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Abstracts from the 2016 Joint Meeting of the International Confocal Group (ICG), the International Dermoscopy Society (IDS), and the International Society for Digital Imaging of the Skin (ISDIS)

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What follows are the abstracts presented at the Joint Meeting of the International Confocal Group (ICG), the International Dermoscopy Society (IDS), and the International Society for Digital Imaging of the Skin (ISDIS). The meeting was held on March 5, 2016, in Washington, DC, USA, in conjunction with the annual meeting of the American Academy of Dermatology (Figure 1). The abstracts appear in the order in which they were presented.

Low-cost smartphone confocal microscope

DongKyun (DK) Kang[1]

1 Wellman Center of Photomedicine, Massachusetts General Hospital, Boston, MA, USA

Spectrally encoded confocal microscopy (SECM) is a high-speed reflectance confocal microscopy technology. SECM utilizes a stationary optical element, a diffraction grating, and a broadband light source to illuminate a line on the tissue with multiple spectrally-encoded spots, which enables scan-less line confocal imaging. In order to conduct two-dimensional confocal imaging, however, SECM still needs to use a beam scanning device or needs to mechanically translate the device. When a slit aperture is used, SECM can image a rectangular area of the tissue with multiple spectrally-encoded lines, which enables two-dimensional confocal imaging without using any beam scanning devices. Resulting confocal images are directly projected on a two-dimensional imaging sensor. This new approach, slit-SECM, can uniquely enable development of a smartphone confocal microscope, in which an optics module is attached to a smartphone to conduct confocal imaging and the smartphone imaging sensor is used to acquire two-dimensional confocal images. Due to its low cost, portability, and inherent network connectivity, smartphone confocal microscopy has a potential to provide an in vivo diagnostic tool in resource-poor countries and also to increase clinical adaptation of confocal imaging in developed countries. We present preliminary results of imaging human skin in vivo with slit-SECM. We developed a slit-SECM bench system with an inexpensive, battery-powered LED ($25) and a low-cost color CMOS sensor ($355). The bench system achieved lateral resolution of 1.3 µm and axial resolution of 6 µm. Confocal images of human skin were acquired at the speed of 10 frames/sec. Acquired confocal images clearly visualized characteristic cellular features of human skin down to the dermal-epidermal junction, including cell nuclei in spinous layer and dermal papilla. Results from this preliminary study show feasibility of conducting skin confocal imaging using inexpensive optical and electrical components and suggest that slit-SECM may be developed into a low-cost smartphone confocal microscope.

Melanocytic hyperplasia – so what?

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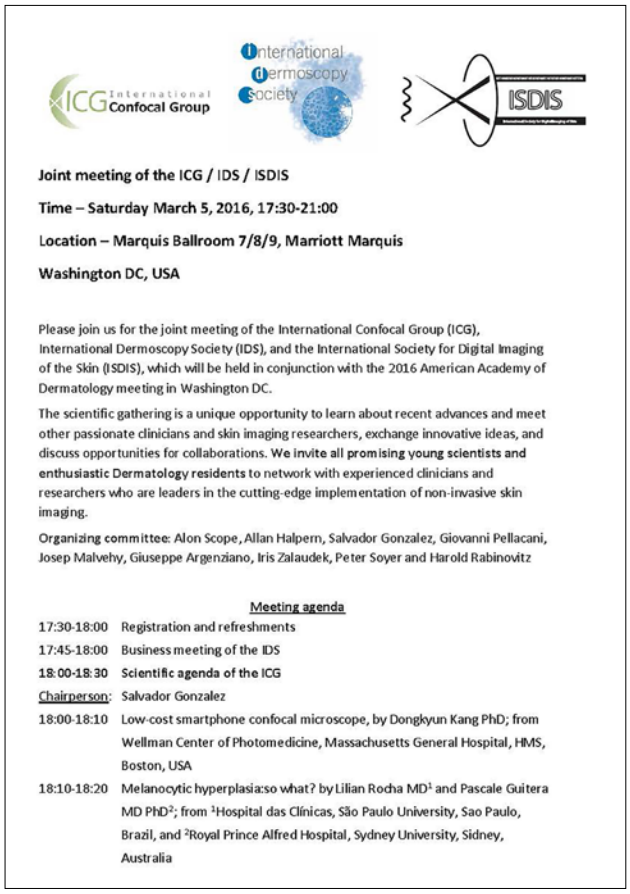

