

Using big data and AI for improved diagnostics of diseases

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Global challenges



A Growing Total
**World
Population**



13+ Million
**Provider
Shortfall**

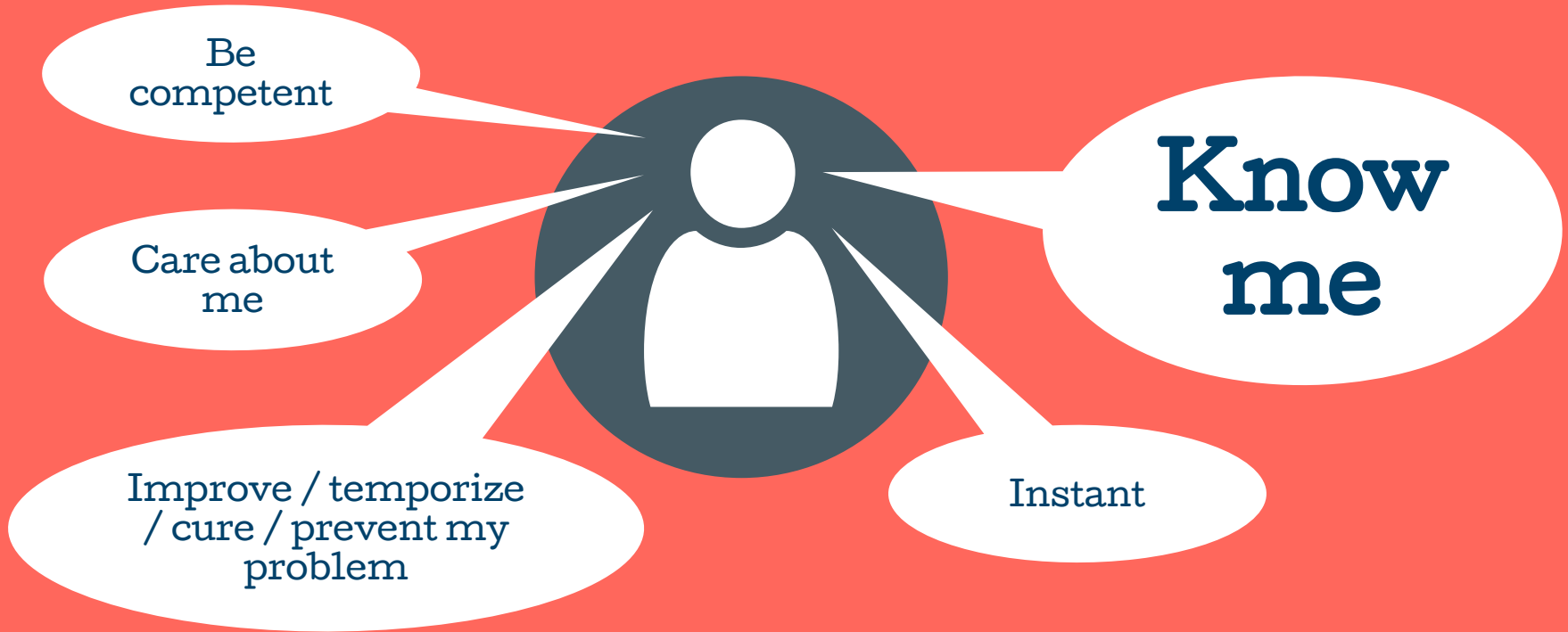


An Aging
**Developed
World** Population



Chronic and
Preventable
Disease **Epidemic**

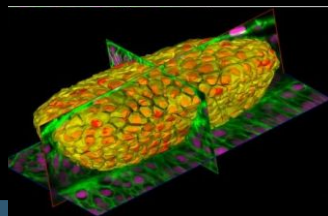
What Patients Want



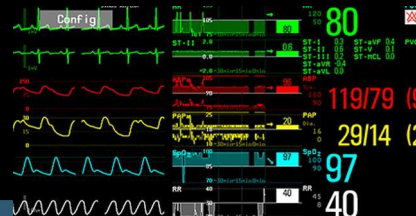
The Era of Big Data, Used for Precision Solutions



