

# 5<sup>th</sup> World Congress on Cell & Stem Cell Research

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## Adipose mesenchymal stem cells and peripheral blood endothelial colony forming cells for tissue engineering

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**Objectives:** The synthetic replacement of full thickness skin is suboptimal both aesthetically and functionally. We aimed to improve upon existing dermal substitutes for wound healing by using adult-derived stem and progenitor cells to form blood vessels within fabricated scaffolds. In doing so, the goal was to improve the trajectory of wound healing since expeditious maturation has been suggested to improve outcomes.

**Methods:** Endothelial colony forming cells and mesenchymal stem cells were isolated from adult peripheral blood (PBECFC) and adipose tissue (AdMSC) and characterized. The PBECFC's were compared to cord blood and umbilical vein derived ECFCs for chemokinesis and chemotaxis within collagen and fibrin gels and using this data, we fabricated collagen gels containing ECFC and AdMSCs co-cultures. Tubule parameters from gels were calculated using confocal microscopy and Imaris 3D software and optimized pre-vascularized gels were scaled up and compared to empty gels within an immunodeficient murine wound model.

**Results and Conclusions:** We demonstrated that autologous adult-derived stem cells could be used to fabricate a pre-vascularized scaffold that enhanced wound to host integration with significantly more tubules noted at 7 days within our optimized pre-vascularized scaffolds than standard gels *in vivo* ( $p=0.04$ ). Our research could pave the way for improved graft take and appearance in full-thickness wound repair and lays the foundations for a world where split skin grafting following trauma or malignancy will no longer be necessary.

### Biography

Daniel Markeson is a plastic surgery resident based in Manchester, UK. After undertaking a BSc (Hons) in Neuroscience at the University of Birmingham, he completed his MBBS medical degree at University College London (UCL). He then trained in renowned London hospitals and undertook surgical training in Oxford before starting his plastic surgery residency in Manchester, UK. He has published 12 peer-reviewed articles and his interest in research led to him completing a research MD at UCL aged 32 in which he fabricated a novel collagen-based scaffold containing vascular networks using stem and progenitor cells derived from adult fat and blood.

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