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## AI A Useful But Not Error-Proof Diagnostic Tool In Melanoma

By Frieda Wiley

**February 7, 2019** | The healthcare system's continuous overhaul has prompted organizations to recruit artificial intelligence (AI) to aid in earlier, more accurate diagnoses while improving overall population management. AI's ability to diagnose melanoma with higher fidelity illustrates the potential impact on patient outcomes, but its usefulness has met some challenges along the way.

### AI Diagnoses More Accurately Than Dermatologists, Aids General Physicians

Skin cancer is the most common (https://www.cancer.org/cancer/melanoma-skin-cancer/about/key-statistics.html) of all cancers.

Melanoma accounts for only 1% of all cancers but remains the leading cause of skin cancer-related deaths. If misdiagnosed or left untreated, melanoma can metastasize and have fatal consequences. Patients could greatly benefit from AI-enhanced diagnostics.

"Google uses AI to identify distinguish between what's a dog versus what's a cat, so why couldn't AI be used for skin?" asks Adewole Adamson, MD, MPP, assistant professor in the department of internal medicine at Dell Medical School at the University of Texas at Austin.

A study published in *Annals of Oncology* in 2018 found that machine learning employing an artificial network of nerve cells called convolutional neural networks (CNN) detected 95% of all melanomas (DOI:10.1093/annonc/mdy166 (https://www.ncbi.nlm.nih.gov/pubmed/29846502)). Dermatologists correctly identified an average of 86.6% and 88.9% malignant melanomas based, respectively, on dermoscopy only or dermoscopy plus clinical information and images. The findings suggested that CNN catches more melanomas than physicians, which could translate into fewer unnecessary surgeries by leading to earlier diagnoses and treatments. In addition to more sensitive diagnostics, computer-assisted diagnostics (CAD) may offer a viable backup in melanoma diagnostics when general practitioners lack access to specialty referrals, Adamson says.

### Technology and Man Both Have Potential to Err

Relying entirely on AI for diagnostics does not offer a foolproof solution, as the ability of AI to accurately identify melanomas depends on its training. For example, during the "machine learning," or "deep learning," phase, CNNs function as an artificial eye that scans thousands of images of melanomas. The software then develops an algorithm based on the images to which it was exposed. However, Adamson warns that exposing AI to a wide variety of images proves crucial in ensuring accurate diagnoses among all populations.

Many clinical trials and data involve exclusively or overwhelmingly Caucasian populations, which can become problematic when conditions manifest differently in diverse populations. Training AI with only images of Caucasian skin can have catastrophic consequences in darker-skinned patients. Melanoma is 20 times more common in Caucasians than African Americans (https://www.cancer.org/cancer/melanoma-skin-cancer/about/key-statistics.html), but according to Adamson, people of color often receive later melanoma diagnoses and subsequently, poorer outcomes. Omitting darker skin tones from the deep learning phase could create a system that falsely recognizes a melanoma or fails to recognize a malignancy or mole in people of color.

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"Before we unleash technology on the population, we have to think about the data and ask ourselves whether the data is going to be representative of the people who are going to use it on the backend," advises Adamson.

### Physician Reticence, Implementation Present Additional Hurdles

Like many industries where technological influx has shifted or reduced the need for human manpower, some physicians fear that AI could one day displace their jobs. Adamson discounts these concerns, stating that a more likely scenario is that AI-physician synergy will enhance patient outcomes at a higher level than either capability could achieve alone.

Some organizations may struggle to overcome financial challenges associated with the AI platform integration, but Ralf Huss, MD, PhD, professor of pathology at Ludwig-Maximilian-University of Munich, defines "human resources, or AI experts," as the most expensive commodities. Additionally, he notes that corporations and academic institutions seek to mitigate some of the economic burden by forming consortia and public-private partnerships that standardize data collection and offer data for comparable results.

Rebecca Lancaster, senior manager of product management at Meditech says that organizations need to be practical when evaluating costs associated with AI-derived data.

"Streamlining documentation workflows and providing accurate results is all the promise of AI but the value is not there if providers do not trust the results," she says. For example, double-checking the accuracy of the documentation, diagnosis, or imaging results reduces and delays the potential for return-on-investment.

Despite the potential challenges associated with AI implementation, all experts agree that AI's use in the healthcare space will continue growing. Huss says new opportunities lie in implementing AI into areas that human experts cannot solve independently.



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