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Tissue engineering, Past, Present and future

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Tissue engineering is an interdisciplinary field, involving biology, medicine, and engineering to improve the quality of life in many patients that suffering from different tissue damage in worldwide. The origin of "tissue engineering" as it is documented today can be clearly followed to a definite individual. In 1985, Y.C. Fung, a pioneer of the field of biomechanics and of bioengineering more broadly, submitted a proposal to NSF for an Engineering Research Center to be entitled "Center for the Engineering of Living Tissues"[1]
.
Fung's idea drew on the traditional definition of "tissue" as a fundamental level of analysis of living organisms, between cells and organs:"The study of organs and organ systems has historically been the domain of the physiologist and physician. There is, therefore, a relative wealth of practical information about organs, codified in terms of medical practice. On the other hand, tissues are composed of cells, having specialized internal organelles and, ultimately, chemical constituents. The composition of the cell and its constituents has been dealt with by cell biologist and biochemist. There are relatively few focused efforts at bridging the gap between these extremes.Aclear understanding of phenomena at the tissue level is prerequisite to the engineering of tissues."

Fung's proposal was not accepted. However, the concept of an engineering approach to the level of biological organization between cells and organs appeared again at NSF in the spring of 1987, at a panel meeting organized to review proposals to the Bioengineering and Research to aid the Handicapped(BRAH) Program within the Engineering Directorate. Fung was present at this meeting, and is recalled as having volunteered the term "tissue engineering" in the course of a discussion that was seeking to crystallize the concept[2].

In 1988 it defined by National Science Foundation as "Tissue engineering is the application of the principles and methods of engineering and the life sciences toward the fundamental understanding of structure-function relationships in normal and pathological mammalian tissues and the development of biological substitutes to restore, maintain or improve functions"; and in 1993 Langer and Vacanti, gave us a valuable definition as "Tissue engineering is an interdisciplinary field that applies the principles of engineering and the life sciences toward the development of
biological substitutes that restore, maintain or improve tissue function" that appear in science journal [3].
Basic Features of Tissue Engineering are 1) Engineering methods and design,2) Quantitative, computational, and modeling approaches to molecular, cell, and tissue biology (multiple functional levels), 3)Cell and tissue characterization and dynamic response (e.g., cell-biomaterial interface),4) Technology translation and commercialization.

As a main Problem and Serious Health Economic Issue is Tissue loss or organ failure due to injury or disease that is one of the most tragic as well as costly problems inhuman health care. Half a trillion dollars are spent each year in the United States alone to care for patients who suffer from tissue loss or end-stage organ failure.Right now different fabricated material in case of allograft, autograft, xenograft and synthetic in associated with appropriate mineral or organic agents are applying for designing of different types of scaffold in shape and size. Differentiation Stem cells and signaling molecules such as growth factors can enhanced the scaffold ability to accelerate the healing processes.

Tissue engineering methods for growing and engrafting the differentiated issue of embryonic, fetal, or adult stem cells have key potential for tissue regeneration and will perform a main role to medicine in the 21st century[4].Organ engineering is a concept belongs to future that can help patients suffering from diseased and injured organs. Scientists in the field of regenerative medicine and tissue engineeringare now applying the principles of cell transplantation, material science, and bioengineering to construct biological substitutes that will restore and maintain normal function in diseased and injuredtissues [5].

Refrences:

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