



What Every Dermatologist Should Know About AI



As augmented intelligence evolves, here are seven things every dermatologist should know about its potential and its limitations.

BY ART PAPIER, MD

>> Artificial Intelligence (AI) refers to the use of software to simulate human intelligence in programming software. The subcategory of machine learning (ML) is highly relevant to our field of dermatology, due to significant progress in this and all the image specialties, including radiology, ophthalmology, and pathology.

As a result of new algorithms developed over the last five years or so, software can now detect patterns in imagery to identify features of specific diagnoses. For example, some software can now be used to scan radiologic images to detect changes over time or point to diagnoses. In ophthalmology, an incredible FDA-approved software application can detect diabetic retinopathy with greater sensitivity than an ophthalmologist.

In dermatology, a current significant focus is on machine learning, using image sets and data associated with those images in order to train software to detect patterns in an image. The goal is that in the clinical setting, dermatologists could, for example, capture an image of a suspicious pigmented lesion. Software could scan that image and detect patterns to derive a “score” that indicates the likelihood that the lesion is a melanoma. Based on his/her *in vivo* assessment, the dermatologist could use that score to decide to watch the lesion or intervene. Software could also be used more broadly to take an image of a rash, for instance, and generate a short list of potential diagnoses. In either case, software will not actually diagnose a disease; rather it will help guide the human physician to a diagnosis. As such, I prefer to think of AI as Augmented Intelligence, rather than Artificial Intelligence. The goal is not to replace human intelligence but to augment knowledge and support clinical decision-making.

With that in mind, the following is an update on the current state of AI, what it is, what it isn't, and how it may impact care.

1 AI Won't Replace Dermatologists

While it is true that dermatologic diagnoses can be missed by non-dermatologists, the reality is that dermatologists can also miss diagnoses. Consider the challenge of diagnosing amelanotic melanoma, for instance. AI, through machine learning, has the potential in the future to provide a second opinion right in the exam room. There is no standard to the way that dermatologists screen for skin cancer. In fact, there is a range of behavior between dermatologists, where some are incredibly thorough and others not. Here, AI has great potential in the near term. The use of digital photography combined with machine learning could create an objective approach that helps dermatologists to detect something that might not have been seen with the naked eye.

2 But it Could Extend Dermatologic Care

Most skincare in America—about 65 percent—is handled by non-dermatologists. In the UK, potentially up to 95 percent of skin complaints are handled by non-dermatologists. In some countries, just a handful of dermatologists serve with a ratio of one dermatologist per million patients. There will never be enough dermatologists. Potentially, software applications can be used to improve skincare globally by augmenting decisions at the point of care, whether with a dermatologist or not. Ultimately, it's not just about our specialty; it's about doing good for people and improving care of the skin.

3 AI Could Address Problems Around Equity

Cognitive biases, such as premature closure, anchoring bias, and representative bias, as well as gender and racial biases, all contribute to diagnostic errors and sub-optimal care. Consider the evidence showing that women experience more diagnostic errors around myocardial infarction (MI), due to the bias resulting from the mistaken belief that women do not experience MIs at



the same rate that men do. AI can help fill in the knowledge gaps created by these biases—if properly trained.

In terms of racial bias, as dermatologists, we know that redness and purple do not appear on brown skin like it does on white skin. AI and machine learning must be trained in a way that is equitable and fair to all people* and could help to reduce the occurrence of these biases.

4 Patients Have a Right to Know

Theoretical and practical concerns have been raised regarding the ethics of AI. For most dermatologists, the most significant ethical consideration is related to transparency. Patients must clearly understand the purpose of AI applied in the clinic. Imagine a ML algorithm gives a 50 percent likelihood of the pigmented lesion to be a melanoma. You recommend a biopsy. Do you explain how the ML analysis informs your recommendation? Currently, in real time in the exam room, most AI in dermatology is used to augment decisions. When we have FDA approved autonomous diagnostic applications such as pigmented lesion analysis we will have to understand all of the ethical ramifications of the use of these tools.

5 Dermatologists Have to Do Their Homework

In order to properly use AI and explain its use to patients, dermatologists must first be aware of what the software or device claims to do. It's also imperative that physicians vet any AI they implement into practice. No doctor should use software or a device in clinical practice without understanding how it works and being certain it is trustworthy. There should be data and science—shared transparently and hopefully independently verified—to prove it is accurate.

AI and machine learning is only as good as the initial data it is trained on. If you train on bad data, then you're going to have bad AI. Before adopting any AI, ascertain who developed it and what data it was trained on.

6 Technology Could Enhance Relationships

Contrary to the common concern that use of EHRs has placed technology between patients and their doctors—literally, as doctors interact with tablets and computers—there is the potential for AI and other technology to enhance the physician/patient relationship and support trust. Even when we are confident of a diagnosis, we can use technology to support our determinations and to educate patients. While it may take just a few seconds to conduct a search for a diagnosis, the patient will perceive that you “took time” with them, and may feel more confident in their diagnosis.

Keep in mind that patients and parents are likely to look up a diagnosis before or after an appointment, or they could have been previously misdiagnosed or simply felt dismissed by pre-

vious physicians. Consider the value to the patient of having a trained dermatologist walk them through technology rather than leaving them to vet online sources for themselves.

7 AI Could Revolutionize Medical Education

The medical educational system and medical practice for the last 100 years has been based on memorizing patterns. In the case of skin disease, dermatologists who see conditions consistently have a greater likelihood of retaining familiarity with the range of potential presentations. For a generalist, who may see mostly “typical presentations,” it may be easier to miss a variant presentation, due to lack of familiarity.

Imagine amassing hundreds of thousands or millions of cases that have been inputted into a computer reliably with good data. (That is a big assumption, because a lot of the data and electronic record is not accurate.) Software could start to see patterns that humans are not seeing. With time and properly developed and vetted software, we could move away from a memory-based system where we create these general statements for people to memorize, to a new world where we augment our thinking based on population datasets. The new generation of residents coming out of residency now have this golden opportunity to really participate in this field of medical informatics, as a research endeavor. It would be great to see groups like the Society for Investigative Dermatology (SID) mentoring more and more academic dermatologists in the field of medical informatics, AI, and machine learning.

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As technology progresses, the question is no longer if AI will be used in dermatology clinical practice. Instead, we should focus on questions of when and how. In dermatology for the near-term, AI has the greatest potential as a tool to support clinical decision making. The best analogy may be to a second opinion. Key to keep in mind is that the doctor will ultimately be the one to reach a conclusion, deliver a diagnosis, and implement a treatment plan. AI is a support tool, and the doctor is still the doctor. ■

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*Dr. Papier published a paper in 2006 addressing disparities in dermatologic resources (J Am Acad Dermatol. 55(4):687-90). Since that time, and the launch of VisualDx, “we’ve been purposeful about collecting imagery in people of color,” he says. “There have been some papers published a year ago and in the JAAD, looking at racial bias, and they highlighted how far ahead VisualDx was of any other resource.” VisualDx has 14,000 images in patients of color. The company’s latest endeavor, Project IMPACT (projectimpact.org), brings attention to the problem of lack of representation of diseases in skin of color and identifies resources that help address this limitation. It is a growing collaboration between the AAD, the SID, the APD, the New England Journal of Medicine, Skin of Color Society, and more.