Joint meeting of the ICG / IDS / ISDIS

Time – Saturday March 5, 2016, 17:30-21:00

Location – Marquis Ballroom 7/8/9, Marriott Marquis

Washington DC, USA

Please join us for the joint meeting of the International Confocal Group (ICG), International Dermoscopy Society (IDS), and the International Society for Digital Imaging of the Skin (ISDIS), which will be held in conjunction with the 2016 American Academy of Dermatology meeting in Washington DC.

The scientific gathering is a unique opportunity to learn about recent advances and meet other passionate clinicians and skin imaging researchers, exchange innovative ideas, and discuss opportunities for collaborations. **We invite all promising young scientists and enthusiastic Dermatology residents** to network with experienced clinicians and researchers who are leaders in the cutting-edge implementation of non-invasive skin imaging.

Organizing committee: Alon Scope, Allan Halpern, Salvador Gonzalez, Giovanni Pellacani, Josep Malvehy, Giuseppe Argenziano, Iris Zalaudek, Peter Soyer and Harold Rabinovitz

Meeting agenda

17:30-18:00 Registration and refreshments
17:45-18:00 Business meeting of the IDS
18:00-18:30 Scientific agenda of the ICG
Chairperson: Salvador Gonzalez
18:00-18:10 Low-cost smartphone confocal microscope, by Dongkyun Kang PhD; from Wellman Center of Photomedicine, Massachusetts General Hospital, HMS, Boston, USA
18:10-18:20 Melanocytic hyperplasia:so what? by Lilian Rocha MD[1] and Pascale Guitera MD PhD[2]; from [1]Hospital das Clínicas, São Paulo University, Sao Paulo, Brazil, and [2]Royal Prince Alfred Hospital, Sydney University, Sidney, Australia
18:20-18:30 New developments in RCM of skin: imaging-guided ablation, computational modeling of DEJ morphologic patterns, integration with widefield imaging, by Heidy Sierra PhD[1], Kivanc Kose PhD[1], Gary Peterson PhD[1], Milind Rajadhyaksha PhD[1], Alican Bozkurt PhD[2], Setareh Ariafar PhD[2], Jennifer Dy PhD[2], Dana Brooks PhD[2] and David Dickensheets PhD[3]; from Memorial Sloan Kettering Cancer Center, New York, NY Northeastern University, Boston, MA and Montana State University, Bozeman, MT, USA
18:30-19:00 Scientific agenda of the IDS
Chairpersons: Iris Zalaudek and Harold Rabinovitz
18:30-18:40 Advances in dermoscopy-guided microbiopsy for biomarker analysis, by Tarl W Prow, Van Hoang, Lynlee Lin, Jean-Marie Tan, Mitch S Stark and H Peter Soyer; from Dermatology Research Centre, The University of Queensland, School of Medicine, Princess Alexandra Hospital, Brisbane, Queensland, Australia
18:40-18:50 Dermoscopy for inflammatory diseases, by Ioannides D et al; from First Dermatologic Department, Medical School, Aristotle University, Thessaloniki, Greece
18:50-19:00 Management of surgical margins of basal cell carcinoma using High Frequency Ultrasound, by Freites-Martinez A.[1], Pasquali P.[2] and Fortuño-Mar A.[3]; from [1]University Hospital of Fuenlabrada, Dermatology, Madrid, Spain, [2]Pius Hospital De Valls, Department of Dermatology, Tarragona, Spain, and [3]Eldine Pathology Laboratory, Pathology, Tarragona, Spain
19:00-19:30 Scientific agenda of the ISDIS
Chairperson: Allan Halpern
19:00-19:15 International Skin Imaging Collaboration (ISIC): Overview and update, by Allan Halpern, Dermatology Service, Memorial Sloan Kettering Cancer Center, New York, NY, USA
19:15-19:30 OHSU/Apple Mole Mapper ResearchKit Project, by Sancy Leachman and Dan Webster; from Department of Dermatology, Oregon Health and Science University, Portland, Oregon, USA
19:30-21:00 Dinner and networking

