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techniques -- Chapter11. An Introduction to Fundamentals of Cancer Biology -- Chapter12. Polarization enabled optical spectroscopy and microscopy techniques for cancer diagnosis -- Chapter13. Polarization Microscopy in Biomedical Applications -- Chapter14. Machine learning in tissue polarimetry. .

Sommario/riassunto

This book focuses on polarization microscopy, a powerful optical tool used to study anisotropic properties in biomolecules, and its enormous potential to improve diagnostic tools for various biomedical research. The interaction of polarized light with normal and abnormal regions of tissue reveals structural information associated with its pathological condition. Diagnosis using conventional microscopy can be time-consuming, as pathologists require an hour to freeze and stain tissue slices from suspected patients. In comparison, polarization microscopy more quickly distinguishes abnormal tissue and provides better microstructural information of samples, even in the absence of staining. This book provides a basic understanding of the properties of polarized light, a description of the polarization microscope, and a mathematical formalism of Mueller matrix polarimetry. The authors discuss various advanced linear and nonlinear optical techniques such as optical coherence tomography (OCT), reflectance and transmission spectroscopy, fluorescence, multiphoton excitation, second harmonic generation, Raman microscopy, and more. They explore the exciting potential of integrating polarimetry with these techniques for possible applications in different areas of biomedical research, as well as the associated challenges. Including the most recent developments on the topic, this book serves as a modern guide to polarization microscopy and advancements in its use in biomedical research.