

Difference Between Tissue Engineering and Regenerative Medicine

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Key Difference - Tissue Engineering vs Regenerative Medicine

Cells are the fundamental units of tissues of the living organisms. Each cell has a lifetime. When this lifetime ends, the cells die, and new cells are generated. This is a natural process known as [apoptosis](#). However, some cells die prematurely due to various factors such as infection, toxin, trauma, etc. [Stem cells](#) are the undifferentiated cells which specialize later into [tissues](#). Tissues and organs contribute to major functions in the body. Tissues are damaged due to different factors. Some tissues recover by [regeneration](#). But some tissue damages cannot be recovered naturally. Using advanced technology and medicine, tissues can be transplanted, and tissue regeneration can be enhanced. Tissue engineering and regenerative medicine are rapidly developing two fields which help people who suffer from tissue loss and damages. The key difference between tissue engineering and regenerative medicine is **that tissue engineering is defined as a practice of combining scaffolds, cells, and biologically active molecules into functional tissues while regenerative medicine is a broad field which includes tissue engineering and self-healing with the help of foreign biological material to recreate cells and rebuild tissues and organs.** These two words are often used interchangeably.

What is Tissue Engineering?

Tissue engineering is a technique which uses combining of cells, scaffolds or biologically active molecules into functional damaged tissues. It is a subfield of regenerative medicine. The objective of tissue engineering is to assemble functional constructs that restore, maintain, or improve damaged tissues or whole organs. There are several types of bioengineered organs manufactured using tissue engineering technologies. Some examples include artificial skin, cartilage, kidney, liver, etc.

Tissue engineering can be defined simply as a technology of manufacturing body parts *ex vivo* through combining cells or supporting scaffold. Tissue engineering process begins with the manufacturing of scaffolds prior to seeding cells of biologically active molecules. The scaffold can be made using proteins or plastics. Once the scaffold is manufactured, cells and growth factors can be

supplied for tissue generation. The necessary environmental conditions should be maintained until the tissue develops. There is another method practiced in tissue engineering. It uses the existing scaffold to create new tissue, and the cells of donor organ are stripped. It is a promising technology to transplant liver, kidney, lung, heart tissue, etc.

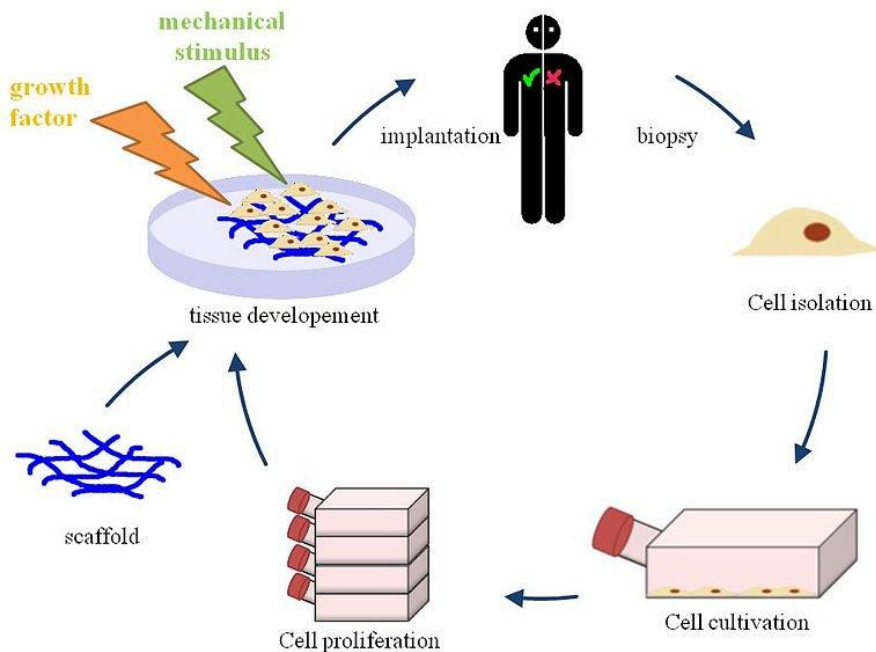


Figure 01: Tissue engineering

What is Regenerative Medicine?

