

Short Term Scientific Mission (STSM) Report

STSM details

Title	Development of a method for the sampling of interstitial fluid from the epidermis by using laser poration
Participant	Ivone Jakasa
Host	Sanja Kezic, Coronel Institute of Occupational Health, Academic Medical Center, University of Amsterdam, Netherlands
Period	16 – 28 July 2015

Aim of the STSM

Development of a method for the sampling of interstitial fluid from the epidermis by using laser poration: (i) evaluation of the experimental conditions for optimal sampling of ISF by varying the number of porations/skin surface, underpressure, depth of the poration as assessed by using confocal laser microscopy, (ii) to study effect of experimental conditions on the levels of IL-1 cytokines in the skin and (iii) development of the standard operation protocol for the ISF sampling.

Work carried out during the STSM

For the development of a new method for sampling of interstitial fluid (ISF) we have used recently developed equipment put on the market as P.L.E.A.S.E. Laser porator (Pantec Solution, Germany). The advantage of this device was that it enables laser poration at various depths of the skin and the number of poration spots. At AMC different "in house" prototypes of harvesting devices have been developed. For the sampling (i.e. suction), two different techniques have been investigated: a new method for sampling by using an evacuated vial and by using a pump.

In the pilot study we have investigated the optimal number of pores and depth of laser poration to obtain the optimal results concerning the sampling time and volume of ISF and at the same time minimal inflammation of the skin which might affect the study results. As a starting point we have used the conditions which were used in previous studies at the Coronel institute by group of Sanja Kezic with older-type device.

Main results obtained

Although the apparatus for laser poration seemed to be a promising tool, there are still several issues to be solved before this technique can be used. In this pilot the porations have been performed on the volar forearm skin. We varied the number of laser pulses which determines the poration depth (1-5 pulses which corresponds to 60-210 μm) and the number of pores (1-3%; 1% results in approximately 15 pores/ cm^2).

The biggest challenge is the size of the pores as it seems that the pores are too small and tissue repair occurs very fast which hampers the collection of the ISF. In the next step of method development the shape and dimensions of the laser poration in the skin will be followed in time by using in vivo confocal reflectance microscopy.

Furthermore, the sampling heads prototypes should be further optimized as the dead volume (the volume which has to be filled with ISF before it reaches the collecting vial is too large).

Future collaboration with the host institution

Further development of the method will be continued at Coroneel Institute. I will be involved in this process and in the future in the application of this technique in clinical studies aiming determination of various inflammatory mediators in ISF of patients with inflammatory skin diseases.

Foreseen publications/articles resulting from the STSM

We aim to publish the methodological article on collection of ISF as an alternative for skin biopsy.

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