THERE IS NO REGISTRATION FEE. Please feel free to forward this announcement to invite colleagues who might like to attend the meeting.

We look forward to seeing you at the meeting!

Figure 1. Agenda of the Joint Meeting of the ICG / IDS / ISDS, 2016. [Copyright: ©2016 Dermatol Pract Concept.]

3 Sydney Melanoma Diagnostic Centre, Royal Prince Alfred Hospital, Sydney, Australia

The differentiation of melanocytic hyperplasia in severe sun-damaged skin (MH) from early stages of Lentigo Maligna (ELM) may be very difficult. Some histopathologic criteria have been proposed helping to classify lesions as malignant or not. But, more distinctive changes of melanoma may not occur for years (pagetoid cells, adnexal spreading, formation of nests of melanocytes and descent of neoplastic cells into the dermis). The exact threshold for malignancy is still controversial and so the management of these lesions remain discussed.

We retrospectively evaluated consecutive cases of pigmented lesions with pathology report as MH or ELM from the confocal databases of the main melanoma centre of Sydney, Australia from 2005 and 2015. Only cases with > 1 year follow up and recorded dermoscopic and RCM images were reviewed.

We reviewed 11 histopathologic features that were correlated to 13 RCM features and sensitivity and specificity for each RCM criterion were studied. We also analysed the dermoscopic features of each lesion using previously described criteria for LM.

51 cases were retrieved in this period. 40 cases had > 1 year follow up but in 3 cases the dermoscopic images could not be retrieved. There was a significant female predominance (25 cases) and mainly located on upper face (front, peri-oricular and scalp) and lower face (cheeks, peri-oral and chin). The most frequent dermoscopic feature was asymmetric hyperpigmented follicular opening and on RCM most cases showed <5 atypical cells in 3 fields and mild cellular pleomorphism. We discuss correlation with pathology and outcomes.

New developments in RCM of skin: imaging-guided ablation, computational modeling of DEJ morphologic patterns, integration with widefield imaging

Heidy Sierra[1], Kivanc Kose[1], Gary Peterson[1], Milind Rajadhyaksha[1], Alican Bozkurt[2], Setareh Ariafar[2], Jennifer Dy[2], Dana Brooks[2], David Dickensheets[3]

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2 Northeastern University, CDSP Center, ECE Department, Boston, MA, USA
3 Department of Electrical and Computer Engineering, Montana State University Bozeman, MT, USA

Reflectance confocal microscopy (RCM) has advanced from merely a research tool for diagnosis of skin cancer to being used in the clinic to guide patient care. Here we present three technology solutions that will further impact clinical advances:

An RCM imaging guided-laser ablation approach has been developed for treatment of basal cell carcinomas (BCCs). Initial testing in 48 lesions using an Er:YAG or an CO2 lasers shows feasibility on patients. Twenty of the lesions, assessed with post-ablation histopathology, show 85% agreement with RCM imaging for detection of residual or clearance of BCCs. Tumor clearance of the remaining 28 lesions has been confirmed with imaging and these are currently being followed-up with additional imaging.

