

STSM REPORT

STSM Application number: COST-STSM-BM1205-18706

STSM Grantee: Marija Buljan, MD, PhD

Home Institution: Department of Dermatology and Venereology, University Hospital Centre "Sestre milosrdnice", Zagreb, Croatia

Host Institution: Division of Dermatology, University of Graz, Austria

STSM period: 14th-28th April, 2014

STSM purpose: establishment of collaboration between Host and Home institutions, practice the use of Reflectance Confocal Microscopy in the evaluation of various skin lesions, participate in the study within the field of Confocal Microscopy

Description of the work carried out during the STSM:

Several tools and techniques have been developed to help clinicians in the evaluation of the wide spectrum of skin lesions. Over the last decade, dermoscopy (dermatoscopy, epiluminescence microscopy, surface microscopy) has become widely used technique in the evaluation of numerous skin lesions and diseases, but it is especially valuable in diagnosing skin tumors. Dermoscopy refers to the examination of the skin using skin surface microscopy, and requires a high quality magnifying lens and a powerful lighting system. This allows examination of skin structures and patterns. It has been shown that in hands of trained user, dermoscopy significantly improves diagnostic accuracy, including the early detection of skin cancer.

Reflectance Confocal Microscopy (RCM) (also called Confocal laser scanning microscopy) is a novel imaging tool (Figure 1.) that permits the real-time examination of the skin at a resolution approaching histologic detail. This technique offers high resolution for the in vivo analysis of the cutaneous pathology. Confocal images closely match the resolution of conventional histology taken in the horizontal plane provided the presence of adequate contrast in the tissue under study. The commercially available confocal microscope employs a low power (<30 mW) near-infrared 830 nm diode laser and a 30x0.9-numerical aperture water immersion objective lens that provides a lateral resolution of 1-2 μm and axial resolution of 3-5 μm . The maximum penetration depth of

the confocal microscope is about 150-350 μm , allowing imaging from the surface of the skin to the papillary or upper reticular dermis (Figure 2).



Figure 1. Confocal laser scanning microscope (VivaScope® 1500)

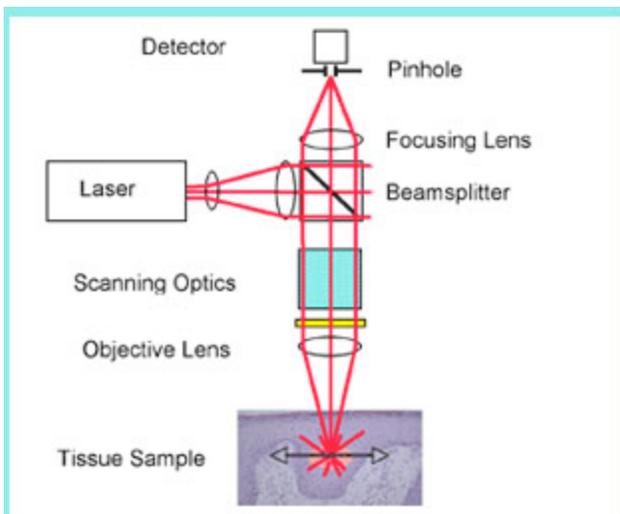


Figure 2. Reflectance Confocal Microscopy technology

The principle of *in vivo* confocal laser scanning microscopy consists of a coherent light of a laser that emits near infrared (700/2500 nm), projected through a lens system on a skin area. The point source of light, the illuminated spot in the sample, and the pinhole aperture lie in optically conjugate focal planes – hence the name “confocal.” The reflected light is caught through an objective and then analyzed. The images obtained through this method have a similar resolution to that of classic microscopy, but they are black and white, horizontal, and parallel with the surface of the skin. In the reflectance mode, the skin imaging is based on different reflection indices of the micro anatomical structures and individual cells. This gives the image its natural contrast. The varying reflection of the laser light is collected through a small aperture and optically conjugates on focal planes (confocal planes), which are analyzed and consecutively transformed into a digital image with different levels of gray. RCM applications in dermatooncology represent an important research area, including improvement of diagnostic accuracy, improved assessment of dermatoscopic-histologic correlation, *in vivo* biopsy site selection, response control of conservative therapies and surgical margin assessment (including Mohs’ micrographic surgery).

