

MITTAG-LEFFLER FUNCTION, ITS SPECIFIC CASES

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Abstract *This article discusses the main types of modern microscopes used in medicine, their principles of operation, and their importance in diagnostics, scientific research, and clinical practice. The capabilities of optical, electron, confocal, fluorescence, and digital microscopes are analyzed, their advantages, and existing problems are considered. Conclusions are also made about the role of modern microscopy technologies in the development of medicine and their future prospects.*

Keywords: *microscopy, modern microscopes, medicine, diagnostics, electron microscope, confocal microscope, fluorescence microscope, artificial intelligence.*

Enter

Microscopy plays an important role in the development of medical science. It is through microscopes that the study of cells, tissues, microorganisms, and subcellular structures in the human body is possible.

In recent decades, as a result of the rapid development of technology, microscopes have been further improved, reaching a new level in terms of accuracy, speed, and functionality. Modern microscopes are widely used not only for diagnostics, but also in scientific research, surgical practice, and educational processes.

This article will detail the types of modern microscopes used in medicine, their oA brief history of the development of microscopy

The first microscopes appeared in the 17th century and were based on simple optical lenses. The simple microscopes created by Anton van Leeuwenhoek made it

possible to observe microorganisms for the first time. Later, light microscopes, phase-contrast microscopes, and electron microscopes were developed.

Since the second half of the 20th century, advances in electronics, laser technology, and digital imaging systems have ushered in a new era of microscopy. As a result, modern microscopes have been created that are now highly accurate, computer-integrated, and equipped with artificial intelligence elements perating.

The main types of modern microscopes

Optical (light) microscopes

Optical microscopes are among the most widely used devices in medicine. Modern optical microscopes are equipped with LED illumination systems, high-quality lenses, and digital cameras. They are widely used in histology, cytology, and microbiology laboratories.

Advantages:

Ease of use

Relatively cheap

Ability to monitor live cells

Disadvantages:

Limited magnification

Inability to see very small (nanometer) structuresThe main types of modern microscopes

Electron microscopes

Electron microscopes use electron beams instead of light, which provides extremely high resolution and magnification. The transmission electron microscope (TEM) and scanning electron microscope (SEM) are mainly used in medicine.

Electron microscopes are used to study viruses, cell organelles, and changes at the molecular level. They are important in oncology, virology, and pathomorphology.

Confocal laser microscopes

Confocal microscopes use laser light to create three-dimensional images. This technology allows for layer-by-layer imaging of tissues.

Confocal microscopes in medicine:

In dermatology, in diagnosing skin diseases

In neurobiology, the study of nervous tissue

Used in oncology to detect tumors

Fluorescence microscopes

Fluorescence microscopy is based on the detection of specific molecules using special dyes and markers. This method is very important for observing biological processes inside cells.

Modern fluorescence microscopes are widely used in genetic research, immunology, and molecular biology.

Digital and artificial intelligence microscopes

In recent years, digital microscopes and systems equipped with artificial intelligence (AI) have been widely implemented in medicine. Such microscopes can automatically analyze images, detect signs of disease, and help doctors make decisions.

For example, in pathology, SL-based microscopes are enabling rapid and accurate analysis of biopsy samples.

Practical application in medicine

Modern microscopes are important in the following areas:

Diagnostics: Identifying diseases through blood, urine, tissue samples

Surgery: Ensuring high precision during surgery in neurosurgery and ophthalmology

Scientific research: Studying processes at the cellular and molecular level

Education: The medical field provides practical knowledge for the visual and field provides practical knowledge. Advantages and problems of modern microscopes

Advantages:

High resolution and image quality.

Digital storage and transfer capability

Automated analysis

Problems:

High price

Maintenance complexity

The need for specialist training

Summary

Modern microscopes have become an integral part of medicine, significantly improving the quality of diagnostics and treatment. As a result of technological progress, microscopes are becoming smarter, more accurate and more convenient. In the future, the further development of artificial intelligence, nanotechnology and 3D imaging methods will undoubtedly create new opportunities in medicine.

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The effective use of modern microscopes remains an important factor in the development of medical science and the protection of human health.

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