AESTHETIC AND COSMETIC DERMATOLOGY (LASERS SEPARATE CATEGORY)

GENERATION OF A NOVEL 3D AGEING SKIN MODEL

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Introduction: Human skin ageing is a complex process, which is characterised as cumulative and progressive changes in the structure of human skin such as dermal atrophy and epidermal thinning. The development of an in vitro ageing skin model is imperative for industrial and academic laboratories, to further understanding of the intricate molecular mechanisms of skin ageing and to provide a platform for the screening of active compounds for pharmaceuticals and cosmetics.

Objective: This study aims to develop a novel 3D ageing skin model based on the Alvetex® scaffold technology. This ageing skin model will be used to investigate dermo-epidermal crosstalk during ageing, and inform novel anti-ageing strategies.

Materials and Methods: To mimic the dermal composition at different ages in vitro, we cultured primary fibroblasts isolated from neonatal (<14 days), young (<30 years), middle aged (40-45 years) and aged (60+ years) donors, within the Alvetex® scaffold to produce endogenous extracellular matrix proteins. An epidermal compartment was generated using commercially available neonatal keratinocytes, and structural changes were analysed by histological and immunofluorescence techniques.

Results: Results demonstrated that an increase in ageing dermal biomarkers such as decreased proliferative capacity and extracellular matrix synthesis can be recapitulated in vitro by incorporating ageing fibroblasts within the Alvetex® scaffold. Age-related changes such as decreased epidermal thickness were also observed in the young epidermis when co-cultured with an ageing dermis.

Conclusions: We have developed a novel 3D ageing skin model that recapitulates age-related changes in vitro. Future directions of this work include the incorporation of ageing keratinocytes to generate an advanced aged system, and an investigation into the paracrine effect of ageing fibroblasts on the structure of the epidermis. This work will provide an improved understanding of the dermo-epidermal crosstalk in skin ageing, and inform novel

anti-ageing strategies.