During this Short Term Scientific Mission, the applicant (dr. Marija Buljan) joined the experts from the Division of Dermatology, University of Graz - professor Iris Zalaudek and her co-workers during their everyday clinical practice and participated in the evaluation of skin lesions implementing dermoscopy and RCM. During her mission, the Applicant and Host also initiated a close scientific collaboration including a project on genetical analysis of recurrent melanocytic skin tumors and preparation of a manuscript on Kaposi sarcoma with lymphnode involvement, which will be soon submitted for peer review.

The applicant also participated in conducting a study in the field of RCM where Lichen sclerosus lesions in genital region were analyzed clinically, dermatoscopically and with RCM. Lichen sclerosus is a chronic disorder of the skin and mucosal surfaces, and is most commonly seen on the female genital skin, most commonly in elderly women. It also occurs on other areas of the body. Currently, ultra-potent topical corticosteroids are the medical treatment of choice. Other treatments that have been utilized for this condition include testosterone, progesterone, tacrolimus, surgery, and phototherapy. Surgery should be reserved for symptomatic patients who fail to respond to multiple medical treatments. The risk of developing squamous cell carcinoma of the vulva approaches 5% in women with vulvar lichen sclerosus, and therefore close surveillance by the healthcare provider and patient is needed.

The aim of this study was to analyze and define criteria in confocal imaging of genital lichen sclerosus, and to evaluate the ability of RCM to detect possible early stage of malignant transformation (into squamous cell carcinoma) within the genital lichen sclerosus.

Patients (No12) were assessed by clinical, histological, dermoscopic and RCM findings. All lesions were confocally imaged with the Vicascope 1500. Images (clinical, dermoscopic and confocal) were evaluated by two dermatologist.

Description of the main results obtained:

The data resulting from the performed extensive (clinical, dermoscopic and confocal) image evaluation procedure are still being analyzed. However, preliminary results indicate that RCM may help to avoid biopsies at sensitive sites like genital region, and may also be helpful in the early detection of possible squamous cell carcinoma development within the LS lesion. Confocal microscopy, as a non-invasive technology therefore could open new diagnostic possibilities in the routine practice guiding the clinician towards an accurate diagnosis before surgical procedures.

Mutual benefits for the Home and Host institutions:

This scientific visit is aimed at fostering collaboration and sharing research ideas. During the time of STSM many ideas for future joint clinical research within the field of dermatooncology and dermoscopy and RCM were discussed which could result in joint publications or conference presentation.

Future collaboration with the Host institution:

Future collaboration between both institutions is expected to continue, especially in the field of dermatooncology, dermoscopy and confocal microscopy.

Foreseen journal publications or conference presentations expected to result from the STSM (if applicable):

Writing a manuscript "A case report on classic Kaposi sarcoma with secondary lymphnode involvement and a short review of literature" is almost finished and is soon to be submitted for the review in the journal "Dermatology Practical and Conceptual"

Also, the results of the analysis/evaluation of confocal microscopy images in genital lichen sclerosis will be published in the (original scientific study) article which is planned in near future.

STSM outcome form

STSM application number	Home institution & country	Host institution & country	BM1205 WG	Objective of the collaboration	Results of the collaboration
COST-STSM-BM1205-18706	Department of Dermatology and venereology, University Hospital Centre "Sestre milosrdnice", Zagreb, Croatia	Division of Dermatology, University of Graz, Austria	WG 4	Use of Confocal Reflectance Microscopy in the evaluation of skin lesions (genital lichen sclerosus lesions)	Planned research publication Preparation of other joined publications

Confirmation by the host institution of the successful execution of the STSM:

I acknowledge that the described Short Term Scientific Mission was successfully carried out in the conditions here specified. We established good collaboration with the applicant and I believe that in future this will lead to joint work/publishing.

Graz, Austria, May 5th, 2014

Iris Zalaudek

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Prof. Iris Zalaudek
Division of Dermatology
University of Graz, Austria

Other Comments

I would like to thank the COST Action BM1205 for the support in this STSM and, I would also like to thank the Division of Dermatology, University of Graz, especially to my host professor Iris Zalaudek, for this wonderful and very useful practical and scientific experience.

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