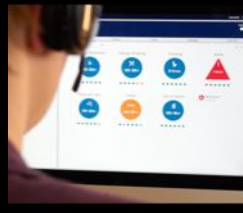
Personal health tracking



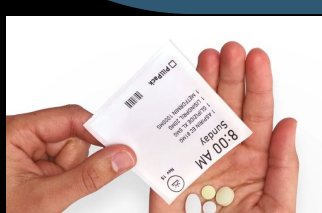
Medical imaging



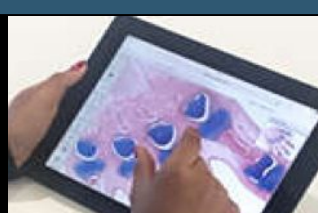
Patient Monitoring



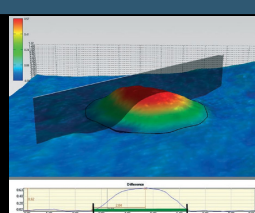
Home monitoring



Medication adherence



Pathology



Quantification



Omics



Analytics

A large crowd of people at night, many holding up their smartphones with the flash on, creating a sea of bright lights. A yellow balloon is visible on the left side of the crowd. The text "6.3 billion smartphones by 2021" is overlaid in the center of the image.

**6.3 billion smartphones
by 2021**

A photograph of a female doctor with blonde hair, wearing a white lab coat over a light green shirt, examining an elderly woman's arm. The doctor is using a magnifying glass to inspect the patient's skin. The elderly woman has grey hair and is wearing a light blue sweater. The background is a bright, clinical setting. The text "Nobody is perfect..." is overlaid in red in the center of the image.

Nobody is perfect...



**Can AI assist HCPs
becoming better?**

Case 1

Dermatologist-level Classification of Skin Cancer with Deep Neural Networks

Andre Esteva*, Brett Kuprel*, Rob Novoa, Justin Ko, Susan Swetter, Helen Blau, Sebastian Thrun

Nature, 2017

***Enhancing
the Expert***



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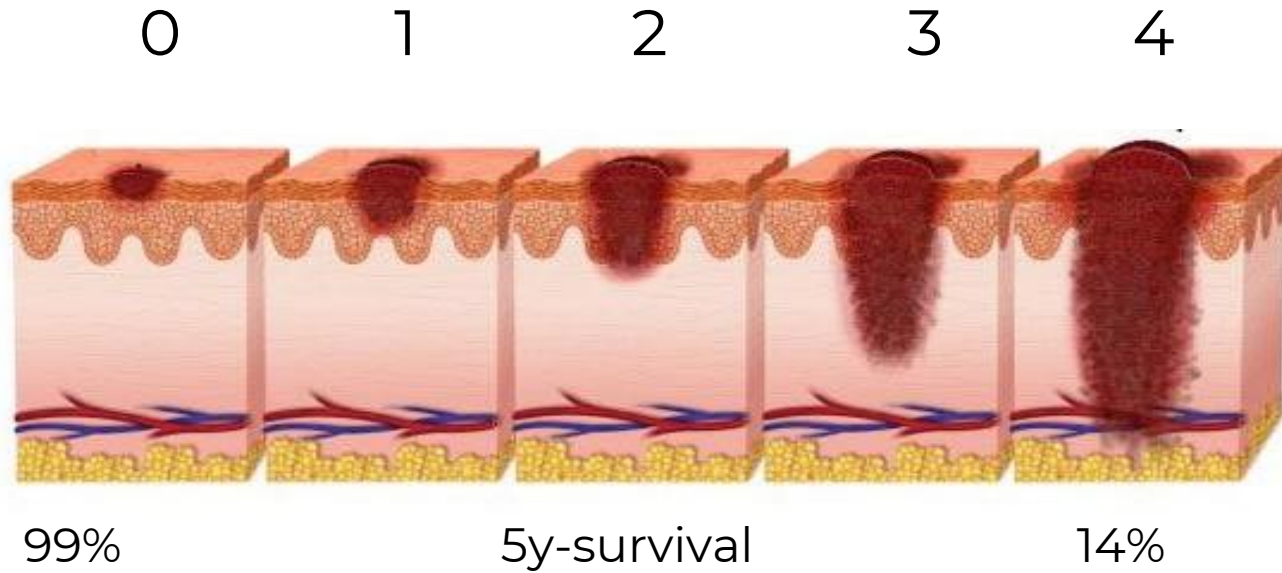
*Artificial intelligence powers detection
of skin cancer from images* **PAGES 36 & 115**

NATURE.COM/NATURE
2 February 2017 £10
Vol. 542, No. 7639

What is cancer and what is not?

