Record Nr.	UNINA9910484442703321
Titolo	Decellularized materials : preparations and biomedical applications / / Xiaoming Li, Huiqi Xie, editors
Pubbl/distr/stampa	Gateway East, Singapore : , : Springer, , [2021] ©2021
ISBN	981-336-962-0
Descrizione fisica	1 online resource (517 pages)
Disciplina	610.28
Soggetti	Tissue engineering Enginyeria de teixits Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro Acknowledgements Contents About the Editors Chapter 1: Overview of Decellularized Materials for Tissue Repair and Organ Replacement 1.1 Background of Decellularized Materials 1.2 Preparation of Decellularized Materials 1.3 Composition and Structure of Decellularized Materials 1.3.1 Composition of Decellularized Materials 1.3.1.1 Collagen 1.3.1.2 Elastin 1.3.1.3 Proteoglycan and Glycosaminoglycan 1.3.1.4 Fibronectin and Laminin 1.3.1.5 Growth Factor 1.3.1.6 Matrix-Bound Nanovesicles 1.3.2 Structure of Decellularized Materials 1.4 Degradation of Decellularized Materials 1.5 Mechanisms of Decellularized Materials on Promoting Tissue Repair/Organ Replacement 1.5.1 Initiating Relatively Low Host Tissue Response to Provide Regeneration Microenvironment 1.5.2 Containing Bioactive Factors to Recruit Endogenous Stems/Progenitor Cells and Promote Matrix Production and Angiogenesis 1.6 Decellularized Tissues and Their Applications 1.7 Decellularized Organs and Their Recellularization 1.8 The Structure and Main Content of this Book References Chapter 2: The Decellularization of Tissues 2.1 Description of Decellularization Protocols 2.1.1 Physical Methods 2.1.1.1 Freeze-Thaw 2.1.1.2 Ultrasound 2.1.1.3 Pressure Gradient 2.1.1.4 Supercritical Fluid Extraction 2.1.1.5

1.

Electroporation -- 2.1.1.6 Immersion and Agitation -- 2.1.2 Chemical Methods -- 2.1.2.1 Alkaline and Acid Treatments -- 2.1.2.2 Non-ionic Detergents -- 2.1.2.3 Ionic Detergents -- 2.1.2.4 Zwitterionic Detergents -- 2.1.2.5 Tri(n-butyl)phosphate -- 2.1.2.6 Hypotonic and Hypertonic Treatments -- 2.1.2.7 Polyethylene Glycol -- 2.1.2.8 Alcohols and Acetone -- 2.1.3 Biological Methods -- 2.1.3.1 Nuclease -- 2.1.3.2 Trypsin -- 2.1.3.3 Dispase -- 2.1.3.4 Lipase -- 2.1.3.5 -Galactosidase.

