ISCH COST Action TD1206

Development and Implementation of European Standards on Prevention of Occupational Skin Diseases (StanDerm)

Short Term Scientific Mission (STSM) Report

STSM details

Title	**Keratinocytes differentiation and cellular stress**
Participant	Dr. Denis Khnykin Department of Pathology, Oslo University Hospital, Norway
Host	Dr. Leopold Eckhart Department of Dermatology, Medical University of Vienna, Austria
Period	10 – 14 April 2017

Background

Proinflammatory microenvironment induced by cellular stress in keratinocytes is an important factor in the generation of immune responses at sensitization phase of allergic contact dermatitis. Keratinocytes cellular stress can be induced by different ways, including an inappropriate process of terminal differentiation – cornification. Different genetic or environmental factors may affect the cornification process in keratinocytes, ultimately leading to a various degree of cellular and tissue stress in the human skin and predisposing to sensitization. The laboratory of Dr. Leopold Eckhart at the Medical University of Vienna has extensive experience on the molecular regulation of keratinocyte differentiation in the epidermis, including organotypic 3D epidermal models in vitro.

Aim (purpose) of the STSM

The aims of this STSM were:

- To get first-hand experience in establishing the 3D model of terminal differentiation in vitro
- To study the biomarkers of cellular stress during inappropriate keratinocytes differentiation
- To analyse, discuss and compare the data of studies performed by our research team and hosting lab in Wien

Work carried out during the STSM

During the one-week visit, I received all necessary information and first-hand experience in generating of 3D organotypic cell cultures, by using a protocol established and developed by Dr. Michael Mildner from the hosting lab. We did perform the experiment where we co-cultured primary human keratinocytes mixed with different ratio with melanocytes cell line plated on dermal equivalent, consisting of collagen matrix with embedded primary human fibroblasts. Upon lifting of plated cells and exposure to the air-liquid interface we could observe the formation of proper 3D cultures which would be further characterised by M. Mildner and colleagues to follow the formation of a proper epidermal barrier and for a histological characterisation of melanocytes clusters formation in 3D skin equivalents.
In addition to experimental work, a research seminar with title "Cellular stress caused by disturbed lipid metabolism in fetal skin predisposes for the development of allergic disorders" have been organized for research staff at the Medical University of Vienna, followed by Q&A session and fruitful discussion. Several face-to-face meeting has been organized with several members of the hosting lab to discuss ongoing projects at the Dermatology Department in Vienna and at the Department of Pathology in Oslo.

Main results obtained

The main result of this STSM is the collaboration between research laboratories in Oslo and Vienna regarding studies on mechanisms of epidermal barrier formation in 3D organotypic cell cultures in steady state and upon exposure to different stress conditions. Exchange of the protocols and knowledge about the experimental system, as well as fruitful discussion about different aspects of barrier formation and lipid metabolism in the skin, was an invaluable part of this scientific visit.

Future collaboration with the host institution

As a result of this STSM, collaboration based on short-term exchange of PhD students and research material (cell lines) is planned in the near future.

Foreseen publications/articles resulting from the STSM

While one week scientific mission is not enough to generate a sufficient amount of data for scientific publication, the future collaboration with hosting lab may result in several publications in the field of organotypic 3D skin equivalents generated with keratinocytes carrying mutations affecting the epidermal barrier.

Other comments

I want to express my great gratitude to Leopold Eckhart, to Michael Mildner and to all members of the hosting lab for their hospitality and for the possibility to learn a new technics.

Denis Khnykin
April 21, 2017