

Enhancing Diversity in Medical Education Representation of Cutaneous Disease: VisualDx Skin-of-Color Atlas

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DISCUSSION

Cutaneous presentations of dermatologic and systemic disease may vary widely based on a patient's skin tone (1). Recent studies have demonstrated that medical education resources display a significant underrepresentation of pathology in individuals with skin of color (SoC). For example, only 24% of dermatologic images in common medical school board materials (Pathoma, Uworld, First Aid) represent pathology in SoC (2). Another study showed that medical students are more likely to misdiagnose conditions on images with SoC, including squamous cell carcinoma, urticaria, and atopic dermatitis (3). The differences in presentation based on skin tone can be seen in **Figures 1 and 2**: two potentially life-threatening infectious diseases with diagnosis necessary in a timely manner. Accurately diagnosing these conditions without proper exposure during medical training can pose a major challenge. With an expanding population of approximately 40% of United States citizens being of SoC, it is crucial that medical students receive proper training in identifying conditions on patients of all skin tones (4).

The COVID-19 pandemic has recently brought to light the gross underrepresentation of cutaneous pathology in SoC. In early 2020, dermatologists created an international registry to compile cases of dermatological manifestations of COVID-19, to gather clues to the disease and aid diagnosis. Out of the 700 submissions to the registry, there were only 34 Hispanic patients and 13 black patients represented (5). Despite the pandemic starting in March, it took until July of 2020 for the first pictures of "Covid toes" in nonwhite patients to be

published in the Journal of the American Academy of Dermatology. This prompted Adelekun et al. to launch an investigation on how severely underrepresented SoC truly is. According to their study published in April 2020, only 4.5% of images in general medicine textbooks illustrate dermatologic diseases in dark skin (6). It is clear that the underrepresentation of SoC in medicine is not a new issue, and physicians worldwide are starting to notice the injustice.

VisualDx is an award-winning diagnostic clinical decision support system that has taken steps to combat this healthcare inequality. It is an innovative tool that has nearly 29% of its leading medical image library representing presentations in SoC (1). This virtual platform has a leading SoC atlas with a user-friendly interface that allows for rapid diagnosis in real-time. By listing the chief complaint, location of the finding, symptoms/signs, or other notable findings, VisualDx can identify differential diagnoses and visual depictions that match the listings. The SoC atlas allows skin conditions to be identifiable across several races. The company has also launched Project IMPACT, a global effort to address implicit bias in medicine. Project IMPACT hosts monthly webinars that educate healthcare professionals and students on cultural awareness in medical practice, identifying diseases on SoC and new advancements for treating skin conditions.

At Northeast Ohio Medical University (NEOMED), we also seek to use innovation to foster diversity and fight racial disparities in medicine. With the help of a generous donation and support from the Dermatology Interest Group (DIG), NEOMED was able to purchase a one-year subscription to VisualDx for all students in the College of Medicine. We believe this software can be helpful to

students in all stages of medical training. Preclinical students can benefit by supplementing course material with VisualDx and applying it toward relevant clinical content. Meanwhile, students in their clinical years can use the tool on rotations in an effort to reduce diagnostic errors by augmenting a clinician's point of view. We plan to incorporate VisualDx into both preclinical and clinical lectures to highlight the variance of skin pathology presentation in SoC. We will aim to do this by incorporating images of dermatopathological conditions in SoC from VisualDx into the M1 and M2 NEOMED lectures covering infectious disease and dermatology topics. Currently, only several lectures explicitly highlight disease presentations on SoC. We hope that by bringing awareness to VisualDx as a resource of diversity and inclusion, lecturers will have an easy way to locate and incorporate images of SoC reflecting any cutaneous disease they discuss in their lectures. Additionally, many medical schools across the country have started incorporating diversity, equity, and inclusion (DEI) statements into their lectures and grand round presentations to foster a more inclusive learning

environment. With the promotion of VisualDx, we hope all NEOEMD associated faculty will gradually begin to incorporate these DEIs into their curriculum and utilize the images from VisualDx to practice inclusivity in medicine. Ultimately, we hope to expand further VisualDx access to the College of Pharmacy and NEOMED postgraduate students to continue our goal of enhancing diversity and improving healthcare outcomes.

Our research into the present substantial issue of inequality in medicine has motivated us to make a difference in the NEOMED community. In a year with a global pandemic, our system has further shown its cracks with the COVID-19 morbidity and mortality rate disproportionately affecting black Americans (7). However, maybe this enormous flaw in the healthcare system is what it takes to start the conversation, to create a movement. This step in improving the gap in medical education is our small step, a step in the direction of positive change, a step in the direction of **equality** in healthcare.



Figure 1. Acute Meningococemia in a patient with skin-of-color (SoC) (left) and in white skin (right). Note difference in the optics of color- presentation of red rash on a dark background (presents as dark brown) versus a white background. Image reproduced with permission from VisualDx (8).



Figure 2. Rocky Mountain Spotted Fever on patient with SoC (left) and white skin (right). Once again, note subtle differences again with optics of color- presentation of a red rash on a dark background versus a white background. Image reproduced with permission from VisualDx (9).

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CONFLICTS OF INTEREST

All authors declare no conflicts of interest.

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