THE IMPACT OF COVID-19 ON THE DIAGNOSIS OF MELANOMA IN BRITISH COLUMBIA

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Background: Melanoma is a potentially deadly skin cancer. Efficient detection, biopsy and excision are important. When there are delays in the management of melanoma, patients and the health care system experience increased morbidity, mortality and costs.

Objectives: On March 17th, 2020, a public health emergency was declared in British Columbia due to the global COVID-19 pandemic. Much of the healthcare system was affected, with thousands of cancelled surgeries and appointments. Many dermatologists and primary care providers switched to a predominantly virtual care model in an attempt to decrease spread of the virus.

Methods: The full impact of the pandemic on patient outcomes remains to be determined. We hypothesized that the COVID-19 pandemic would result in a lower number of biopsies of melanoma and a higher number of patients with more advanced melanoma at diagnosis. To address these hypotheses, we initially conducted a retrospective review of 14 months of pathology reports for melanomas diagnosed in the BC lower mainland in 2019 and 2020. We have now completed a review of a full 24 months of pathology reports, comparing the periods of March 2019-Feb 2020 to March 2020-Feb 2021.

Findings: A preliminary summary of the early results of this study was presented at the 2021 UBC Research Day. This year, we will present results of our full data analysis of 10,117 pathology reports, including 1239 invasive cutaneous melanomas within the study period.

Conclusions: This study provides insight into the impact of the COVID-19 pandemic in British Columbia. It will help with understanding the adaptability of the healthcare system in BC and provide planning information in anticipation of future pandemics.

Category: Early experiments with well-defined objectives/hypotheses

INHIBITION OF TISSUE RESIDENT MEMORY-T CELLS AS A THERAPY FOR CONTACT HYPERSENSITIVITY

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Systemic therapy for eczema targets the immune system during active inflammation. Disease inevitably returns to previously inflamed skin due to the persistence of tissue resident memory T (Trm) cells responding to autoantigens/allergens. The survival of Trm cells is regulated by IL-15. We present a mouse model of recurrent contact hypersensitivity and suggest a novel approach to the treatment of inflammatory skin diseases through inhibition of Trm cells.

Mice were sensitized on the abdomen with the allergen 2,4-dinitrofluorobenzene (DNFB) (day -5), and then challenged on the ear on day 0. Mice then received peritoneal injections of IL-15-receptor neutralizing antibodies, twice a week for four weeks, and then re-challenged with DNFB on day-30. The control group received no antibodies. Ear swelling was measured every 12-hours for 96-hours post challenge. Ear skin was harvested 2-days (inflamed skin) and 15-days (healed skin) after DNFB ear re-challenge.

In the control group, the number of Trm cells and expression of IL-15-receptors increased in healed skin compared to inflamed skin post 30-day re-challenge ($p < 0.05$). Following the 30-day DNFB re-challenge, the IL-15-receptor inhibitor group showed significantly less ear swelling ($p < 0.05$) as well as significantly reduced number of Trm cells expressing IL-15 receptors in both inflamed and healed skin ($p < 0.05$), compared to control.

Trm cells expressing IL-15-receptors accumulate in healed skin following inflammation. Inhibition of IL-15-receptors during disease quiescence prevents skin inflammation following allergen re-challenge, and correlates with a reduction of Trm cells expressing IL-15-receptors. This may be a novel strategy to prevent dermatitis recurrence and maintain long-term remission.

Category: Applied/functional experiments (animal models of disease and in vivo studies, etc)

WHEN TANNING IS TRENDING: A CONTENT QUALITY STUDY OF SKIN CANCER ON TIKTOK

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Introduction: TikTok is an increasingly popular video-based social media platform, especially amongst young adults. Dermatologists have also increasingly used this platform for providing educational content online. This novel study aims to analyze skin cancer content on TikTok.

Methods: A total of 600 videos were collected from two queries for *#skincancer*, one month apart. Two authors categorized videos by content and type. Educational videos were evaluated using PEMAT, a validated tool.

