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OVERVIEW OF METHODS USED IN HISTOLOGY

The objective of a histology course is to lead the student to understand the microanatomy of cells, tissues, and organs and to correlate structure with function.

Histology [Gr., *histos*, tissue; Gr., *logia*, science], also called **microscopic anatomy**, is the scientific study of microscopic structures of tissues and organs of the body. Modern histology is not only a descriptive science but also includes many aspects of molecular and cell biology, which help describe cell organization and function. The methods used by histologists are extremely diverse. Much of the histology course content can be framed in terms of light microscopy. Today, students in histology laboratories use either **light microscopes** or, with increasing frequency, **virtual microscopes**, where digitized microscopic specimens are viewed on a computer screen or mobile devices. In the past, more detailed interpretation of microscopic structures was done with the **electron microscope (EM)**—both the **transmission**

electron microscope (TEM) and the **scanning electron microscope (SEM)**. Now, the **atomic force microscope (AFM)** and a variety of **super-resolution microscopy techniques** can provide images that are comparable or higher (e.g., AFM) in resolution to those obtained with the TEM. Both EM and AFM, because of their greater resolution and useful magnification, are often the last step in data acquisition from many auxiliary techniques of cell and molecular biology. However, usage of super-resolution techniques is increasing in cell and molecular biology research, mainly because high-resolution images can be captured directly from living cells using fluorescence microscopy. These **auxiliary techniques** include the following:

- Variety of staining methods to enhance contrast of microscopic images
- Histochemistry and cytochemistry techniques
- Immunocytochemistry and hybridization techniques
- Autoradiography
- Organ and tissue culture
- Cell and organelle separation by differential centrifugation