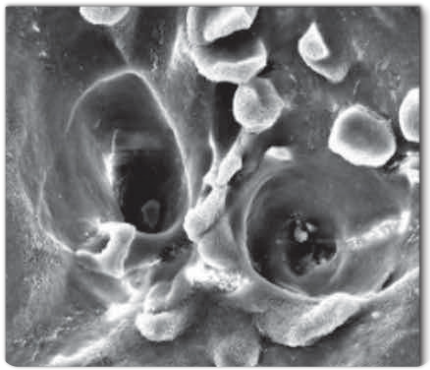
Acute Cutaneous Wounds Treated with Human Decellularised Dermis (DCD) Show Enhanced Angiogenesis During Healing

Nicholas S. Greaves, Julie Morris, Brian Benatar, Teresa Alonso-Rasgado , Mohamed Baguneid, Ardeshir Bayat

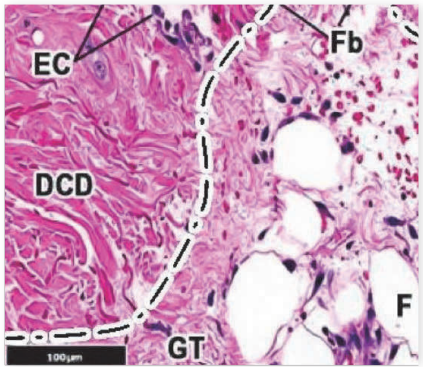
This study compared the angiogenic response in acute human wounds treated with an autograft, allograft, and xenograft compared to control (secondary intention).

This study demonstrated the following about DCD:

MIGRATION & PROLIFERATION OF NATIVE CELLS INCLUDING ENDOTHELIAL CELLS AND FIBROBLASTS



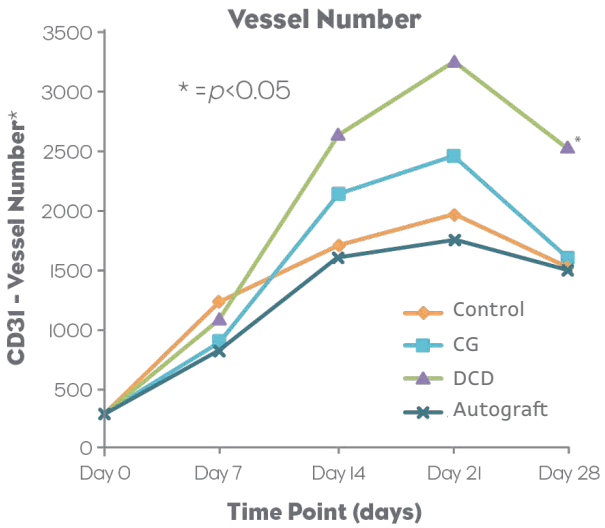
Allograft - DCD Vascular Channels



Allograft - DCD at 7 days

Vascular channels in DCD represented an access point for migration and proliferation of endothelial cells and fibroblasts.

DEVELOPMENT OF NEW VASCULATURE



Endothelial cell marker, CD31 was higher for DCD than all other groups between the 7 to 14-day mark and significantly higher at day 21 and 28.

CD31 increase *- new vessel formation.*

Endothelial cells *- line the vasculature. New blood vessels form by sprouting of endothelial cells.*

This study provides corroborating evidence that treatment with DCD resulted in increased angiogenesis.

DCD – DermaPure, **EC** – Endothelial Cells, **Fb** – Fibroblast, **F** – Subcutaneous fat,
GT – Granulation Tissue, **CG** - Integra Wound Matrix, **Black dotted line** – border between DCD and host tissue

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Skin Substitute-Assisted Repair Shows Reduced Dermal Fibrosis in Acute Human Wounds Validated Simultaneously by Histology and Optical Tomography

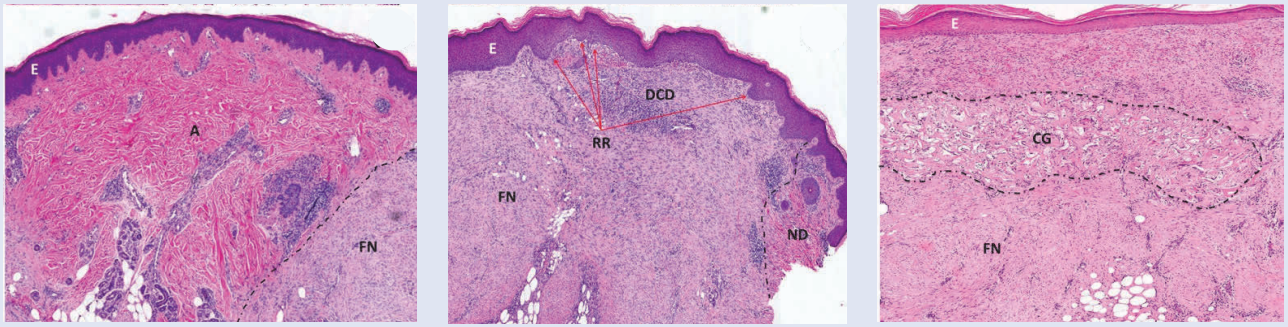
Nicholas S. Greaves, Syed A. Iqbal, Tom Hodgkinson, Julie Morris, Brian Benatar, Teresa Alonso-Rasgado , Mohamed Baguneid, Ardeshir Bayat

This study identified and quantified fibrotic outcomes in wounds treated with an autograft, allograft, and xenograft compared to control (secondary intention).

This study demonstrated the following about DCD:

INTEGRATES WITH AND CLOSELY APPROXIMATES THE STRUCTURE AND FUNCTION OF NATIVE TISSUE

Comparative histology at 28 days after injury



Autograft
- Retention of normal ECM architecture
- Minimal fibrosis

Allograft - DCD
- Cellular infiltration
- Partial rete ridge reformation
- Uniform fibrosis
- Allograft could not be distinguished from native dermis

Xenograft - CG
- A dense, thick band of fibrosis
- Xenograft remains visibly present

Treatment with autografts or DCD resulted in reduced dermal fibrosis compared to equivalent injuries treated with xenograft and those healing by secondary intention.

EXPRESSION OF IMMUNE REGULATORY GENES

DCD only:
Unique bimodal expression of Oncostatin M (OSM) & Interleukin 10 (IL10)

OSM
- Mitogen for fibroblasts
- Limits monocytes cell recruitment

IL10
- Reduces inflammation
- Promotes regenerative healing

Author's statement:

The findings related to DCD are particularly exciting suggesting DCD may stimulate a more regenerative rather than reparative therapeutic option.

A - Autograft, **DCD** – DermaPure, **E** - Epidermis, **FN** - Fibrotic Neodermis, **CG** - Integra Wound Matrix, **GT** – Granulation Tissue, **ND** - Native Dermis, **RR** - Rete Ridges, **Black dotted line** – border between CG and host tissue

Citation: Greaves NS, Bayat A (2015). Skin Substitute-Assisted Repair Shows Reduced Dermal Fibrosis in Acute Human Wounds Validated Simultaneously by Histology and Optical Tomography. Wound Rep Reg (2015) 23 483–494

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