Transcript Details
This is a transcript of an educational program. Details about the program and additional media formats for the program are accessible by visiting: https://reachmd.com/programs/dermconsult/managing-melanoma-take-action-with-ai/12641/

ReachMD
www.reachmd.com
info@reachmd.com
(866) 423-7849

Managing Melanoma: Take Action with AI

Dr. Greenberg:
Welcome to *DermConsult* on ReachMD. I'm Dr. Michael Greenberg, and joining me today to discuss his fascinating study on the application of artificial intelligence to determine the severity of melanoma is Dr. Sam Polesie, a specialist physician in the department of Dermatology and Venereology at the Sahlgrenska University Hospital in Gothenburg, Sweden.

Dr. Polesie, thanks for being here today.

Dr. Polesie:
Thank you for having me.

Dr. Greenberg:
To start us off, Dr. Polesie, can you tell us how you first got the idea to use artificial intelligence to help determine the severity of a patient's melanoma?

Dr. Polesie:
Well, as you might know, there's been a lot of publications during the past four or five years within dermatology and most of these have been conducted in order to put correct labels on dermoscopy and clinical close-up images of surface skin tumors and skin disorders. We think it's really important to find neat applications where we can pre-operatively have a better understanding about the melanoma depth. And as you are well aware of, most melanoma cases are quite easy to find. In fact, most melanomas are found by patients and not physicians. However, it's very hard to know pre-operatively whether a melanoma is in situ or invasive. So we really wanted to use the power of convolutional neural networks to aid us in this quite frequently occurring binary justification problem. So that was the basic setup, or the background, for our investigation.

Dr. Greenberg:
So, once that lightbulb popped in your head, how did you go about testing your theory?

Dr. Polesie:
So, it was quite easy for us because we report all melanomas, at our department, all melanomas are classified by dermatopathologists and they have a list of all the procedures, all analysis being performed, so we used that list and cross-checked it with our patient journals and we identified all dermoscopy images in a five-year time period yielding approximately 1,100 histopathologically verified lesions, of which 550 were invasive and 622 were melanoma in situ. It was quite easy to find those images. Obviously, we only included images with high quality that are usable in a clinical setting.

So, once we had those, we just simply randomized them into three sets. That is, training set, a validation set, and then a test set. And this test set consisted of 200 images and the training set was 749 images and the validation set was 188 images. So, during the validation and the training phase you really don't use the test set, at all, okay? So, you refine and you develop, and you improve your modal using these training images and these validation images. And once you're happy with the architecture of your model, well, you unlock the test set. And you only have one shot at this. And these 200 images, well, we let the model decide whether it was in situ melanoma or invasive melanoma. And the neat thing is that we can also compare this evaluation to dermatologist's evaluation. So, we let seven independent dermatologists classify the same 200 lesions and then we could compare the output of the algorithm on the one hand, and the dermatologists' combined answer on the other hand.

Dr. Greenberg:
And what exactly did you find? Was the algorithm able to accurately assess melanoma, and did it have any limitations?

Dr. Polesie:
Well, you have to take into consideration that we only included 749 images in a training set and only validated them on 188 images. And the test set was only 200 images. But so the test set was fairly small. That is, of course, a limitation. However, the algorithm performed in absolute terms I mean it was outperformed by dermatologists. So, there was no, in fact, there was no difference in the AUC in terms of accuracy rate on the test set. If you compared a combined dermatologist score and the CNN outputs.

Of course there are several limitations to this investigation. We only included in situ and invasive melanomas and in a real-life setting, of course, a dermatologist needs to be aware of dysplastic nevi, common nevi, and dermatofibromas and all lesions that sometimes can look very similar to melanoma. And if I was to show like a cat to the algorithm it would only select from invasive or in situ melanoma. So, I mean, you have to be very cautious about this algorithm in a clinical setting. And of course, a dermatologist uses a lot of extraneous information such as patient history, and whether the lesion is raised and a global assessment a comparative approach of the lesion and whether the lesion arises from chronically sun-damaged skin, etc. family history of melanoma. So, in a relapse setting dermatologists integrates so much more info than just simply a dermoscopic image. The clinical image is obviously very important as well.

You have to remember that most patients in our department, patients that were included in this investigation, they have Nordic skin types, the Fitzpatrick skin type range from 1 to 3. And it's also of vital importance to consider this in terms of external validity. That's also something that's well worth mentioning. So you should be really cautious in using a similar algorithm if you know that the data that the model has been trained up has been used for training purposes does not reflect your population. And that is a very important limitation, of course. However, I mean, uh, patients with that have more hyperpigmented skin and melanoma that is quite a rare occurrence at our department. And moreover, melanomas located in special sites, such as acral lentiginous melanomas and amelanotic melanoma, etc., those cases, are of course unrepresented because they are so rare in, in our population. So, melanomas of special site, you need to be cautious, of course. The vast majority of lesion in our investigation were either on the trunk or the extremities, excluding the hands and palms. So, that's also an important consideration. And obviously, this was only a research letter so it's a teaser, a scientific teaser. But shedding light on an important application that hopefully can be used one day.

