosing various medical conditions. This process involves both gross and microscopic evaluation of the tissue, which provides essential information for determining the nature of the lesion and guiding subsequent treatment decisions. The first stage of the examination is the gross description, where the pathologist inspects the specimen visually, noting its size, shape, and texture. This step is crucial for identifying macroscopic features such as cysts, tumors, or signs of necrosis, which can give initial clues about the nature of the condition.

Following the gross examination, the pathologist performs a microscopic examination of the tissue. This step involves analyzing the cellular architecture under a microscope to observe the arrangement, size, and shape of the cells. The pathologist looks for signs of malignancy, infection, or inflammation, focusing on features like abnormal cell growth, cellular atypia, or the presence of tumor markers. The microscopic analysis helps differentiate between benign and malignant conditions, providing crucial insights into the presence of cancer or other pathologies. In cases of malignancy, the pathologist may identify specific cellular changes, such as increased mitotic activity or altered tissue structure, which support the diagnosis of cancer.

Finally, based on the findings from both the gross and microscopic examinations, the pathologist provides a diagnosis. This diagnosis is essential for determining the appropriate course of treatment. It may involve confirming whether a lesion is benign or malignant, identifying the specific type of cancer, or diagnosing conditions such as infections, inflammatory disorders, or autoimmune diseases. The diagnosis directly informs treatment decisions, including the need for surgery, chemotherapy, radiation, or other therapeutic interventions, ensuring that patients receive targeted and effective care.

Conclusion

Biopsy procedures are indispensable tools in the diagnosis of various medical conditions, ranging from benign growths to life-threatening cancers. By utilizing different biopsy techniques, such as excisional, incisional, and fine needle aspiration, healthcare providers can obtain the necessary tissue samples to accurately diagnose and manage patient conditions. Once a specimen is obtained, it undergoes thorough processing and pathologic examination, which play a critical role in determining the correct diagnosis. While biopsy results are typically reliable, second opinions may be sought in complex cases. Continued advancements in biopsy techniques and pathology are improving diagnostic accuracy and patient care outcomes.

References

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