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Advancing dermatology education with AI-generated images

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To the Editor:

Artificial intelligence (AI) has significantly impacted various fields, including science, business, and content creation. The specialty of dermatology is no exception, as AI technology offers potential applications such as the generation of realistic images of rare skin conditions and diverse skin phototypes to train other AI algorithms and enhance diagnostic capabilities.

The scarcity of images for rare skin disorders can pose challenges in achieving accurate and timely diagnoses [1]. AI-generated images can address this issue by augmenting databases with high-quality and diverse clinical images, ultimately enhancing the quality of care provided to patients with rare skin disorders.

Dermatological conditions often present differently across skin tones, leading to diagnostic and treatment errors [2]. Generative adversarial networks (GANs), a class of advanced machine learning algorithms, can synthesize clinical images that encompass various skin tones and textures. By initially training GANs on smaller representative datasets, they can generate larger, more diverse datasets that provide a more inclusive representation of skin diseases across all ethnic backgrounds. This approach reduces diagnostic disparities and improves treatment outcomes.

AI-generated images also contribute to the development of visual diagnostic tools for diagnosing skin diseases more accurately and efficiently. Comprehensive training sets can enhance

the diagnostic skills of trainees and practicing physicians and encourage the creation of new AI-based diagnostic tools.

Acquiring high-quality images of skin lesions can be difficult because of factors such as their location on the body and the presence of skin artifacts like colored markings and tattoos [3]. AI-generated clinical images offer a solution to these challenges while also eliminating privacy concerns associated with using actual patient photos.

Moreover, GANs have the remarkable capability to transfer the learned visual representation of a skin disease onto existing photographs. The vast number of existing healthy skin photographs can serve as inputs for generating new diverse datasets that encompass a wide variety of dermatological conditions. This innovative application allows for the generation of a diverse range of realistic images, enhancing the understanding, diagnosis, and treatment of various dermatological conditions in a more inclusive manner across different skin tones and textures.

The results of our experiment employing a generative adversarial network demonstrate its ability to generate images of clinically pertinent and realistic quality with a potential for the integration of AI-generated images within the field of Dermatology (**Figures 1, 2**). These lifelike photographs can be incorporated into clinical practice and education, addressing existing challenges, improving diagnosis and treatment of rare diseases, enhancing diagnosis



Figure 1. Artificial intelligence-generated image of an adult male patient.



Figure 2. Artificial intelligence-generated image of an adult male patient with rosacea.

across various skin tones, and facilitate the development of more effective diagnostic tools.

Potential conflicts of interest

The authors declare no conflicts of interest.

References

1. Daneshjou R, Vodrahalli K, Novoa RA, et al. Disparities in dermatology AI performance on a diverse, curated clinical image set. *Sci Adv.* 2022;8:eabq6147. [PMID: 35960806].
2. Mah J, Lieu A, Heck E, Quickfall D, Ugarte-Torres A. Primary varicella in 2 adult immigrants to Canada. *CMAJ.* 2023;195:E300-E303. [PMID: 36849176].
3. Li Z, Koban KC, Schenck TL, et al. Artificial Intelligence in Dermatology Image Analysis: Current Developments and Future Trends. *J Clin Med.* 2022;11:6826. [PMID: 36431301].