Results: Among 338 included videos, 21.3% presented medical content with a focus on skin cancer. 28.1% of videos aimed to raise awareness, mainly by recommending sunscreen and physician skin exams. Clothing and hats were rarely suggested. Photoprotection videos were viewed 7.6 times more than others ($p<0.001$). While 82.4% had healthy or neutral messaging, 18.6% of videos using *#skincancer* were actually pro-tanning, most commonly via tanning beds.

Among the 49 (14.5%) educational videos, average PEMAT scores were 79.6% and 53.1% for understandability and actionability, respectively. The inferior actionability score is primarily due to 41% of videos neglecting to provide a single measure consumers could take towards the prevention or detection of skin cancer. Common issues included not breaking down actions into steps, difficult to read text, and unclear photographs.

Conclusions: Given the substantial amount of misinformation and even dangerous content on TikTok, dermatologists on social media should create more high-quality educational content encouraging protective measures against skin cancer. In clinical practice, particularly in the adolescent population, screening for tanning behaviors and explicitly addressing the ongoing social pressure to tan is warranted.

Category: Early experiments with well defined objectives/hypotheses

GENERATING CLINICAL IMAGES OF SKIN DISORDERS FOR PATIENTS OF COLOR USING A STYLE-BASED GENERATIVE ADVERSARIAL NETWORK

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Introduction: Images are important in dermatology, including for the purposes of education and patient management. However, there is a lack of images with dark skin colored patients in teaching presentations, datasets, and scientific articles. Dataset biases such as these can lead to cognitive biases that contribute to underdiagnosis of skin conditions in patients of color. Thus, there exists a need for a more diverse representation of skin color for dermatology images.

Objectives: To investigate the use of deep learning in creating clinical images of patients of color.

Methods: We leveraged a deep learning model, a style-based generative adversarial network, to generate images from a random seed into a desired image using example training images**.** We used a dataset of clinical images, containing 260 different skin diseases, across varying skin conditions. We then decomposed the training images into 512 features where the model would then generate new images from that feature set as well as translate existing images.

Results: The model was able to both successfully generate convincing skin patch images of varying skin disorders and translate those same images to capture relevant features in dark skin clinical presentation.

Conclusions: Leveraging this deep learning model to synthesize completely novel images of dermatological conditions in dark skin patients is potentially a useful tool to improve the diversity of skin image datasets, and facilitate dermatological education in treating patients of color.

Category: Early experiments with well defined objectives/hypotheses

ADVERSE CUTANEOUS EVENTS OF LOW-DOSE METHOTREXATE: A SYSTEMATIC REVIEW

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Methotrexate (MTX)-induced epidermal necrosis is a rare adverse effect (AE) of MTX use, characterized by Stevens-Johnson syndrome (SJS)/ toxic epidermal necrolysis (TEN)-like reactions, exfoliative dermatitis or skin necrosis. Low-dose MTX (up to 30mg/week) has been used safely to treat dermatological and rheumatological conditions for years. This systematic review aims to summarize reports of low-dose MTX-induced EN in dermatological and rheumatological conditions. EMBASE, Medline and CENTRAL were searched in October 2021 according to the PRISMA guidelines using the keywords, "skin ulcers" or "drug eruption" or "necrosis" and "methotrexate" or "amethopterin". In total, 109 studies were included (80 case reports, 19 case series, 8 retrospective reviews, 1 prospective comparative study and 1 randomized control trial), representing 233 patients with reactions to MTX. Of the patients, 55.0% were female and the average age was 57 years old. Overall, 135 (57.9%) patients were taking MTX for a dermatological condition, 84 (36.0%) for a rheumatological condition and 13 (5.6%) took MTX for another reason (including accidentally and due to suicidality). Among those with a dermatological condition, n=69 (51.1%) had ulcerations of lesional skin, while in those with rheumatological conditions, n=26 (31.0%) had ulcerations over trauma prone sites such as the hands, elbows, knees, axillary folds, and inner thighs. We illustrate the potential for adverse cutaneous effects of low-dose MTX and suggest that ulcerations occur over areas of high cellular turnover. In conclusion, clinicians should be aware of the possibility of MTX-induced EN and its various presentations to advise patients when starting MTX therapy.

