2023rd Annual UBC Skin Research Day

UBC Dermatology

8.40 AM

ETHNICAL AND DEMOGRAPHICAL FACTORS ASSOCIATED WITH CUTANEOUS DRUG ALLERGIES TO BETA-LACTAMS, SULFONAMIDES AND NSAIDS

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ABSTRACT

Background: Caucasian ethnicity and female sex have been reported to be associated with increased risks of developing cutaneous drug allergies to beta-lactam drugs. It is unclear if these associations are also true for other drug classes, and if there are additional ethnical and demographical factors associated with cutaneous drug allergies.

Objectives: To perform a systematic analysis on ethnical and demographical factors associated with cutaneous drug allergies to beta-lactams, sulfonamides, and NSAIDs.

Methods: A prospective questionnaire-based study was performed in an urban multi-ethnical outpatient clinic. The patients self-reported if they developed drug allergies, the names of the drugs involved, and the types of allergic reactions. Information is also collected on self-declared ethnicity, gender, age, height, and body weight. The prevalence of self-reported drug allergies was calculated for beta-lactams, sulfonamides, and NSAIDS. Single and multivariate analyses were performed to calculate the relative risks for developing cutaneous drug allergies associated with ethnicity, sex, age and BMI.

Results: Of the 3157 patients who completed the questionnaires, 456 (14%) reported a history of allergic reactions to at least one drug, including beta-lactams (7.6%), sulfonamides (2.9%), and NSAIDS (1.2%). Female sex and Caucasian ethnicity were associated with increased cutaneous allergies to not only beta-lactams but also sulfonamides. Advancing age is a risk factor for developing cutaneous allergies to sulfonamides and NSAIDs but not to beta-lactams.

Conclusion and Clinical Relevance:

Sex, ethnic origin, and age are important factors associated with development of cutaneous drug allergies. Future clinical trials should endeavor to increase diversity of participants in terms of sex, ethnicity and age in order to evaluate fully the safety of drugs under investigation.

8.50 AM

MICRO-RELIEF CHARACTERIZATION OF SKIN LESIONS BY *IN VIVO* OPTICAL POLARIZATION SPECKLE ANALYSIS

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Background/Purpose: Skin relief, colloquially known as roughness, is an important feature in the diagnosis and monitoring of many skin diseases. However, there exist few practical methods of quantifying skin roughness values in clinical practice. Polarization speckle is an optical method designed to obtain information-rich snapshot roughness measurements with a portable form-factor. The aim of this study is to test a novel polarization speckle technique by quantitatively measuring the average roughness of different types of skin lesions *in vivo*.

Methods: The device was tested in a clinical study on patients with malignant and benign skin lesions that resemble cancer (malignant diagnoses were histopathologically confirmed): 11 malignant melanomas (MM), 43 basal cell carcinomas (BCC), 27 squamous cell carcinomas (SCC), 108 seborrheic keratoses (SK), 81 nevi, 11 actinic keratoses (AK). Normal skin roughness was obtained for the same patients (307 different body sites proximal to the lesion).

Results: The average root mean squared (rms) roughness ± standard error of the mean for MM and nevus was equal to 19±5μm and 21±3 μm respectively. Normal skin has rms roughness 31±3 μm, other lesions have roughness 35±10 μm (AK), 35±7 μm (SCC), 31±4 μm (SK), and 30±5 μm (BCC).

Conclusion: An independent-samples Kruskal-Wallis Test indicates that MM and nevus can be separated from each of the tested types of lesions ($p < 0.05$), except each other. These results quantify clinical knowledge of lesion roughness and could be useful for optical cancer detection.

9.00 AM

PRETREATMENT WITH TOPICAL CLOBETASOL TO REDUCE INJECTION SITE REACTIONS ASSOCIATED WITH BIOLOGIC AGENT ADMINISTRATION

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While biologic agents such as anti-tumor necrosis factors and interleukin inhibitors have been highly effective in treating numerous dermatologic and rheumatologic conditions, a noteworthy number of patients experience injection site reactions (ISR) that can cause significant morbidity and even hinder treatment compliance. To address this issue, a treatment strategy of applying 0.05% clobetasol propionate ointment/cream to the injection site once daily, starting 1-2 days prior to the biologic therapy injection, has been carried out in our dermatology-rheumatology combined clinic. In this open-label study, we recommended pre-treatment with clobetasol to 8 consecutive patients with ISRs following biologic administration. 7/8 reported significant improvement in symptoms with pre-treatment. We found this method to be safe and effective in reducing injection site pain, erythema, swelling, and the duration of these symptoms. Further studies are required to evaluate the inflammatory mechanisms underlying ISR and how topical steroid therapy diminishes this reaction. Although no obvious effect on biologic efficacy was noted, this will also need to be examined.

Category:

(1) Pilot/exploratory experiments (for study design, hypotheses creation, etc.)

9.10 AM

DIFFERENTIATION OF SKIN DISEASES USING MULTISPECTRAL IMAGING

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Category: Early experiments with well-defined objectives/hypotheses

Background: Visual examination is crucial for skin disease diagnostic evaluation in dermatology. Non-invasive imaging techniques for skin assessment can extend the perception of human vision and can be beneficial tools for diagnosis, research, and monitoring disease progression.

