Postgraduate Certificate in Biofabrication Fabrication

Tissue Engineering and Regenerative Medicine

3D Bioprinting
Related terms: Additive Manufacturing, Biofabrication

3D bioprinting is a type of additive manufacturing that uses biological materials, such as cells, growth factors, and biomaterials, to create complex structures in a layer-by-layer manner. This technology has the potential to revolutionize the field of tissue engineering and regenerative medicine by enabling the creation of functional tissues and organs for transplantation.

Acellular Matrix
Related terms: Decellularization, Tissue Engineering

An acellular matrix is a matrix that has been stripped of its cellular components, leaving behind the extracellular matrix (ECM). Acellular matrices can be used as a scaffold for tissue engineering, providing a natural environment for cells to grow and differentiate. Decellularization is the process of removing cells from a tissue or organ, leaving behind the ECM.

Bioactive Materials
Related terms: Biomaterials, Tissue Engineering

Bioactive materials are materials that elicit a specific biological response when in contact with living tissue. These materials can be used in tissue engineering to promote cell adhesion, proliferation, and differentiation.

Biomaterials
Related terms: Biocompatibility, Tissue Engineering

Biomaterials are materials that are used in contact with living tissue. These materials can be natural or synthetic and must be biocompatible, meaning they do not elicit an adverse reaction when in contact with living tissue. Biomaterials are used in a wide range of medical devices, including implants, prosthetics, and tissue engineering scaffolds.

Bioreactor
Related terms: Tissue Engineering, Cell Culture

A bioreactor is a device that is used to culturing cells in a controlled environment. Bioreactors are used in tissue engineering to provide the necessary conditions for cells to grow and differentiate, including nutrients, oxygen, and mechanical stimulation.

Cell Seed
Related terms: Tissue Engineering, Scaffold

A cell seed is a group of cells that are placed onto a scaffold for tissue engineering. The cells attach to the scaffold and begin to grow and differentiate, forming new tissue.

Decellularization
Related terms: Acellular Matrix, Tissue Engineering

Decellularization is the process of removing cells from a tissue or organ, leaving behind the extracellular matrix (ECM). Decellularized tissues and organs can be used as a scaffold for tissue engineering, providing a natural environment for cells to grow and differentiate.

Differentiation
Related terms: Tissue Engineering, Stem Cells

Differentiation is the process by which stem cells become specialized cells, such as muscle cells, nerve cells, or bone cells. Differentiation is controlled by a variety of factors, including growth factors, biomaterials, and mechanical stimulation.

Extracellular Matrix (ECM)
Related terms: Acellular Matrix, Tissue Engineering

The extracellular matrix (ECM) is the non-cellular component of tissues and organs. The ECM provides structural support and biochemical signals that regulate cell behavior. Acellular matrices are matrices that have been stripped of their cellular components, leaving behind the ECM.

Growth Factors
Related terms: Tissue Engineering, Differentiation

Growth factors are signaling molecules that regulate cell behavior, including proliferation, differentiation, and survival. Growth factors are used in tissue engineering to promote the growth and differentiation of cells.

Hydrogels
Related terms: Biomaterials, Tissue Engineering

Hydrogels are crosslinked networks of hydrophilic polymers that can absorb large amounts of water. Hydrogels are used in tissue engineering as a scaffold for cell growth and differentiation.

Regenerative Medicine
Related terms: Tissue Engineering, Stem Cells

Regenerative medicine is a branch of medicine that focuses on the repair and regeneration of tissues and organs. Regenerative medicine uses a variety of approaches, including tissue engineering, stem cell therapy, and gene therapy, to restore function to damaged tissues and organs.

Scaffold
Related terms: Tissue Engineering, Cell Seed

A scaffold is a 3D structure that is used to support the growth and differentiation of cells in tissue engineering. Scaffolds can be made from a variety of materials, including natural and synthetic biomaterials, and can be tailored to specific applications.

Self-Assembly
Related terms: Biofabrication, 3D Bioprinting

Self-assembly is the process by which components spontaneously organize themselves into a specific structure. Self-assembly is used in biofabrication to create complex structures, such as tissues and organs, in a layer-by-layer manner.

Stem Cells
Related terms: Differentiation, Regenerative Medicine

Stem cells are undifferentiated cells that have the ability to differentiate into specialized cells, such as muscle cells, nerve cells, or bone cells. Stem cells are used in tissue engineering and regenerative medicine to repair and regenerate damaged tissues and organs.

Tissue Engineering
Related terms: Scaffold, Regenerative Medicine

Tissue engineering is a multidisciplinary field that combines engineering, biology, and medicine to develop functional tissues and organs for transplantation. Tissue engineering uses a variety of approaches, including scaffolds, cells, and growth factors, to create functional tissues and organs.

Biocompatibility
Related terms: Biomaterials, Tissue Engineering

Biocompatibility is the ability of a material to be used in contact with living tissue without causing an adverse reaction. Biocompatibility is an important consideration in the development of biomaterials and tissue engineering scaffolds.

Cell Culture
Related terms: Bioreactor, Tissue Engineering

Cell culture is the process of growing cells in a controlled environment. Cell culture is used in tissue engineering to provide the necessary conditions for cells to grow and differentiate, including nutrients, oxygen, and mechanical stimulation.

Layer-by-Layer
Related terms: 3D Bioprinting, Self-Assembly

Layer-by-layer is a technique used in 3D bioprinting and self-assembly to create complex structures in a stepwise manner. Layers of cells, biomaterials, and growth factors are deposited one at a time to build up a 3D structure.

Mechanical Stimulation
Related terms: Tissue Engineering, Differentiation

Mechanical stimulation is the application of physical forces to cells or tissues. Mechanical stimulation is used in tissue engineering to promote the growth and differentiation of cells.

Printability
Related terms: 3D Bioprinting, Biofabrication

Printability is the ability of a material to be used in 3D bioprinting or biofabrication. Printability is determined by the properties of the material, including its rheological properties, resolution, and structural integrity.

In summary, Tissue Engineering and Regenerative Medicine are fields that use a variety of approaches, including scaffolds, cells, and growth factors, to create functional tissues and organs for transplantation. These fields use a variety of technologies such as 3D Bioprinting, Biofabrication, Bioreactor, Biocompatibility, Cell Culture, Layer-by-Layer, Mechanical Stimulation and Printability. Understanding these concepts and terms are crucial for anyone looking to delve deeper into the field of tissue engineering, regenerative medicine, biofabrication and 3D bioprinting.