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A Brief Note on Tissue Engineering

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Commentary

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DESCRIPTION

Tissue engineering is a biomedical engineering discipline that restores, maintains, improves, or replaces biological tissues using a combination of cells, engineering, materials technologies, and appropriate biochemical and physicochemical parameters. Tissue engineering is most commonly associated with the use of cells on tissue scaffolds in the development of new living tissue for medical purposes, however it is not restricted to cell and tissue scaffold applications. While it was once considered a sub-field of biomaterials, it has grown in scope and importance to the point where it can now be considered a separate field.

One of the most important components for tissue engineering success is cells. Tissue engineering is a technique that uses cells to create or replace new tissue. Fibroblasts, which are used for skin repair and renewal, chondrocytes, which are used for cartilage repair, and hepatocytes, which are utilised in liver support systems, are examples.

Tissue engineering applications can use cells alone or with support matrices. For cell-based building blocks, a suitable environment for cell development, differentiation, and integration with existing tissue are essential. Manipulation of any of these cell activities opens up new possibilities for tissue development.

Cell isolation techniques vary depending on the cell source. Techniques for removing cells from bio fluids include centrifugation and apheresis. Prior to centrifugation or apheresis techniques to extract cells from tissues/organs, digestion processes, which typically use enzymes to remove the Extracellular Matrix (ECM), are required. The most commonly utilised enzymes for tissue digestion are trypsin and collagenase. Collagenase is less susceptible to

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temperature changes than trypsin.

Primary cells are those that have been extracted directly from the host tissue. These cells provide an *ex-vivo* model of cell behaviour that is free of genetic, epigenetic, or developmental alterations, making them a more accurate representation of *in-vivo* settings than cells obtained by other approaches. This limitation, on the other hand, can make studying them difficult.

Cells of a secondary nature are a portion of a primary culture's cells are transferred to a new repository/vessel to continue to be cultured. The initial culture's medium is removed, the cells to be transferred are obtained, and the cells are subsequently cultivated in a new vessel with fresh growth medium. A secondary cell culture is useful for ensuring that cells have the space and nutrients they need to thrive. Secondary cultures are most commonly utilised in situations when a larger number of cells is required than can be found in the original culture. Secondary cells face the same limitations as primary cells, but they also face the possibility of contamination when moving to a new vessel.

A bioreactor is a device used in tissue engineering that attempts to mimic a physiological environment in order to promote cell or tissue growth in vitro. A physiological environment can include a variety of variables such as temperature, pressure, oxygen or carbon dioxide concentration, or fluid osmolality, and it can also include biological, chemical, or mechanical stimuli. As a result, there exist systems that apply forces to the tissue, such as electromagnetic forces, mechanical pressures, or fluid pressures. These systems might be two-dimensional or three dimensional. Bioreactors have applications in both academia and industry. There are also commercially available general purpose and application-specific bioreactors that can offer static chemical stimulation or a combination of chemical and mechanical stimulation.