Objective: We aim to investigate the utility of a multispectral imaging (MSI) technique to objectively quantify and differentiate skin diseases.

Methods: We designed an MSI system that captures a series of ten images, including a white light image and nine narrowband spectral images (420, 467, 540, 560, 580, 632, 660, 730 and 980 nm) which were uniquely filtered to target the distribution of various skin chromophores, such as the bilirubin, hemoglobin, melanin, and the water contents of the skin. These colored images will be analyzed using image processing approaches based on the pixel properties of each image and the wavelength properties. Pixel-wise descriptions of disease morphological features will be made as classification prediction variables. These variables would be used to derivate a processing framework for identification and classification of benign and malignant skin diseases.

Expected Outcome: We anticipate that the MSI optical technique can be used to classify different skin diseases and to monitor disease progression with improved results over color cameras. Our study can show the distinct biological and biophysical compositions of diseased skin compared to healthy skin based on the pixel-based findings that are correlated with morphologic traits and disease severity.

9.20 AM

EXTRAMAMMARY PAGET DISEASE: A CASE SERIES OF MULTIFLAP REPAIRS FOLLOWING MOHS MICROGRAPHIC SURGERY TO DECREASE MORBIDITY

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Extramammary Paget disease (EMPD) is a rare adenocarcinoma of the skin occurring primarily in apocrine gland-bearing skin, most frequently the anogenital region. Primary EMPD, the most common form, is often intraepithelial with low likelihood of metastasizing; unfortunately, it confers significant morbidity given the extensive areas of involvement at diagnosis. Its sex predominance varies, with Caucasian patients showing a female predominance and East Asian patients showing a male predominance. Standard treatment, often performed by non-dermatologic surgical specialties, involves wide local excision (WLE) with a 3.5-5 cm margin. Closure of these WLEs typically involves either split thickness grafting from the thigh or a vacuum dressing, both with suboptimal cosmesis. Following precise clearance of the margins using Mohs micrographic surgery (MMS), the repair of a large defect in the perineal region can be achieved with strategic, often superiorly based, rhombic flaps from the inguinal fossae, and in males, the use of remnants of the scrotal tissue and base of the penis for advancement over large defects. Standing cones can be used as grafts in the perineal or perianal areas, with pie crusting technique to ensure drainage given the dependent area. Surgical management of EMPD using MMS and a multiflap repair approach minimizes morbidity and provides excellent cosmesis for defects as large as 400-600 cm^2 when compared to traditional WLE. Demonstration of this technique will be reviewed and depicted with case examples of large defects repaired with simple rhombic flaps, standing cone flaps, and advancement of scrotal or penile base tissue.

Category: Pilot/exploratory experiments (for study design, hypotheses creation, etc)

9.30 AM

COMBINING CONVOLUTIONAL NEURAL NETWORKS AND RAMAN SPECTROSCOPY FOR SKIN CANCER DETECTION

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Background: Distinguishing skin cancer from benign lesions has been previously demonstrated by using Raman Spectroscopy. The objective of this presentation is to determine if skin cancer detection can be improved by combining deep neural networks and Raman spectroscopy.

Patients and Methods: In total 731 lesional Raman spectra were included in this study, including 340 cancerous and precancerous lesions (melanoma, basal cell carcinoma, squamous cell carcinoma and actinic keratosis) and 391 benign lesions (melanocytic nevus and seborrheic keratosis). One-dimensional convolutional neural networks (1D-CNN) were developed for Raman spectral analysis. The stratified samples were divided randomly into training (70%), validation (10%) and test set (20%), and were repeated 56 times using parallel computing. Different data augmentation strategies were implemented, including added random noise, spectral shift, spectral combination and artificially generated Raman spectra using generative adversarial networks (GAN). The area under the receiver operating characteristic curve (ROC AUC) was used as a measure of the diagnostic performance. Multivariate statistical analyses, including logistic regression (LR), support vector machine (SVM), principal component and linear discriminant analysis (PC-LDA) and partial least squares for discriminant analysis (PLS-DA) were evaluated for comparison with the same data splitting scheme as the 1D-CNN.

Results: The ROC AUC of the *test set* based on the original training spectra were 0.886□0.022 (1D-CNN), 0.525□0.045 (LR), 0.864□0.027 (SVM), 0.875□0.033 (PC-LDA), and 0.870□0.028 (PLS-DA), which were improved to 0.911□0.021 (1D-CNN), 0.899□0.022 (LR), 0.907□0.022 (SVM), 0.896□0.023 (PC-LDA) and 0.894□0.027 (PLS-DA) respectively after the training dataset augmentation ($p<0.0001$, Wilxocon test).

Conclusions: Convolutional neural networks outperform slightly over the conventional multivariate statistical analyses for skin cancer detection by Raman spectroscopy. Data

augmentation improved the performance of both convolutional neural networks and conventional multivariate statistical analyses.

Category: Applied/functional experiments (in vivo studies)