It's Us Versus It

Are we entering a dermatologist-free zone?

BY MARK KAUFMANN, MD

My last column (available online at PracticalDermatology.com/2017/07) outlined the promise of precision medicine, and this month we will discuss the perils (or at very least the potential pitfalls) that may occur as we move further into this new era of medicine.

We have seen some precision medicine uptake in dermatology, most notably in terms of the drugs that we use to treat advanced melanoma. About half of all melanomas have changes in the BRAF gene, and we can now test tumors to see if they express BRAF mutations before prescribing the expensive therapies that only work against BRAF tumors.

But for our nuanced specialty, the biggest impact will likely be felt at the intersection between artificial intelligence (AI) and precision medicine—an intersection we are quickly approaching.

CNNs: REAL NEWS

A study in the February 2017 issue of *Nature* should give us all pause. In essence, the study pitted dermatologists against AI to diagnose keratinocyte carcinomas versus benign seborrheic keratoses or malignant melanomas versus benign nevi.

And the deep convolutional neural networks (CNN)—i.e., an artificial intelligence-based algorithm based on 130,000 images of 2,000 skin diseases—detected skin cancer as well as 21 seasoned dermatologists. (FYI, the algorithm developer had no background in dermatology).

This is about as big as when Watson, IBM's cognitive computing system, bested two *Jeopardy!* Champions, and the implications are even greater.

"Outfitted with deep neural networks, mobile devices can potentially extend the reach of dermatologists outside of the clinic…and can therefore potentially provide low-cost universal access of vital diagnostic care," the study authors boldly proclaimed.

Bolder headlines followed in the popular press. A particularly daunting one on *Wired* read: "If You Look at X-rays or Moles for a Living, AI Is Coming for Your Job."

Uh-oh! If a computer algorithm is as good as we are at diagnosing lesions, what does it mean for our future? Is this scary, exciting, or both?

REINFORCEMENT VS. REPLACEMENT

Computer-aided diagnosis isn't new, but until now it has merely helped doctors do their job more efficiently. Computer-aided mammography, for example, just flags suspicious areas for radiologists to focus on, and teledermatology, as it stands, allows us to see lesions or wounds earlier so that we can better triage care.

CNNs are smart enough to make clinical diagnostic calls. They are designed to recognize patterns and can then interpret data based on these patterns. And unlike our nation's doctor supply, which reboots as new residents come up and veteran physicians retire, CNNs only augment their knowledge set. They never have to start from scratch, like a new resident does. So they get smarter as we constantly tread water.

While CNN's knowledge can outpace ours, we are safe for at least the time being. Yes, CNN may be able to differentiate a seborrheic keratosis from a keratinocyte carcinoma, but they can't play detective and determine why a patient developed a specific lesion, assess and address medication preferences, troubleshoot adherence issues, or make a patient feel better.

There's anther glitch, too, that we touched on in the last article. Electronic health records are lagging in their ability to handle this type of information, and interoperability, which would be needed to share data, is still a bit of a pipe dream.

I believe that we will be seeing more and more amazing achievements from CNN and articifial intelligence, and that this will give rise to precision medicine solutions. But nothing will replace the patient-physician relationship. These technologies—and the answers they unearth—will only reinforce the care we provide. ■

Mark D. Kaufmann, MD is an associate Clinical Professor of dermatology Dept. of Dermatology at the Icahn School of Medicine at Mount Sinai in New York City.