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SNAKE VENOM-CONTROLLED 3D FIBRIN ARCHITECTURE REVEALED BY SANS/USANS DICTATES FIBROBLAST DIFFERENTIATION

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Fibrin is the founding matrix after injury, delivering the key biophysical cues to promote wound healing in a timely and coordinated manner. The effect of the fibrin architecture on wound healing hasn't been studied due to a lack of control over the enzyme-catalyzed polymerization of the fibrin network in vitro. Here, we establish a new defined snake venom-controlled fibrin system with precisely and independently controlled architectural and mechanical properties. By utilising combined small-angle neutron scattering (SANS) and ultra-small angle neutron scattering (USANS) techniques, we characterize the full-scale architectural properties of the new system from the internal structure of the individual fibres to the structure of the fibrin networks and compare them to super-resolution optical methods. This very precise set of neutron scattering data confirms our full control over the network's architectural features, which serves as a foundation for the application of this defined system. The subsequent cell differentiation studies reveal that fibrin architecture has prevailing control over fibroblast spreading phenotypes and long-term myofibroblast differentiation. These findings implicate matrix architecture as a key activator of fibroblast differentiation and provide new biophysical strategies in the design of biomaterials to promote scarless wound healing.

Presenter Gender

Man

Do you wish to take part in the Student Poster Slam

Yes

Condition of submission

Yes

Students Only - Are you interested in AINSE student funding

Yes

Level of Expertise

Student

Pronouns

He/Him

Which facility did you use for your research

Australian Centre for Neutron Scattering

Primary authors: Mr WANG, Zhao (1Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, Australia.); Dr LAUKO, Jan (1Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, Australia.); Dr KIJJAS, Amanda (1Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, Australia.); Prof. GILBERT, Elliot (Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, Australia; Australian Centre for Neutron Scattering, Australian Nuclear Science and Technology Organization, Lucas Heights, NSW, Australia.); Prof. MATA, Jitendra (Australian Centre for Neutron Scattering, Australian Nuclear Science and Technology Organization, Lucas Heights, NSW, Australia.); Dr TURUNEN, Petri (Microscopy Core Facility, Institute of Molecular Biology, Mainz, Germany.); Prof. ROWAN, Alan (Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, Australia.)

Presenter: Mr WANG, Zhao (1Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, Australia.)

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