2.1.3.6 Chelating Agents -- 2.1.4 New Methods -- 2.1.4.1 Apoptosis -- 2.1.4.2 Serum -- 2.1.5 Combinatorial Methods -- 2.2 Evaluation of Decellularization -- 2.2.1 Establishing Metrics for Effective Decellularization -- 2.2.2 Evaluation Methods -- 2.2.2.1 Histological Analysis -- 2.2.2.2 Immunohistochemistry -- 2.2.2.3 DNA Assay --2.2.2.4 SDS-PAGE -- 2.2.2.5 Mechanical Testing -- 2.2.3 Effect of Ineffective Decellularization -- 2.3 Subsequent Cleaning and Sterilization -- 2.3.1 Subsequent Cleaning of Decellularized Tissues --2.3.2 Regulatory Requirements for Sterilization -- 2.3.3 Sterilization of Decellularized Tissues -- 2.3.3.1 -Irradiation -- 2.3.3.2 Ethylene Oxide Exposure -- 2.3.3.3 Supercritical Carbon Dioxide -- 2.4 Conclusions and Future Considerations -- References -- Chapter 3: Different Forms of Decellularized Tissues and Their Characteristics, Applications in Tissue Repair as Well as Perfo... -- 3.1 Scaffolds in Sheet and Tubular -- 3.2 Extracellular Matrix Powders -- 3.2.1 Preparation Methods and Characteristics -- 3.2.2 Optimization and Applications -- 3.2.3 Usage Concentration -- 3.2.4 Particle Morphology -- 3.2.5 Sterilization Methods -- 3.2.6 Solubilization Properties -- 3.2.7 Crosslinking Methods -- 3.2.8 The Applications of ECM Powder in Tissue Engineering -- 3.2.8.1 ECM Powder as Carrier --3.2.8.2 Cell Culture Carrier -- 3.2.8.3 Drug Delivery Vehicle -- 3.2.8.4 Powder Substrate -- 3.2.8.5 ECM Modification -- 3.2.8.6 3D Bioprinting Ink -- 3.2.8.7 Clinical Application of Powder-Based ECM --3.3 Extracellular Matrix Hydrogels -- 3.3.1 Preparation Methods --3.3.2 Characteristics -- 3.3.2.1 Microstructure -- 3.3.2.2 Rheological Properties -- 3.3.3 Applications and Efforts in Performance Optimization -- 3.4 Extracellular Matrix Coating -- 3.4.1 Preparation Methods and Characteristics. 3.4.2 Applications and Efforts in Performance Optimization -- 3.5 3D Printing Tissue ECM Scaffolds -- 3.5.1 Preparation Methods and Characteristics -- 3.5.2 Applications and Efforts in Performance Optimization -- 3.6 Conclusions -- References -- Chapter 4: Applications of Decellularized Materials for Tissue Repair -- 4.1 Introduction -- 4.2 Decellularized Materials for Musculoskeletal Tissue Engineering -- 4.2.1 Bone Tissue Engineering -- 4.2.1.1 Structure and Characteristics of Bone -- 4.2.1.2 Requirements for Bone Tissue Engineering Materials -- 4.2.2 Cartilage Tissue Engineering -- 4.2.2.1 Structure and Characteristics of Cartilage -- 4.2.2.2 Requirements for Cartilage Tissue Engineering Materials -- 4.2.2.3 Applications of Decellularized Materials in Cartilage -- 4.2.3 Ligament and Tendon Tissue Engineering -- 4.2.3.1 Structure and Characteristics of Tendon and Ligament -- 4.2.3.2 Requirements for Tendon and Ligament Tissue Engineering Materials -- 4.2.3.3 Applications of Decellularized Materials in Tendon and Ligament -- 4.3 Decellularized Materials for Skin Tissue Engineering -- 4.3.1 Structure and Characteristics of Skin -- 4.3.2 Requirements for Skin Tissue Engineering Materials -- 4.3.3 Applications of Decellularized Materials in Skin -- 4.4 Decellularized Materials for Bladder Tissue Engineering -- 4.4.1 Structure and Characteristics of Bladder -- 4.4.2 Requirements for Bladder Tissue Engineering Materials -- 4.4.3 Applications of Decellularized Materials