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

9:45 AM

DEVELOPING RISK PREDICTION MODELS: STEPS TOWARDS TARGETING INDIVIDUALS AT HIGHER RISK FOR SKIN CANCER

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Introduction: While screening facilitates early diagnosis, its use at the population level for skin cancer is costly. Identifying high risk individuals may provide a more effective strategy that enables more efficient use of healthcare resources. We aim to develop skin cancer risk prediction models applicable to individuals living in northern latitudes.

Methods: 1000 patients from the Skin Care Centre in Vancouver have been surveyed. Demographics, environmental exposures, medical history, phenotypic features, and sun exposure were collected through interviews to develop predictive models via logistic regression modeling.

Results: Preliminary analyses have been conducted using data from 530 patients (283 skin cancer cases and 247 controls). 65, 212, and 94 patients had a current or previous history of melanoma, basal cell carcinoma (BCC), and squamous cell carcinoma (SCC) respectively. Univariate regressions show that the strongest risk factors for **melanoma** were Fitzpatrick skin phototype (odds ratio [OR] 11.35 (95%CI: 2.35-204), and presence of lentigines (OR 7.94 (1.69-142)). The strongest predictors for **BCC** and **SCC** were presence of lentigines (OR 12.8 (4.63-53.3); 6.05 (1.83-37.4) respectively), history of actinic keratoses (OR 7.07 (4.53-11.4); 7.67 (3.84-17.5) respectively), and age ≥71 (OR 4.34 (2.81-6.80); 9.78 (4.95-21.7)) respectively. Other significant risk factors included: presence of (atypical) nevi and freckles for **melanoma**, and Fitzpatrick skin phototype, >20 adult/childhood sunburns, and light-colour eyes for **BCC**/**SCC**.

Conclusions: The study has identified risk factors to incorporate into skin cancer risk prediction models. Future directions include developing and validating the models using the full dataset for use in predicting skin cancer risk.

Category: Early experiments with well-defined objectives/hypotheses

TRANSMISSION OF ONYCHOMYCOSIS BETWEEN HOUSEHOLD MEMBERS: A SCOPING REVIEW

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Background: Onychomycosis is a common fungal infection of the nail, caused by dermatophytes, non-dermatophytes, and yeasts. Predisposing factors include older age, trauma, diabetes, immunosuppression, and previous history of nail psoriasis or tinea pedis. Though many biological risk factors have been well characterized, the role of the environment has been less clear. Studies have found evidence of transmission in 44% to 47% of households with at least one affected individual, but the underlying mechanisms and risk factors for transmission of onychomycosis between household members are incompletely understood.

Methods: A scoping literature review was performed to characterize and summarize environmental risk factors involved in the transmission of onychomycosis within households.

Results: A total of 90 papers met the inclusion criteria, and extracted data was analyzed in an iterative manner. Shared household surfaces may harbor dermatophytes and provide sources for infection. Shared household equipment, including footwear, bedding, and nail tools, may transmit dermatophytes. The persistence of dermatophytes on household cleaning supplies, linen, and pets may serve as lasting sources of infection.

Conclusions: Our study provides an overview of factors contributing to the persistence and spread of onychomycosis among household members. Based on these findings, we provide recommendations that aim to interrupt household transmission of onychomycosis. Given the paucity of studies directly exploring the mechanisms behind household transmission, this study is limited to a broad overview of implicated factors. Further investigation of the specific mechanisms behind household spread is needed to break the cycle of transmission, reducing the physical and social impacts of onychomycosis.

