How Does Ultrastructural Stiffness and Structure Affect Wound Healing?

The burden of clinical management of skin scarring costs the NHS £8.3 billion per annum

X-ray Scattering for ECM Ultrastructure

Collagen tissues have hierarchical structure from amino acid through the fibril to fiber level.

Disordered collagen fibrils in early stage wound healing
Progressive nano/microscopic alignment with healing

Nanoindentation for ECM Biomechanics

Viscoelasticity adhesion modulus

Nanoscale mechanical stiffness lowered in wound healing

Conclusion & Outlook

Conclusion: New nanoscale features identified

Disordered fibrils 
Low collagen density 
Lower stiffness 
Inconsistent D-period

Early wound bed exhibits measurable mechanical and ultrastructural changes.

Outlook: Link with micro and macro scale changes
Link cell behaviour at microscale and tissue-level response at macroscale with nanoscale features.

Outlook: Biomarker identification
Characterise biomarkers to quantify impaired wound healing and fibrilic conditions.

Outlook: Therapy innovation
Use pipeline to evaluate existing therapies and find potential future treatments.

References and Acknowledgments

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