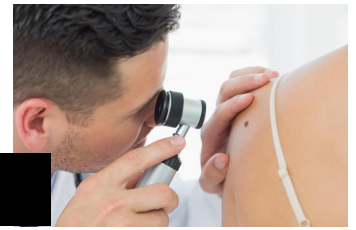


Skin cancer



Skin Cancer Classification

What is Good or Bad



Clinical images

Epidermal

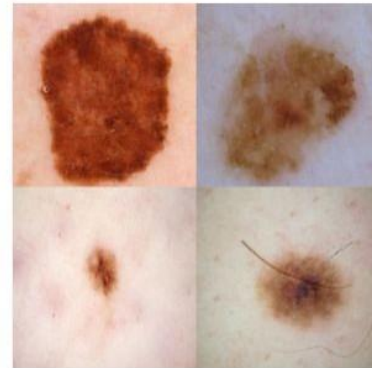
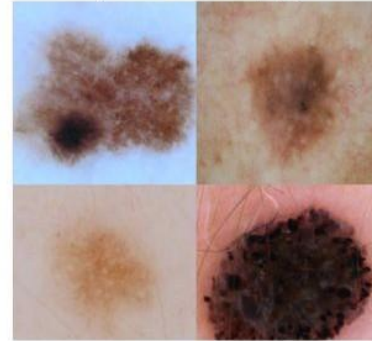


