HAIR DISORDERS

A REGRESSIVE 3D SCAFFOLD FREE MICRO HAIR FOLLICLE (µHF) MODEL TO TEST PEPTIDE MIMETICS OF FGF18

M. Meloni [1] - J.s. Craw [2] - K. Rodan [2] - K. Fields [2]

Vitroscreen, In Vitro Research Laboratory, Milan, Italy [1] - Rodan + Fields, Life-changing Skincare, San Francisco, United States [2]

Introduction: The hair follicle (HF) is a self-renewing “mini-organ” which undergoes to continuous cycles of growth and regression, following a precise scheme in which a complex and fine-tuned interaction of signals induces deep metabolic and morphologic changes. The HF cycle is divided in an active growth phase (anagen), a regressive phase (catagen) and a final quiescence state (telogen). It is known that epithelial FGF18 is responsible for regulating the hair cycle through the non-grown phases although the transitions from the growth phase to the quiescent phase is not yet fully understood.

Objective: To establish a regressive HF in vitro model to elucidate the molecular mechanism underlying the quiescence state of HF and to develop tools for the screening of active compounds.

Materials and methods: We have developed a new 3D µHF model starting from 3D scaffold free micro hair follicle standard expressing the most relevant anagen biomarkers FGF7, BMP2 and WNT5b.

Results: This new 3D µHF can be induced into a catagen-like state (regression) by exposure to TGFβ-1, as determined by a significant down regulation of FGF7 gene expression. Furthermore, the µHF in this regressive state has been shown to continue to be sensitive to FGF18 exposure (10-100ng/ mL), as determined by increase down-regulation of FGF7 after 24h. In parallel the WNT5b gene, whose expression increases after TGFβ-1 exposure (probably connected to epithelial re-modelling as it occurs in catagen), was found to be significantly down regulated after the subsequent FGF18 exposure suggesting follicle quiescence and absence of epithelial compartment. Furthermore, ATP as a measure of metabolic activity was found reduced in the regressive µHF.

Conclusions: The new 3D µHF has been applied to screen various peptide mimetics of FGF18 for their ability to maintain quiescence: the results have shown a different efficacy according to the chemical structure and doses.