Dr. Greenberg:
Based on those findings, Dr. Polesie, what implications might this technology have on the way we assess melanoma?

Dr. Polesie:
So, the model as we speak today is I mean very premature. It's not right for clinical use. It needs to be further refined and also evaluated in prospective clinical trials where the dermatologists can have access to this information in a prospective setting. I mean, that's key. And in fact, there are only, I mean, not many prospective clinical trials integrating clinical decision-making in combination with machine-learning outputs in the real-life clinical setting. And so that is very much lacking today. And of course, we need to develop this algorithm further and also integrate the clinical close-up image and possibly also other meta-factors such as whether the lesion is raised and well, as I said earlier, other clinical important information, obviously. So, I wouldn't say that the algorithm today is mature for a clinical setting. However, it is a very frequent binary classification problem, which is really hard for dermatologists in selected cases. And it is appealing to find novel targets for machine-learning and tools and this is an important application, in my opinion. It could really help us in selected cases to increase our sensitivity and specificity if that model is developed further, and I mean achieves well in a prospective setting. So, this is the first grain of seed in an upcoming investigation. This is the start point, I'd say.

Dr. Greenberg:
For those just tuning in, you're listening to *DermConsult* on ReachMD. I'm Dr. Michael Greenberg, and today I'm speaking with Dr. Sam Polesie about his study on using artificial intelligence to assess melanoma. So, now Dr. Polesie, I'm sure there are lots of dermatologists out there listening to this who might be starting to worry a bit and view artificial intelligence as a threat. What would you say to them?

Dr. Polesie:
In fact, we have conducted attitude investigations whether dermatologists and also dermatopathologists are concerned about this development with an increased AI use in clinical practice. And at large, I mean, these responding physicians, they're not. And particularly not young physicians and young dermatologists will certainly find these tools in the not-too-distant future. And of course, we lead to be wise in finding the correct tools in specific selected clinical problems, such as this one. So, I wouldn't be too worried. I mean, the dermatologists or general surgeon will still need to perform the surgery, however, if the surgeon has an idea that this melanoma is in situ, you can preferably choose a 5m surgical margin and then possibly avoiding another unnecessarily subsequent investigation. Because the histopathological margin was too narrow or positive. So, that's really what it's boiling down to. Also that information is also important for the patients. Let's say that you have a really worried patient and well your primary suspicion is melanoma, but you can say that well I suspect this is an in situ melanoma, which is of course, much more benign lesion and you can provide that information pre-operatively to a certain degree. I mean, I think that it will appeal to our patients, as well. Of course, the pathology, histopathology report

will still be the gold standard but if you can convey some important information to the patient that's nice, as well. So, I mean to answer your question, I wouldn't be too worried about this development. I'd say let's embrace and welcome this development, but let's be wise in selecting the appropriate setting for machine learning algorithms.

Dr. Greenberg:
That's really interesting. So, what's next for you and your team? Are you hoping to continue diving into this line of research?

Dr. Polesie:
So, this is a fairly new research line within our research group and we have developed a new algorithm that is only focusing on clinical close-up images. And it's the same, kind of setup. We retrospectively collect all clinical close-up images from our department, and we exclude those with too poor quality, and we let the convolutional neural network decide whether the lesion is in situ or invasive. And we give the exact same problem to dermatologists and say we'll see how they perform in the same task. And well we have done that, and we are now analyzing results from that investigation. And in the future, obviously, we will integrate the dermoscopic image, as well as the clinical close-up image along with relevant methodata. So that's the ultimate aim.

But of course, bringing this product into the market that would involve a lot of red tape and so we're not definitely not there yet. The next step would be to take this to clinical, prospective clinical trials to see how useful it is in a real-world setting and to share all the data. To share all the dermoscopic images. We will eventually die one day, but the data will still be there and it is very likely that the models that we develop today will be very immature, but within twenty, fifty years, we would have succeeded and we would have expanded our knowledge. Perhaps that's the most important thing that we can do today, is to share our data.

Dr. Greenberg:
Thank you, so much, Dr. Polesie for being on the program.

Dr. Polesie:
Thank you, so much for having me. It's been a pleasure.

Dr. Greenberg:
For ReachMD, I'm Dr. Michael Greenberg. To access this episode and others from *DermConsult*, visit ReachMD.com/DermConsult, where you can Be Part of the Knowledge. Thanks for listening.