Melanocytic



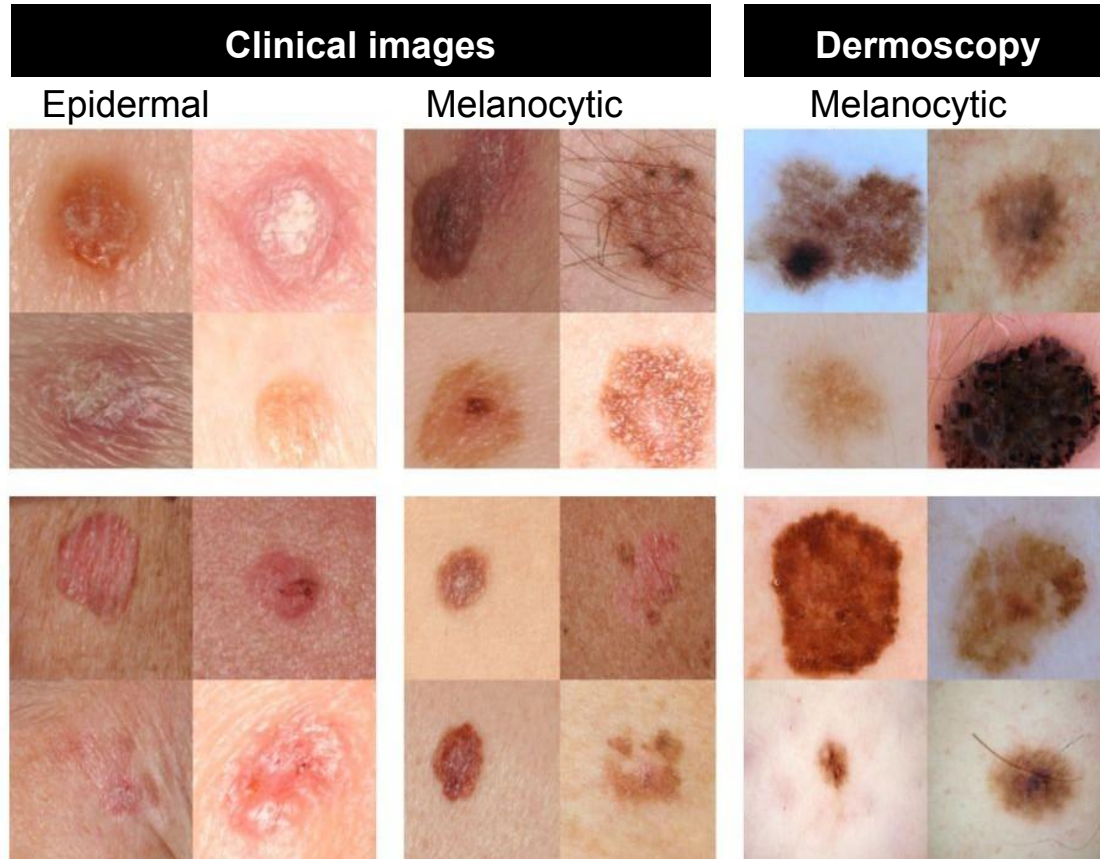
Dermoscopy

Melanocytic



Skin Cancer Classification

**Benign
Good**

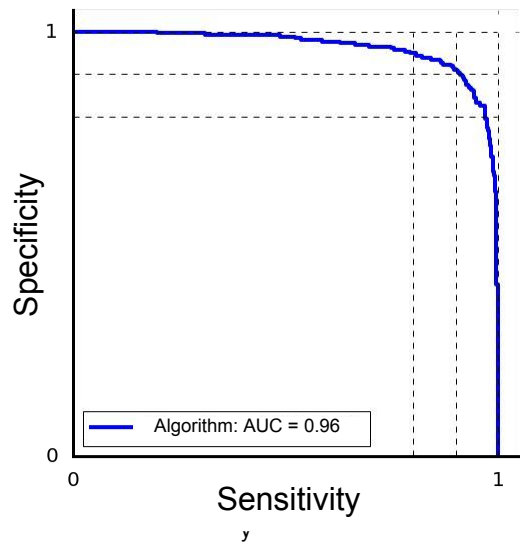


**Malignant
Bad**

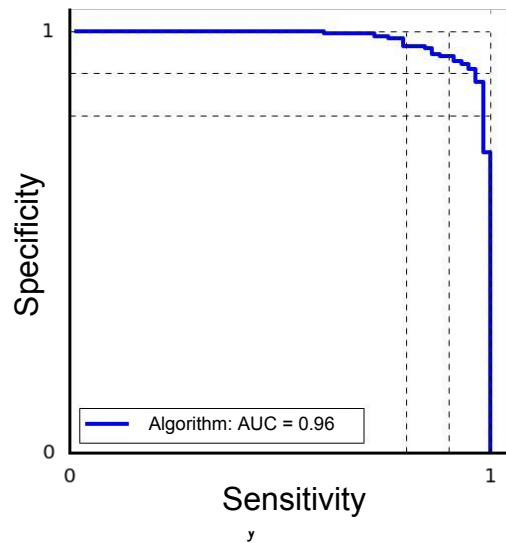
Skin Cancer Classification

Test set: Total (1942 images)

Carcinoma: 707 images



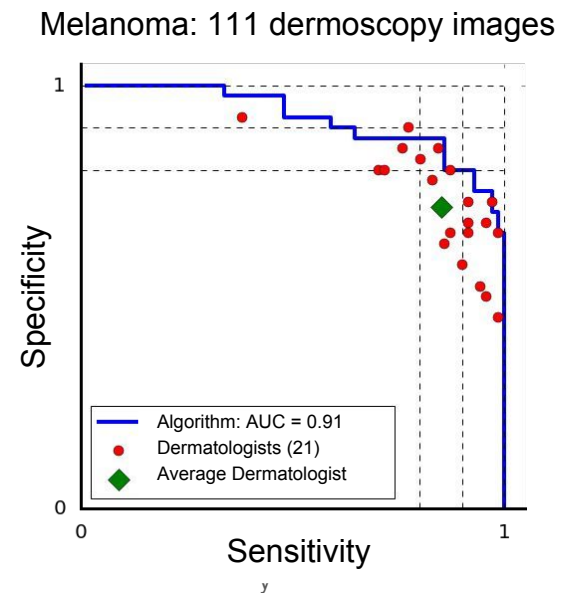
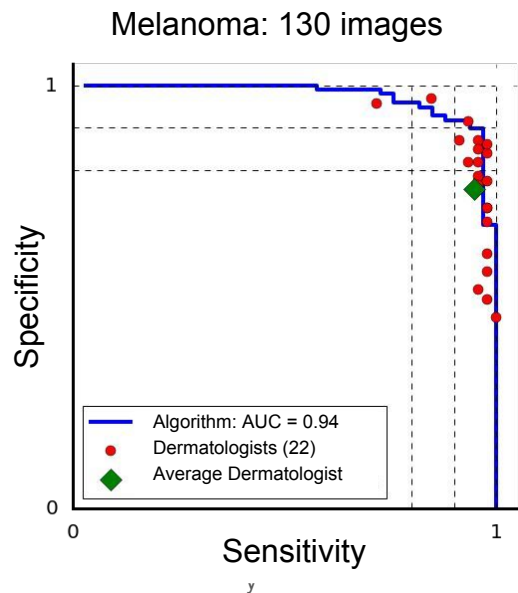
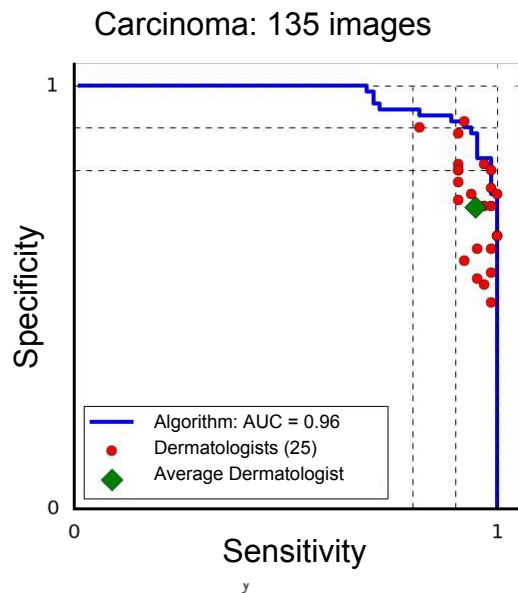
Melanoma: 225 images