An image analysis based automated tool for quantitative analysis of RCM mosaics of melanocytic lesions collected is being developed. The method can distinguish patterns, at dermal-epidermal junction level, of benign (ring, meshwork, clod) from non-specific (potentially malignant) and background non-lesional skin using their textural appearance. Preliminary analysis on 20 RCM mosaics shows classification with 80-67% sensitivity and 99-78% specificity in distinguishing these patterns.

An innovative solution has been developed, that integrates a miniature color camera into the objective lens of our microscope, providing simultaneous widefield dermoscopy images of the skin surface and RCM images of the subsurface cellular structure. Initial in vivo testing on 15 volunteers shows feasibility of the approach.

Advances in dermoscopy-guided microbiopsy for biomarker analysis

Tarl W. Prow[1], Van Hoang[1], Lynlee Lin[1], Jean-Marie Tan[1], Mitch S. Stark[1], H. Peter Soyer[1]

1 Dermatology Research Centre, The University of Queensland, School of Medicine, Translational Research Institute, Brisbane, Australia

The refining of clinico-pathologic correlation using dermoscopy by Scope et al in the area of dermatology has led to "a plea for a combined diagnostic approach of histopathologic and dermoscopic evaluation of melanocytic lesions". Integration between dermoscopy and histology was only effective in a limited number of scientific works despite its promising premise. We propose that a sub-millimetre skin biopsy device known as the Microbiopsy for minimally invasive and suture-free skin sampling for molecular diagnosis be used for this purpose. To this end we are integrating microbiopsy based sampling into dermoscopy to enable dermoscopy guided microbiopsy for molecular diagnosis. We discuss our recent advances in microbiopsy technology and the future of dermoscopy-guided microbiopsy.

Principles of inflammatory dermoscopy

Dimitrios Ioannides[1], Aimilios Lallas[1]

1 First Department of Dermatology, Aristotle University, Thessaloniki, Greece

Although traditionally used for evaluation of skin tumors, dermoscopy continuously gains appreciation in other fields of dermatology. The dermoscopic patterns of several inflammatory and infectious skin diseases have already been described, and the technique has been shown to improve clinical performance in terms of differential diagnosis in the daily practice. The increasing use of dermoscopy in general dermatology was significantly enhanced by the development of the new generation hand-held dermatoscopes, which can be easily placed in every dermatologist's pocket and do not require use of immersion fluid. Four main categories of dermoscopic criteria should be considered when applying the technique in inflammatory diseases: 1) vascular features, including purpuric structures (morphology distribution); 2) color variegations; 3) follicular abnormalities and 4) specific features. Nowadays, the dermatoscope should not be regarded a second-level diagnostic equipment, but an irreplaceable diagnostic tool in every-day clinical setting, similarly to the stethoscope in general medicine. We provide an up-to-date summary of data on dermoscopy in general dermatology, attempting to assist clinicians to profitably utilize and apply the available knowledge in the everyday practice.

Management of surgical margins of basal cell carcinoma using High Frequency Ultrasound

A. Freites-Martinez[1], P. Pasquali[2], A. Fortuño-Mar[3]

1 University Hospital of Fuenlabrada, Dermatology, Madrid, Spain
2 Pius Hospital De Valls, Department of Dermatology, Tarragona, Spain
3 Eldine Pathology Laboratory, Pathology, Tarragona, Spain

Introduction & Objectives: High Frequency Ultrasound (HFUS) is a non-invasive technique that allows visualizing skin tumors in vivo to obtain size, shape and tumor volume. In this study, we sought to measure the correlation between ex vivo HFUS and histopathology surgical margins of basal cell carcinoma.

Material & Methods: This was a prospective, single-blinded study. All patients had been sent for tumor excision. HFUS

was performed with a 22 MHz Ultrasound (Taberna Pro-Medicum, Lüneburg, Germany®) before and immediately after excision to determine length and depth. Tumor measurements and surgical margins (SM) were evaluated. SM were established by observing echogenicity differences and tumor shape. The pathologist was blinded to HFUS measurements and SM.

