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Temporal increase in the number of annual days with a very high UV index across the US

Menas Kizoulis, Joshua D. Williams, PhD, Johnson & Johnson Consumer

The ultraviolet (UV) index is an international standard indicating the intensity of solar radiation at a given place and time with respect to the risk of sunburn. The World Health Organization recommends utilizing sun protection including wide brim hats, sunglasses and sunscreens with SPF of at least 30 when UV index values are moderate (UV index levels of 3-5). Extra protection and greater awareness of high sunburn risk are urged for very high and extreme levels of UV exposure, when the UV index is 8 or above. At this UV index level, a typical individual may sunburn in less than 20 minutes. Using archived data from the NOAA Center for Weather and Climate Prediction, we investigated the number of very high UV index days for numerous metropolitan areas across the US to determine how the intensity of solar exposure has changed over a 20-year period (1997-2017). Overall, the number of very high UV index days was observed to increase across all evaluated cities. Most striking were the significant increases in areas with moderate annual UV levels such as Boston in and Seattle. However, the number of high UV index days increased even in areas with average UV exposure such as the desert southwest. While there are numerous factors that contribute to the intensity of solar radiation at a specific location, this data indicates that Americans currently face a greater annual risk of solar overexposure and the resulting short and long-term negative skin health outcomes.

Commercial disclosure: This study was funded by Johnson & Johnson Consumer.



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Study of individual cell motion in healthy human skin microcirculation by in vivo reflectance confocal video microscopy

Inga Saknite, PhD, Zijun Zhao, BS, Vanderbilt Dermatology Translational Research Clinic, Department of Dermatology, Vanderbilt University Medical Center; J. Randall Patrinely Jr, Vanderbilt University School of Medicine; Michael Byrne, DO, Vanderbilt University Medical Center; Madan Jagasia, Eric Tkaczyk, Department of Veterans Affairs and Vanderbilt Dermatology Translational Research Clinic

Background: Cutaneous microcirculation is altered in skin conditions such as hypersensitivity reactions, scleroderma, and skin cancer. Most existing technologies to evaluate cutaneous microcirculation are limited to the assessment of a bulk tissue. Visualization and quantification of individual cell motion in a single capillary may enhance our understanding of disease pathology and enable the development of novel biomarkers.

Methods: We used a reflectance confocal microscope (Vivascope 1500; Caliber ID) to acquire videos of volar forearm and upper chest capillaries of ten healthy subjects. Through video analysis, we assessed nine quantitative parameters: capillary size and density, flowing leukocyte velocity, the number and size of stuck, adherent, and rolling leukocytes, and the time of leukocyte being stuck.

Results: We found no rolling leukocytes. We observed "stuck" leukocytes ie leukocytes that temporarily stop, coinciding with the simultaneous stopping of the rest of the blood flow. We imaged more stuck (median: 1.0 per subject) and adherent (1.5) leukocytes in the forearm than in the chest (median 0 stuck and 0 adherent per subject). We visualized blood flow change direction. Flowing leukocyte velocities were on average higher in the upper chest (117 $\mu\text{m/s}$) than in the volar forearm (66 $\mu\text{m/s}$).

Conclusions: The proposed method and reported values in healthy skin provide new insights into intact human skin microcirculation, and will enable further exploration of the diagnostic potential for various clinical applications.

Commercial disclosure: None identified.



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Incorporation of dermoscopy improves inter-observer agreement among dermatopathologists in histologic assessment of melanocytic neoplasms

Elsy V. Compres, BA, Northwestern University Feinberg School of Medicine; Katherine Shi, BS, Department of Dermatology, Northwestern University; Kara E. Walton, MD, Lauren S. Mohan, Bin Zhang, Ayesha U. Khan, MBA, Department of Dermatology, Feinberg School of Medicine, Northwestern University; Daniel Kim, BS, Department of Dermatology, Northwestern University; Elnaz Panah, MD, Pedram Yazdan, MD, Department of Dermatology, Northwestern University Feinberg School of Medicine; June Robinson, Pedram Gerami

Background: Histopathologic assessment of melanocytic neoplasms is currently the diagnostic gold standard, but there are well documented limitations resulting in diagnostic discordance among dermatopathologists. This study examines the utility of incorporating dermoscopy with histopathologic assessment of melanocytic neoplasms in improving interobserver agreement among dermatopathologists.

Methods: In this prospective cohort study, 136 lesions were identified for biopsy based on atypical dermoscopic features. Three dermatopathologists blinded to diagnosis assessed H&E, deeper levels, and immunohistochemistry slides for each specimen. Cases were reassessed with the addition of clinical and dermoscopic images.

Results: Initial lesion diagnoses included 63 moderately atypical nevi, 35 severely atypical nevi, and 38 melanomas. Inter-rater reliability (IRR) using Fleiss' kappa statistic revealed an increase from 0.447 without to 0.496 with dermoscopy among all dermatopathologists across all cases. The kappa also increased from 0.495 before to 0.511 with dermoscopy for the group in separating high-grade atypia or melanoma cases from those with moderate atypia or less. When at least two dermatopathologists noted levels or IHC to be helpful, kappa increased from 0.316 to 0.471 overall (n = 59) and 0.216 to 0.325 when grouped by the high-grade group versus the low-grade group (n = 59). The diagnosis of melanoma was favored after dermoscopic review in 3 cases.

Conclusions: Our data demonstrates the utility of dermoscopy as a diagnostic modality and in improving interobserver agreement between dermatopathologists. This highlights the benefit of having access to three-dimensional topography and suggests that some cursory level training in dermoscopy may be of value for dermatopathologists.

Commercial disclosure: None identified.



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Efficacy and tolerability of a rebalancing moisture treatment cream in subjects with moderate to severe facial photodamage

Diane B. Nelson, RN, MPH, SkinBetter Science; David H. McDaniel, MD, Jeffrey Dover, MD, FRCP, Yale University School of Medicine; Mitchell S. Wortzman, PhD, SkinBetter Science

Objective: This study evaluated the effects of twice-daily application of a new rebalancing moisture treatment (TRMT) cream that aims to optimize skin moisturization and enhance skin barrier by supporting skin's natural lipid bilayer and enhancing NMFs and HA in subjects with moderate to severe photodamaged skin.

Methods: An 8-week multicenter study evaluated the effects of TRMT in 40 subjects with moderate to severe photodamaged skin. Expert photographic evaluations based on a 6-point scale assessed changes in fine lines/wrinkles, erythema, skin brightness, and skin texture at baseline and 2, 4, and 8 weeks. Changes in skin hydration were measured using bioinstrumentation, and self-assessments were obtained at 2, 4, and 8 weeks. Adverse events (AEs) were collected throughout the study.

Results: Thirty-nine subjects completed the study. Enrolled subjects were about 54 years of age, female, and FST III. Significant mean percent improvements were observed as early as 2 weeks in skin brightness ($P < .0001$), skin texture ($P < .0004$), fine lines/wrinkles ($P < .001$), and hydration ($P < .004$). At 8 weeks, statistically significant changes were achieved in all categories. A substantial percentage of subjects achieved at least a 1-grade improvement in skin brightness (75%), skin texture (60%), and erythema (53%) at 4 weeks. High levels of subject satisfaction were reported. Nearly all subjects reported the product absorbed well and was not greasy. Mild transient AEs were reported.

Conclusions: Twice-daily application of a rebalancing moisture treatment cream resulted in early, significant improvements in hydration and visible improvements in skin brightness, texture, fine lines/wrinkles, and erythema.

Commercial disclosure: SkinBetter Science.