**Dermatologist-level performance
Versus
AI
(Convolutional Neural Network)**

Skin Cancer Classification

Test set: Dermatologist Comparison (21 dermatologists, 376 images)



Can the AI be applied in the clinic?

Case from US

Prof J Ko, dermatologist



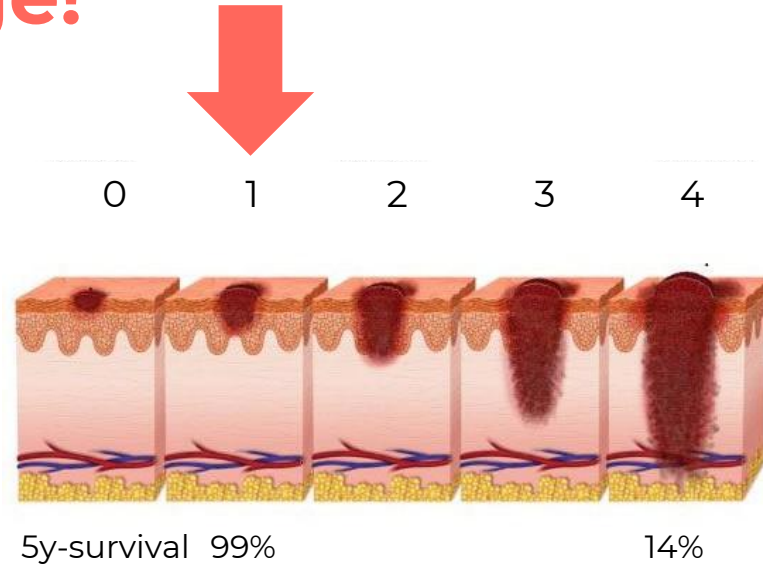
**What
is
this?**



**Uploaded several pictures
to the algorithm and it said
Malignant melanoma**

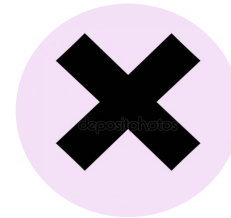
**Decided to cut it out, and it
was Malignant Melanoma!**