Results: A total of 79 basal cell carcinoma (BCC) (56 nodular, 15 superficial and 8 with more than one histological subtype) were included. Out of 79 BCC, 76 (96.2%) had a correspondence between ex vivo HFUS and histology (72 had negative and 4 had positive SM by ex vivo HFUS and histology). Of the remaining 3 tumors, one had uncertain and 2 had negative SM by ex vivo HFUS while positive SM by histology. In this study, ex vivo HFUS allowed correct visualization of negative SM in 72/79 BCC (91.1%).

Conclusions: other non invasive techniques such as dermoscopy and confocal microscopy allow an accurate diagnosis in most BCC cases. However, the information related to depth and tumor volume is limited. HFUS devices are portable and give extra valuable information for BCC surgical management. Future studies are needed to compare ex vivo HFUS with other non-invasive technique such optical coherence tomography and confocal microscopy.

International Skin Imaging Collaboration (ISIC) Update

Allan Halpern[1]

1 Dermatology Service, Memorial Sloan Kettering Cancer Center, New York, New York, USA

Overview: The International Skin Imaging Collaboration is an academia/industry partnership designed to facilitate the application of digital skin imaging to help reduce melanoma mortality. The mobile era presents an exciting opportunity for the application of digital photography as an aid to early diagnosis of melanoma. ISIC is designed to address two barriers to the broad successful implementation of mobile solutions for melanoma diagnosis: A lack of standards for dermatologic imaging, and limited access of educators and developers to large numbers of high quality clinically annotated skin lesion images.

Standards: There are currently no DICOM standards for dermatologic imaging. Through the efforts of 5 working groups comprised of international melanoma thought leaders from academia and industry we are using the Delphi method to propose standards related to 5 areas of skin cancer imaging: technology, terminology, techniques, privacy, and metadata. The working groups have prepared several publications to date that are in press and/or under review. It is hoped that the efforts of the working groups will serve as the basis for convening a successful DICOM process for dermatologic imaging with an initial focus on melanoma.

The ISIC Archive: Current efforts in melanoma education and automated diagnosis typically rely on convenience samples of small numbers of images that vary in quality and annotation. The ISIC archive is a partnership of leading international melanoma centers to provide a large public repository of clinically annotated high quality skin images. The ISIC Archive software is open source and the images in the archive are publicly available through a Creative Commons zero License (CC0). The individual lesion images in the archive are annotated with clinical (e.g., pathology diagnosis) and technical (e.g., EXIF header content) attributes. In addition, a process has been developed to append morphologic annotations to the images at the lesion level (e.g., symmetry) and at the sub-lesion level (e.g., the presence of pigment network in a specific region within a lesion). The initial focus of the archive and annotations has been on dermoscopic images, as these are most diagnostic for melanoma. The archive has been selected for an ongoing 2016-2017 image analysis challenge (for automated lesion segmentation and classification) by the International Symposium of Biomedical Imaging.

OHSU/Apple Mole Mapper ResearchKit Project

Sancy Leachman[1], Dan Webster[1]

1 Department of Dermatology, Oregon Health and Science University, Portland, OR, USA

Mobile technologies are revolutionizing medicine. Smart phones are being leveraged by the 'quantified self' movement and major health systems to empower individuals to take a bigger and more direct role in their own health and medical care. Skin cancer is no exception. There is an ongoing proliferation of apps to educate and assist the public in skin cancer recognition.

In October 2015, Oregon Health & Science University released an iPhone app "Mole Mapper" designed to advance melanoma research by giving users the ability to accurately measure and monitor moles, and contribute photos of the evolution of their moles over time to Apple's open source 'ResearchKit'. Sage Bionetworks, a nonprofit research institute is a key partner in managing and analyzing the melanoma data and images for this project.

In this presentation, Drs. Leachman and Webster provide a brief overview of the current state of consumer apps for melanoma detection and the progress of the ResearchKit melanoma project.