Category: Pilot/exploratory experiments

10:01 AM

QUANTIFICATION OF IMAGE FOCUS: A PROOF OF CONCEPT STUDY TO IMPROVE IMAGE QUALITY IN TELEDERMATOLOGY

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The use of teledermatology has been on the rise throughout the pandemic and continues to play an important role in the practices of many dermatologists. One of the greatest limitations that dermatologists face with teledermatology is that the photographs that are submitted by patients are not always in focus on the appropriate region of interest. This can introduce uncertainty and difficulty in rendering the correct diagnosis. In this proof of concept study, and with the assistance of computer vision, we have devised a technique for patients to be able to quantify the degree of sharpness or focus of an image, in order to allow them to submit dermatologic photographs that are in focus. The algorithm computes the ratio of high spatial frequency content to the low spatial frequency content of an image using Fast Fourier Transform in order to quantify image sharpness. We have further extended this focus-detecting algorithm to extract frames from a video containing a region of interest of a patient's skin, and to select the five frames with the highest quantitative focus. This technique can be used by patients to produce and transfer the most in-focus media to their dermatologist for facilitation of diagnosis and management. In the future, a real-time implementation of this algorithm on a smartphone could allow patients to be guided through the process of taking high quality in-focus dermatologic photographs through real-time feedback on modification of photography parameters, such as the distance of the camera to the skin and lighting.

Category: Pilot/Exploratory experiments

PREVALENCE OF CONTACT ALLERGY TO NICKEL: A RETROSPECTIVE CHART REVIEW

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No recent studies reporting nickel sensitivity prevalence in Canadians exist. The aim of this study was to quantify nickel sensitivity prevalence in patients at a patch test clinic in Vancouver. This study is a retrospective chart review of 3263 patients patch tested for nickel sensitivity at our clinic in Vancouver between 2008 and 2020. In total, 24.3% (n = 792 of 3263) of patients were sensitive to nickel. Nickel sensitivity significantly increased over time from 24.3% to 27.9% from 2008 to 2020. Nickel-sensitive patients were significantly more likely to be women ($P < 0.001$), between the ages of 19 and 64 years ($P = 0.010$), and have dermatitis affecting the face ($P = 0.001$) and hands ($P = 0.001$). Nickel-sensitive patients were significantly less likely to be 65 years or older ($P = 0.001$) and have dermatitis affecting the legs ($P = 0.002$). Approximately half of nickel-sensitive reactions were new positive reactions at the second reading. Nickel sensitivity occurred in approximately one quarter of patients and significantly increased over time.

Category: Applied/functional experiments (animal models of disease and in vivo studies, etc)

10:17 AM

FOLLOW-UP OF PATIENTS WITH KERATINOCYTE CARCINOMA: SYSTEMATIC REVIEW OF CLINICAL PRACTICE GUIDELINES

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Introduction: Patients with keratinocyte carcinoma (KC) are at risk of developing recurrence, metastasis, and additional cutaneous malignancies. However, it is unclear how often patients should be seen for follow-up. We conducted a systematic review of clinical practice guidelines to summarize recommendations for dermatologic follow-up after a KC diagnosis.

Methods: We searched PubMed, MEDLINE, and Embase for guidelines containing follow-up recommendations after a KC diagnosis. Guideline quality was assessed using the AGREE II tool's 7-point system converted to a scaled domain score.

Results: Fourteen guidelines were included. The recommended overall follow-up duration ranged from a single visit to lifelong surveillance. Eleven guidelines stratified recommendations by tumour risk. For high-risk basal cell carcinoma (BCC), one guideline suggested follow-up every 3 months, while four recommended every 6 months. For low-risk BCC and guidelines without risk stratification, recommendations ranged from every 6-12 months. For high-risk squamous cell carcinoma (SCC), recommendations included various follow-up frequencies, spanning every 3 months (n=5 guidelines), 4 months (n=1), 6 months (n=6), or annually (n=4). For low-risk SCC, follow-up recommendations included annually (n=5), every 6 months (n=3), or every 3 months (n=1). One SCC guideline did not use risk stratification and recommended annual screening. The highest scoring AGREE II domain was "scope and purpose" (mean domain score=71.2%±23.8), which assessed the guideline's overall objectives, and the lowest was "applicability" (mean domain score=18.2%±18.1), which assessed guideline implementation.

Conclusions: There was little consensus among guidelines on the appropriate follow-up schedule for KC patients. Randomized trials are necessary to define an optimal follow-up regimen.

Category: Early experiments with well-defined objectives/hypotheses