**AI helped the patient
getting it cut out at a very
early stage!**



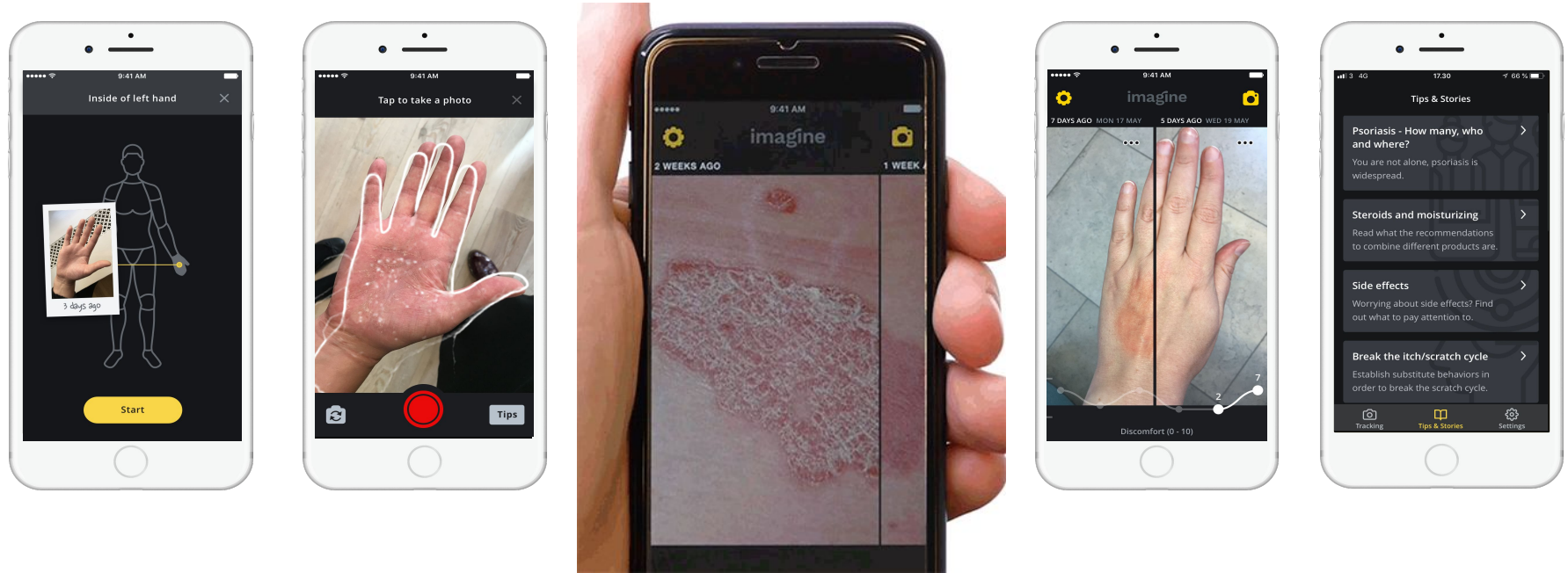
Case 2

Identifying triggers of a disease is hard!



Imagine - Skin Tracker

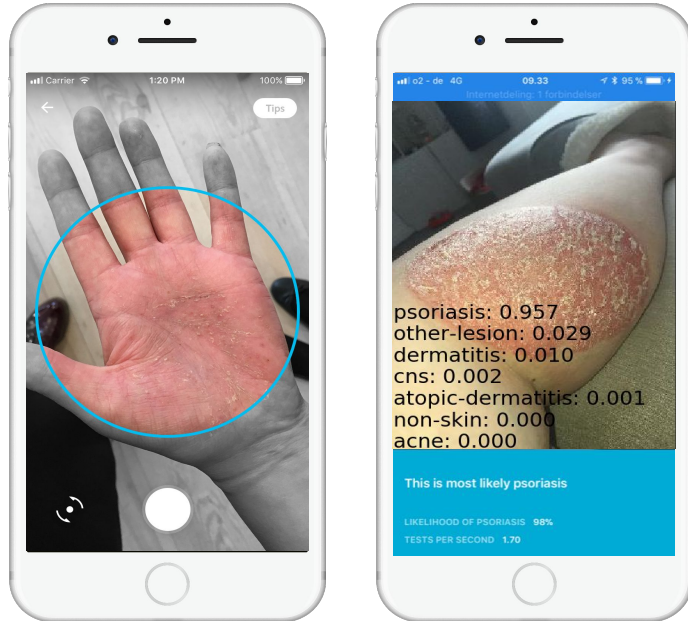
Goal: Help patients track and stay on top of longer-term skin disorders



The shown app is not a medical device and does not provide, nor replace, qualified medical advice.

