

Basic Science

- Matrix nativity is important in wound healing
- MatriDerm shows similar properties to human dermis
- MatriDerm has superior biological activity compared to Integra and Pelnac
- MatriDerm provides a superior surface for natural tissue regeneration

BIOLOGICAL DERMAL TEMPLATES WITH NATIVE COLLAGEN SCAFFOLDS PROVIDE GUIDING RIDGES FOR INVADING CELLS AND MAY PROMOTE STRUCTURED DERMAL WOUND HEALING

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BACKGROUND

- Successful wound healing depends on carefully orchestrated cellular and physiological processes at the host-biomaterial interface
- There are different properties a dermal substitute has to fulfil to enhance tissue regeneration
- The degradation of biodegradable natural materials needs to follow the dynamics of the wound repair, guaranteeing the physiological healing evolution, and releasing active principles when needed

STUDY GOAL

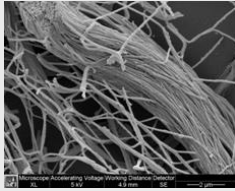
- To test whether native collagen networks can promote superior cell adhesion and proliferation on the surface of different commercially available dermal templates

METHODS

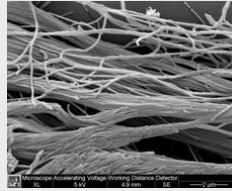
- Investigated products: MatriDerm[®], Integra[®] and Pelnac[®]
- The binding properties and cellular architecture of keratinocytes and fibroblasts on the different collagen matrices were assessed
 - Cell attachment, cell spreading, and cell proliferation
 - Cell alignment, elongation, and circularity
- Methods used:
 - Transmission electron microscopy
 - Scanning electron microscopy
 - Immunoelectron microscopy

RESULTS

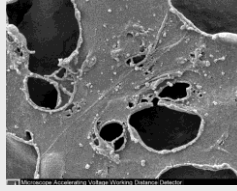
MatriDerm ultrastructural is similar to human skin



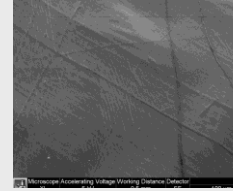
Human dermis



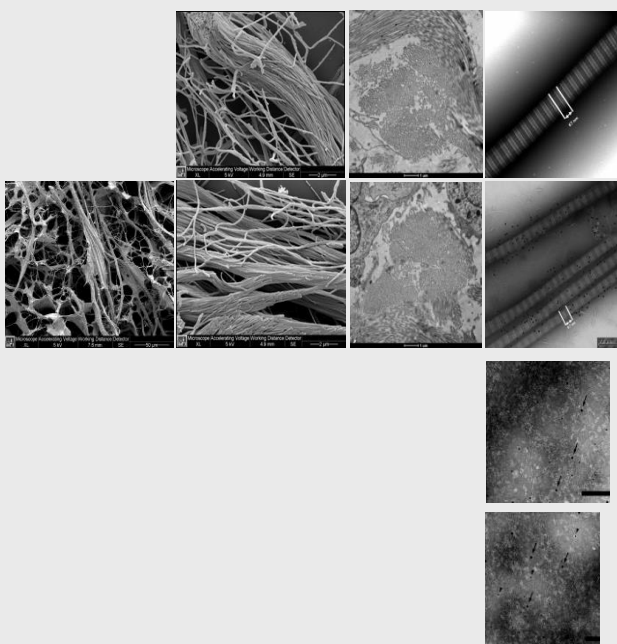
MatriDerm



Integra



Pelnac



Human dermis

MatriDerm

Integra

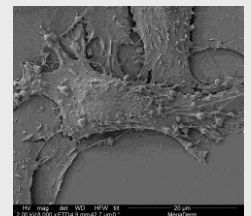
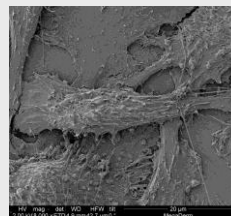
Pelnac

- MatriDerm demonstrated similar ultrastructural features as native collagen fibre bundles in dermis
- Integra and Pelnac demonstrated large fields with amorphous structures

Native collagen fibrils in MatriDerm promote cell adherence and cell spreading

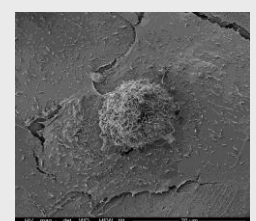
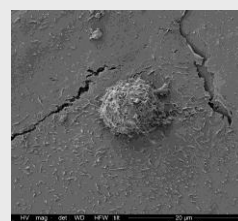


Elongated fibroblast firmly adhered on MatriDerm fibril



Left: Elongated Human skin fibroblast. Right: MatriDerm

- The native collagen fibril scaffolds found in MatriDerm provide compatible surfaces for natural cell adherence, spreading, proliferation, and viability.
- Integra and Pelnac show lesser amounts of native, intact collagen fibril networks and appear to exhibit a less pronounced potential to harbour these properties.
- Due to its nativity, MatriDerm provide a better surface for natural wound healing and tissue regeneration



Left: Round shaped Fibroblast on Integra. Right: Pelnac