in Bladder -- 4.5 Decellularized Materials for Abdominal Wall Tissue Engineering -- 4.5.1 Structure and Characteristics of Abdominal Wall -- 4.5.2 Requirements for Abdominal Wall Tissue Engineering Materials -- 4.5.3 Applications of Decellularized Materials in Abdominal Wall --4.6 Decellularized Materials for Cardiovascular Tissue Engineering. 4.6.1 Structure and Characteristics of Cardiovascular -- 4.6.2 Requirements for Cardiovascular Tissue Engineering Materials -- 4.6.3 Applications of Decellularized Materials in Cardiovascular -- 4.7 Others -- 4.7.1 Trachea Tissue Engineering -- 4.7.1.1 Structure and Characteristics of Trachea Tissue -- 4.7.1.2 Requirements of Trachea Tissue Engineering -- 4.7.1.3 Applications of Decellularized Materials for Trachea Tissue Engineering -- 4.7.2 Gastrointestinal Tissue Engineering -- 4.7.2.1 Structure and Characteristics of Gastrointestinal -- 4.7.2.2 Requirements for Gastrointestinal Tissue Engineering Materials -- 4.7.2.3 Applications of Decellularized Materials in Gastrointestinal -- 4.7.3 Esophagus Tissue Engineering -- 4.7.3.1 Structure and Characteristics of Esophagus -- 4.7.3.2 Requirements for Esophagus Tissue Engineering Materials -- 4.7.3.3 Applications of Decellularized Materials in Esophagus -- 4.7.4 Nerve Tissue Engineering -- 4.7.4.1 Structure and Characteristics of Nerve --4.7.4.2 Requirements for Nerve Tissue Engineering Materials -- 4.7.4.3 Applications of Decellularized Materials in Nerve -- References --Chapter 5: The Decellularization of Whole Organs -- 5.1 Decellularization Method -- 5.1.1 Physical Method -- 5.1.2 Chemical Method -- 5.1.3 Enzyme Decellularization -- 5.1.4 Decellularized Perfusion -- 5.2 General Effective Standards for the Decellularization of Organs -- 5.2.1 Cell Composition -- 5.2.2 ECM Structure -- 5.2.3 ECM Composition -- 5.2.4 Immunological Analysis -- 5.2.5 Mechanical Strength -- 5.2.6 Detergent Residue -- 5.3 The Decellularization of Different Whole Organs -- 5.3.1 Heart -- 5.3.2 Lung -- 5.3.3 Liver --5.3.4 Kidney -- 5.3.5 Pancreas -- 5.3.6 Intestine -- 5.3.7 Uterus --References -- Chapter 6: Recellularization of Decellularized Whole Organ Scaffolds: Elements, Progresses, and Challenges -- 6.1 Introduction.

6.2 Cell Sources for Whole Organ Engineering -- 6.2.1 General Considerations -- 6.2.1.1 Differentiated Versus Stem Cells -- 6.2.1.2 Autologous Versus Allogenic Cells -- 6.2.1.3 Other Considerations --6.2.2 Cell Lines -- 6.2.3 Endothelial Progenitor Cells and Endothelial Cells -- 6.2.3.1 Endothelial Progenitor Cells (EPCs) -- 6.2.3.2 Endothelial Cells (ECs) -- 6.2.4 Organ-Derived Cells for Whole Organ Engineering -- 6.2.4.1 Differentiated Cells Isolated from the Organ of Interest -- 6.2.4.2 Organ-Derived Stem/Progenitor Cells -- 6.2.5 Stem Cells for Whole Organ Engineering -- 6.2.5.1 ESCs for Whole Organ Engineering -- 6.2.5.2 iPSCs for Whole Organ Engineering -- 6.2.5.3 Adult Stem Cells for Whole Organ Engineering -- Perinatal Stem Cells -- Mesenchymal stem cells (MSCs) -- 6.3 Decellularization of Whole Organ Scaffolds -- 6.3.1 Decellularization Methods -- 6.3.1.1 Set up a Perfusion System -- 6.3.1.2 Factors Used in Whole Organ Decellularization -- Physical Factors -- Chemical Factors -- Enzymatic Factors -- 6.3.1.3 Sterilization of the Whole Organ Scaffolds -- 6.3.2 Evaluation of Decellularization -- 6.3.2.1 Integrity of Vascular Structures -- 6.3.2.2 Detergent Residual -- 6.3.2.3 Cellular Components -- 6.3.2.4 ECM Components -- 6.3.2.5 Mechanics of the Decellularized Scaffolds -- 6.3.3 Decellularized Whole Organ Scaffolds -- 6.3.3.1 Decellularized Heart Scaffolds -- 6.3.3.2 Decellularized Liver Scaffolds -- 6.3.3.3 Decellularized Lung Scaffolds -- 6.3.3.4 Decellularized Kidney Scaffolds -- 6.3.3.5 Decellularized Pancreas Scaffolds -- 6.4 Recellularization Methods for Whole Organ Engineering -- 6.4.1 Recellularization Methods -- 6.4.1.1 Cell Delivery -- Cell Number -- Delivery Routes -- Cell Concentration -- 6.4.1.2 Perfusion Culture -- 6.4.1.3 Endpoints -- 6.4.2 Bioreactor -- 6.4.2.1 The Basic Framework of a Bioreactor. 6.4.2.2 Organ-Specific Bioreactors.