AI to diagnose skin diseases

Goal: Provide diagnostic feedback and medical knowledge to HCPs and patients



Patient-sourced
mobile photos

Deep learning
trained on photos labelled
by expert dermatologists

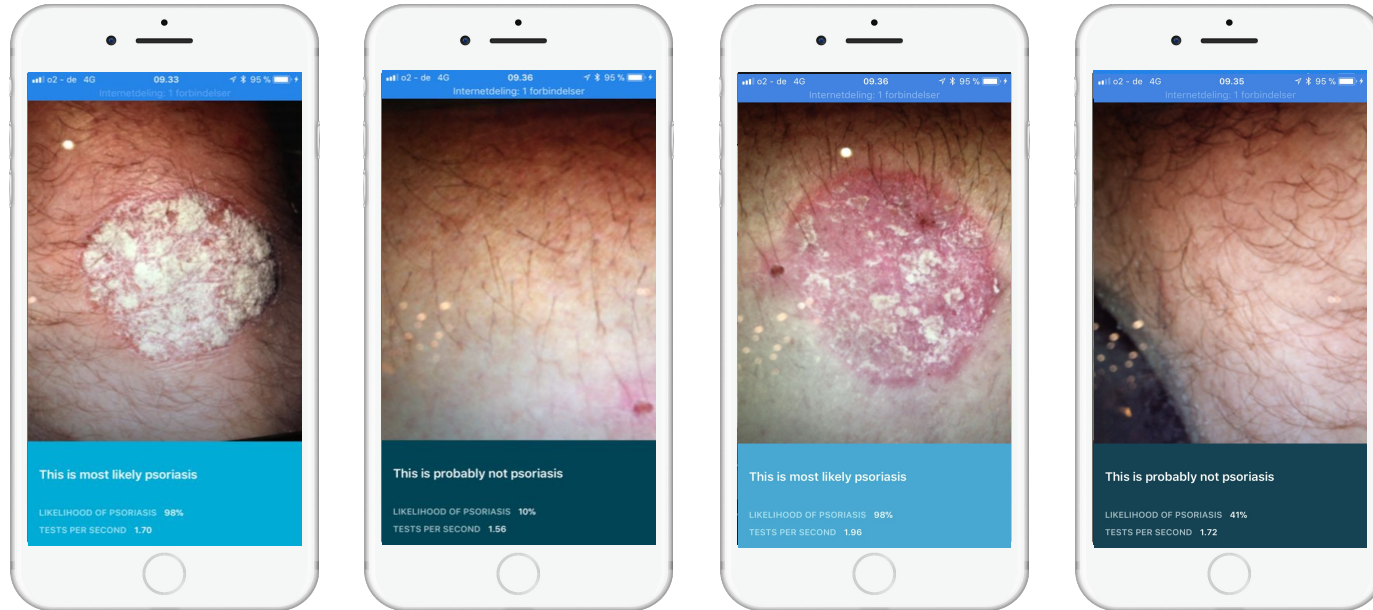
91% accuracy
on psoriasis or not

86% accuracy
on dermatitis or not

The shown app is not a medical device and does not provide, nor replace, qualified medical advice.