Regenerative medicine is a broad field which includes tissue engineering and self-healing using own systems or aiding foreign biological materials to regenerate cells or tissues. Though tissue engineering is a subfield of regenerative medicine, these two fields focus on one main objective, which is curing patients who suffer from tissue problems. Regenerative medicine belongs to the field of health sciences which focuses on replacing or regenerating human cells, tissues or organs in order to re-establish normal functions. Regenerative medicine is an important field that helps regeneration of tired and falling organ systems and reduces the [chronic](#) diseases.

Stem cells are used in regenerative medicine. These are the cells which are undifferentiated. They are pluripotent cells which can differentiate into many types of special tissues. Stem cells are engineered to restore or regenerate tissues.

Strategies For Tissue and Organ Engineering

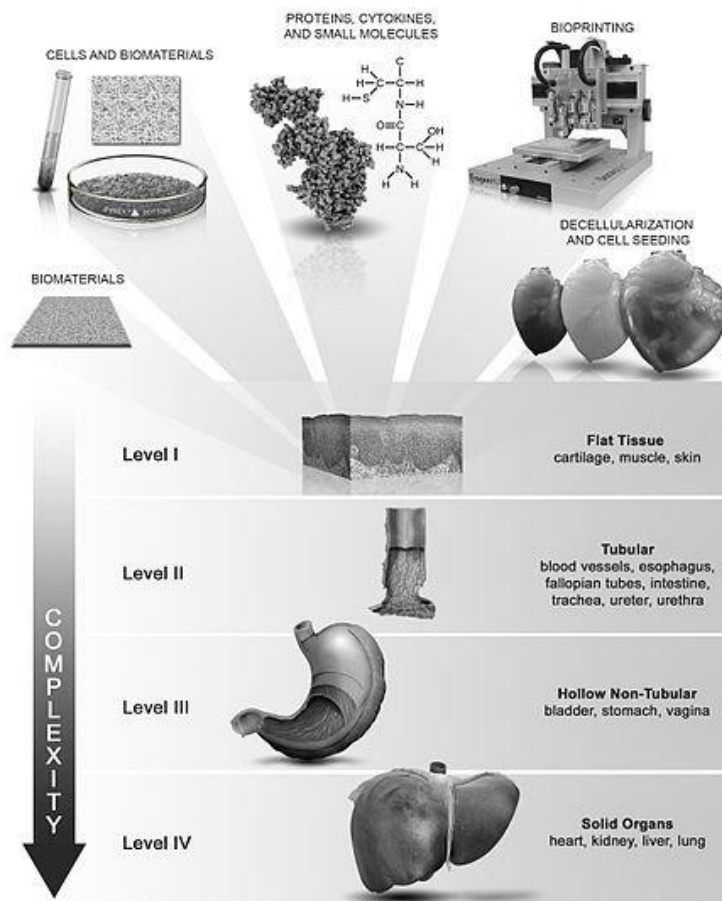


Figure 02: Regenerative Medicine – Tissue and organ engineering

What is the difference between Tissue Engineering and Regenerative Medicine?

Tissue Engineering vs Regenerative Medicine	
Tissue engineering is a field which aims to develop biological substitutes that restore, maintain and improve tissue function.	Regenerative medicine is a field of health science which deals with the process of replacing, engineering or regenerating human cells, tissues or organs to restore normal functions.
Areas	
Tissue engineering is a subfield of regenerative medicine.	Regenerative medicine includes tissue engineering and molecular biology.

Summary - Tissue Engineering vs Regenerative Medicine

Tissue engineering is the practice of combining scaffolds, cells, and biologically active molecules into functional tissues. Tissue engineering falls under regenerative medicine which deals with the process of replacing regenerating cells or tissues to reestablish the normal tissue function. This is the difference

between tissue engineering and regenerative medicine. Both fields are highly evolving fields in the medicine today.

References:

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