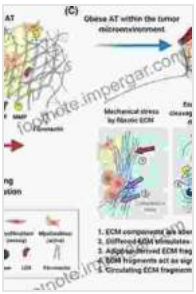
Extracellular Matrix Omics: Biology of Extracellular Matrix

The extracellular matrix (ECM) is a complex network of macromolecules that surrounds and supports cells. It plays a critical role in a wide range of cellular processes, including cell adhesion, migration, differentiation, and proliferation. The ECM is also involved in tissue development and repair, and its dysregulation can contribute to a variety of diseases.



Extracellular Matrix Omics (Biology of Extracellular Matrix Book 7) by Sylvie Ricard-Blum

4.3 out of 5

Language	: English
File size	: 3693 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
X-Ray	: Enabled
Word Wise	: Enabled
Print length	: 222 pages
Lending	: Enabled

This book provides a comprehensive overview of the biology of the ECM. It covers the latest research on ECM structure, function, and regulation, and discusses the role of the ECM in a variety of diseases. The book is written by leading experts in the field and is an essential resource for anyone interested in understanding the biology of the ECM.

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The ECM is a complex network of macromolecules that surrounds and supports cells. It is composed of a variety of proteins, carbohydrates, and lipids, and its composition varies depending on the tissue type. The ECM provides a structural scaffold for cells, and it also plays a role in cell adhesion, migration, differentiation, and proliferation. The ECM is also involved in tissue development and repair, and its dysregulation can contribute to a variety of diseases.

Structure of the ECM

The ECM is a complex structure that is composed of a variety of proteins, carbohydrates, and lipids. The major proteins of the ECM are collagen, elastin, and proteoglycans. Collagen is the most abundant protein in the ECM, and it provides structural support to tissues. Elastin is a rubbery protein that allows tissues to stretch and recoil. Proteoglycans are proteins that are covalently linked to glycosaminoglycans (GAGs). GAGs are long, unbranched polysaccharides that are negatively charged. They are responsible for the water-binding capacity of the ECM.

The ECM is organized into a meshwork of fibers and gels. The fibers are composed of collagen and elastin, and they provide structural support to tissues. The gels are composed of proteoglycans and GAGs, and they provide a hydrated environment for cells.

Function of the ECM

The ECM plays a critical role in a wide range of cellular processes. It provides structural support to tissues, and it also regulates cell adhesion, migration, differentiation, and proliferation. The ECM is also involved in tissue development and repair.

The ECM provides structural support to tissues by forming a meshwork of fibers and gels. The fibers are composed of collagen and elastin, and they provide strength and elasticity to tissues. The gels are composed of proteoglycans and GAGs, and they provide cushioning and lubrication.

The ECM regulates cell adhesion, migration, differentiation, and proliferation by providing a variety of cues to cells. The ECM contains a variety of proteins that can bind to cell surface receptors, and these interactions can trigger intracellular signaling pathways that lead to changes in cell behavior. For example, the ECM can promote cell adhesion by binding to integrins, which are cell surface receptors that link the ECM to the cytoskeleton. The ECM can also promote cell migration by binding to growth factors, which are proteins that stimulate cell movement. The ECM can also regulate cell differentiation by providing a variety of cues that can influence gene expression. For example, the ECM can promote osteoblast differentiation by binding to bone morphogenetic proteins (BMPs),which are proteins that induce bone formation.

The ECM is also involved in tissue development and repair. During development, the ECM provides a scaffold for cells to organize and differentiate into tissues. The ECM also plays a role in tissue repair by providing a framework for cells to migrate and proliferate to repair damaged tissue.

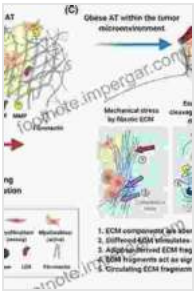
Regulation of the ECM

The ECM is a dynamic structure that is constantly being remodeled by cells. The synthesis and degradation of ECM components is regulated by a variety of factors, including growth factors, hormones, and cytokines. Growth factors are proteins that stimulate cell proliferation, and they can also induce the production of ECM components. Hormones are chemicals that are produced by glands, and they can also regulate the production of ECM components. Cytokines are proteins that are produced by immune cells, and they can also regulate the production of ECM components.

The remodeling of the ECM is essential for tissue development and repair. The ECM must be constantly remodeled to accommodate changes in cell number and shape, and to repair damaged tissue. The remodeling of the ECM is also important for the regulation of cell behavior. The ECM can provide a variety of cues to cells, and these cues can influence cell adhesion, migration, differentiation, and proliferation.

Role of the ECM in disease

The dysregulation of the ECM can contribute to a variety of diseases. For example, the excessive production of ECM components can lead to fibrosis, which is a condition in which tissues become thickened and



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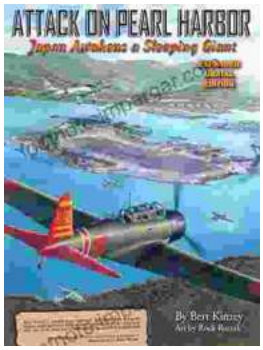

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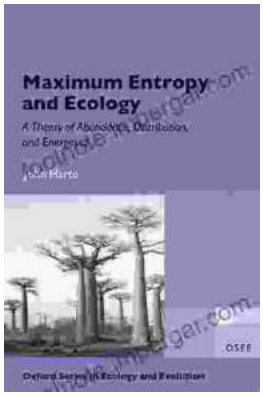

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