First promising **AI** model for non-cancer diagnosis

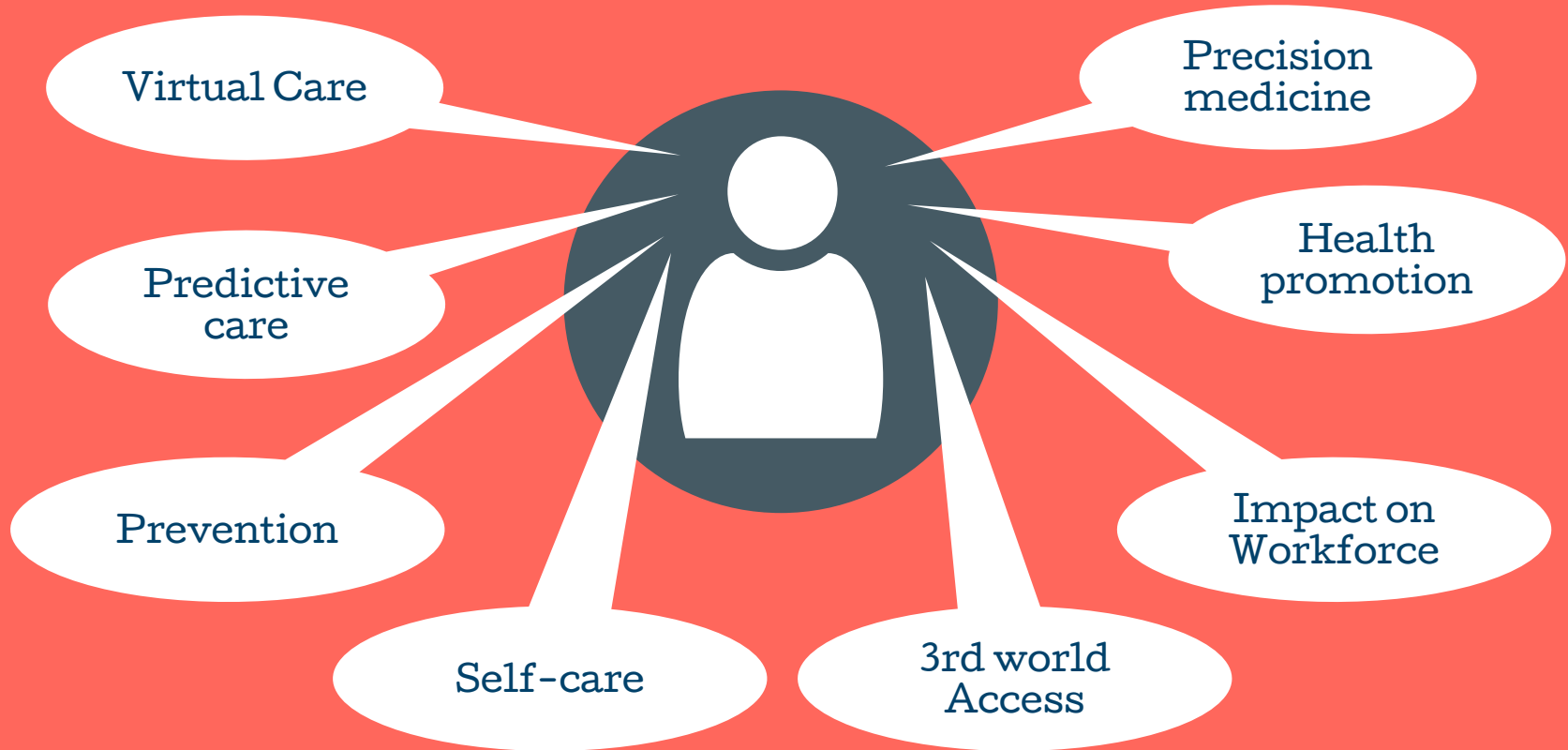
Psoriasis - 91% accuracy





AI CAN assist HCPs in the future!

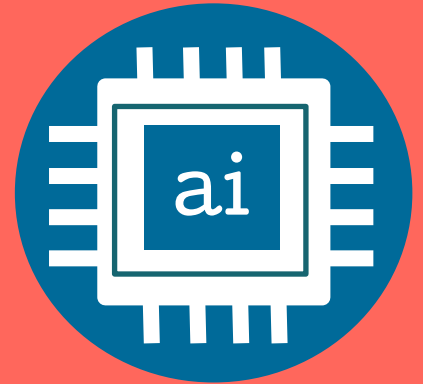
What Patients Get in 2025



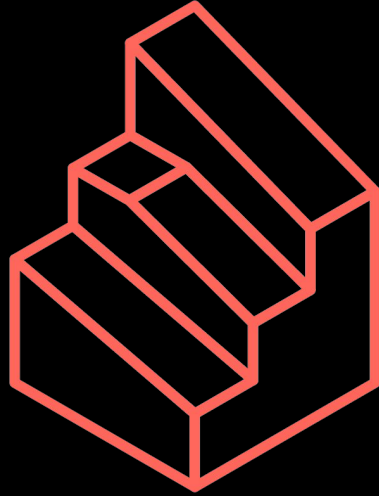
Key takeaways

Artificial intelligence will...

- Enable preventive and precision medicine
- Improve patient experience, access and outcomes
- Augment the intelligence of the clinician, and remove non-value added work
- Allow doctors to "know" their patients like never before



**Digital solutions will in the future help
HCPs moving from SICKCARE
to HEALTHCARE...**



Using big data and AI for improved diagnostics of diseases

Anne Fleischer

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