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TISSUE ENGINEERING & WOUND HEALING

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Tissue engineering revolutionized the therapeutic potential for hard-to-heal wounds and for wounds that are not amenable to primary closure. Over the past decades, there have been extraordinary advances in our understanding of the cellular and molecular processes involved in acute wound healing and in the pathobiology of chronic wounds. Increased knowledge has led to wound care innovations.

There are there major areas of research relating to stimulating complex wounds to heal.

- Use of biologics (growth factors and stem cells)
- Use of artificial extracellular matrices for regeneration
- Effect of mechanical forces on wound healing

Four components are essential for tissue engineering

- Stem cells
- A matrix or scaffold
- A bioreactor (culture medium)
- Cytokines

Two major approaches have been utilized to develop engineered tissue

- *In vitro* (cellular constructs)
- *In vivo* (acellular constructs)

The goal of tissue engineering has been initially to substitute in patients with extensive burns split-thickness auto grafts or allografts with tissue-engineered autologous epidermal sheets (CEA's) grown from small punch biopsies. Difficulties encountered with standard CEA's have stimulated the development of various products with different delivery systems. Although increased healing rates of burn and/or chronic wounds can be observed with current engineered constructs, several intrinsic shortcomings limit their use. Currently, unfortunately no commercial products readily available can permanently replace both dermis and epidermis in a single-stage application procedure. Further improvements are needed to insure that tissue-engineered constructs are less complex, more cost effective and user friendly, and carry minimal risk of infection.

Notes: