

Utilizing AI for Lower Extremity Diagnostics and in Practice

Friend or Foe?

Bela Pandit, DPM, FACFAS

Your profession as you know it will change.

YOU NEED TO EMBRACE THE GOOD AND BAD OF AI TO SURVIVE

Basics

What is AI?

AI (Artificial Intelligence) :the name was coined in 1956 but was mentioned all the way back to ancient mythology but the boom has been in the 2000's

Simply, it's the concept of machines being able to perform tasks that require intelligence

Continued...

- Artificial Intelligence (AI)
 - sophisticated computer learning software or algorithms
 - analysis, presentation, and comprehension of complex data
 - used to mimic or simulate human cognition
 - gives the illusion of making intelligent human-like responses
- AI can be trained to solve specific problems
 - using vast amounts of data
 - ethical issues with protected health information

So Where is the Data Coming From?

- Various types of AI data
 - numeric data stock market, sports scores, shopping
 - textual data: words and sentences, natural language processing
 - visual data: object recognition and classification, facial recognition
- Artificial intelligence in healthcare and PHI
 - relationships between clinical techniques and patient outcomes
 - diagnostics and treatment protocols impacting patient care
 - personalized medicine, patient monitoring, improved decision making

IF YOUR DATA COLLECTION IS WRONG, ANY CONCLUSION IS WRONG!

Garbage Data In



Analysis Pipeline



Garbage Data Out



DATA QUALITY MATTERS

What you use AI for today

It's everywhere!

- Virtual personal assistants
 - Siri, Google Assistant, Alexa
 - foreign language translation, chatbots, voice recognition, Dragon
- Personal recommendation services
 - Amazon, Netflix, Facebook
- Financial services
 - algorithmic trading, fraud detection, credit scoring, risk assessment
- ChatGPT
 - natural language, human-like responses to various queries

So What Does This Mean For You?

The GOOD

- Potential better diagnoses, techniques and outcomes
- Problem Solving
- Surgical Planning
- Studying / Academics
- Charting /Scribing
- Auditing
- Billing

So What Does This Mean For You?

The BAD

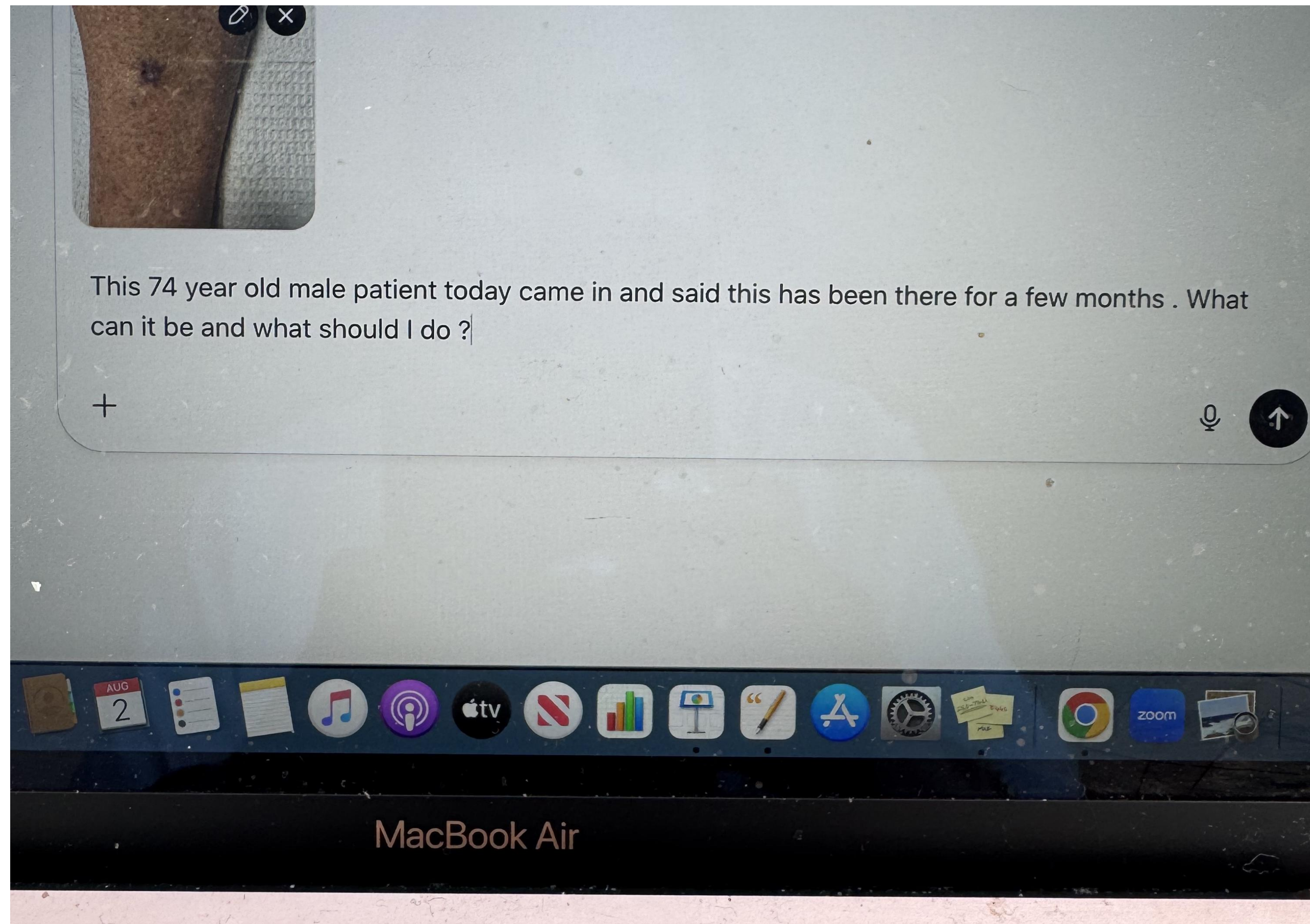
- Billing
- Auditing
- Lack of Patient trust
- Legal
- Professional Threats
- Non Escapism

Medical Professions Most at Risk

- Radiology
- Pathology
- Laboratory
- Pharm Techs
- Billers
- Telehealth

Lets see a very basic Use of AI

Your friend Chat GBT



Quick Question

This 74 year old male patient today came in and said this has been there for a few months . What can it be and what should I do ?

Thank you for the image and clinical background. Based on the photo and description ("a few months," 74-year-old male), here are **possible differential diagnoses** and **suggested next steps**:

Appearance Suggests:

- A small, ulcerated lesion with a central dark crust or eschar
- Surrounding mild erythema and induration
- Appears non-healing

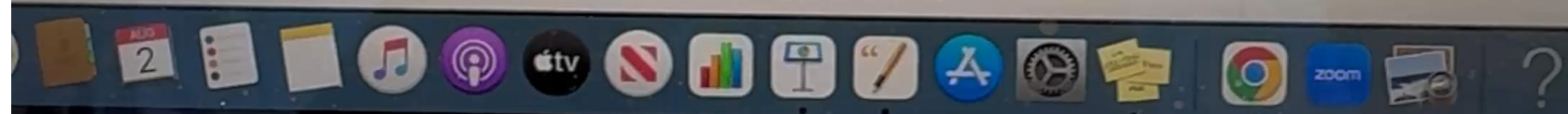
Differential Diagnosis:

1. Squamous Cell Carcinoma (SCC)

- Common in sun-exposed areas in elderly patients
- Can appear as a non-healing ulcer or crust
- May bleed, itch, or grow slowly over time

+ Ask anything

ChatGPT can make mistakes. Check important info.



MacBook Air



Vs Google Leens

The screenshot shows a Google search results page for a query related to skin lesions. The browser is Chrome, and the search results are displayed in a grid format. The top navigation bar includes the Google logo, a search bar, and a 'Sign in' button. The search results are as follows:

- Top Left:** A close-up image of a skin lesion on a leg. Below it, the source is 'ReGenesis Plastic Surgery' with the text 'Skin Cancer Information | ReGenesis Plastic Surgery'.
- Top Middle:** A close-up image of a skin lesion on a leg. Below it, the source is 'Reddit' with the text 'Had these spots around both of my legs for about a month now...'.
- Top Right:** A close-up image of a skin lesion on a leg. Below it, the source is 'Facebook' with the text 'Squamous Cell Carcinoma (SCC): A Common but Treatab...'.
- Middle Left:** A close-up image of a skin lesion on a leg. Below it, the source is 'alemanvein.com' with the text 'Aleman Vein Center is an Atlanta vein clinic that offers the best...'.
- Middle Right:** A close-up image of a skin lesion on a leg with a ruler for scale. Below it, the source is 'HMP Global Learning Net...' with the text 'When A Healthy 85-Year-Old Patient Presents With Changin...'.

The bottom of the screenshot shows the macOS dock with various application icons including Safari, Spotlight, Photos, Messages, Calendar, Notes, Music, Podcasts, Apple TV, News, Stocks, Reminders, Photos, App Store, System Preferences, Zoom, and Mail.

What's on the agenda today?

A patient presents with sharp pain in foot, intermittent, normal muscle strength, normal reflexes, normal NCVT, normal EMG. |



7. Joint-related issues

- **Osteoarthritis**, synovitis, or early **inflammatory arthritis** in foot joints
- Pain may be activity-related and intermittent

8. Complex Regional Pain Syndrome (CRPS) – early stage

- Often following trauma or surgery
- Pain out of proportion, color/temperature changes
- Normal neurophysiological tests early on

Next Steps for Workup

- **Thorough physical exam** with palpation to localize tenderness
- Consider **imaging**: X-ray → if negative but suspicion remains, order MRI
- **Ultrasound** can help assess for neuroma or plantar fascia tears
- **Tinel's test** over tarsal tunnel and intermetatarsal space
- Evaluate **gait and footwear**
- Consider **diagnostic nerve block** if entrapment suspected

Let me know if you'd like a decision tree or workup algorithm based on these.



Vs Google

The image shows a Google search interface. The search bar contains the text "patient presents with sharp pain in foot, intermittent, normal muscle strength, no". The search results display a link to a StatPearls article titled "Anterior Tarsal Tunnel Syndrome - StatPearls" by MA Dreyer, published in 2022. The article snippet states: "Patients will typically complain of sharp shooting pain, numbness, or tingling along the distribution of the DPN or its terminal branches." Below the article is a "People also ask" section with four questions: "What are the symptoms of anterior tarsal tunnel syndrome?", "What nerve is affected with foot drop?", "What is a positive Babinski reflex?", and "What is nerve entrapment in the foot?". A "Feedback" link is located at the bottom right of the "People also ask" section. Below this is another search result from "Practical Neurology" with the title "When to Refer Patients With Pain for EMG". The snippet for this article reads: "Like any diagnostic procedure or test, EMG is not perfect. A normal result does not mean a patient does not have a deficit in their nerve or muscle." and lists missing information: "Missing: intermittent, strength, reflexes, NCVT,".

Google

patient presents with sharp pain in foot, intermittent, normal muscle strength, no

<https://www.ncbi.nlm.nih.gov/books/NBK538488>

Anterior Tarsal Tunnel Syndrome - StatPearls

by MA Dreyer · 2022 · Cited by 2 – Patients will typically complain of sharp shooting pain, numbness, or tingling along the distribution of the DPN or its terminal branches.

People also ask

- What are the symptoms of anterior tarsal tunnel syndrome?
- What nerve is affected with foot drop?
- What is a positive Babinski reflex?
- What is nerve entrapment in the foot?

Feedback

PN Practical Neurology

<https://practicalneurology.com/articles/2018-sept>

When to Refer Patients With Pain for EMG

Like any diagnostic procedure or test, EMG is not perfect. A normal result does not mean a patient does not have a deficit in their nerve or muscle.

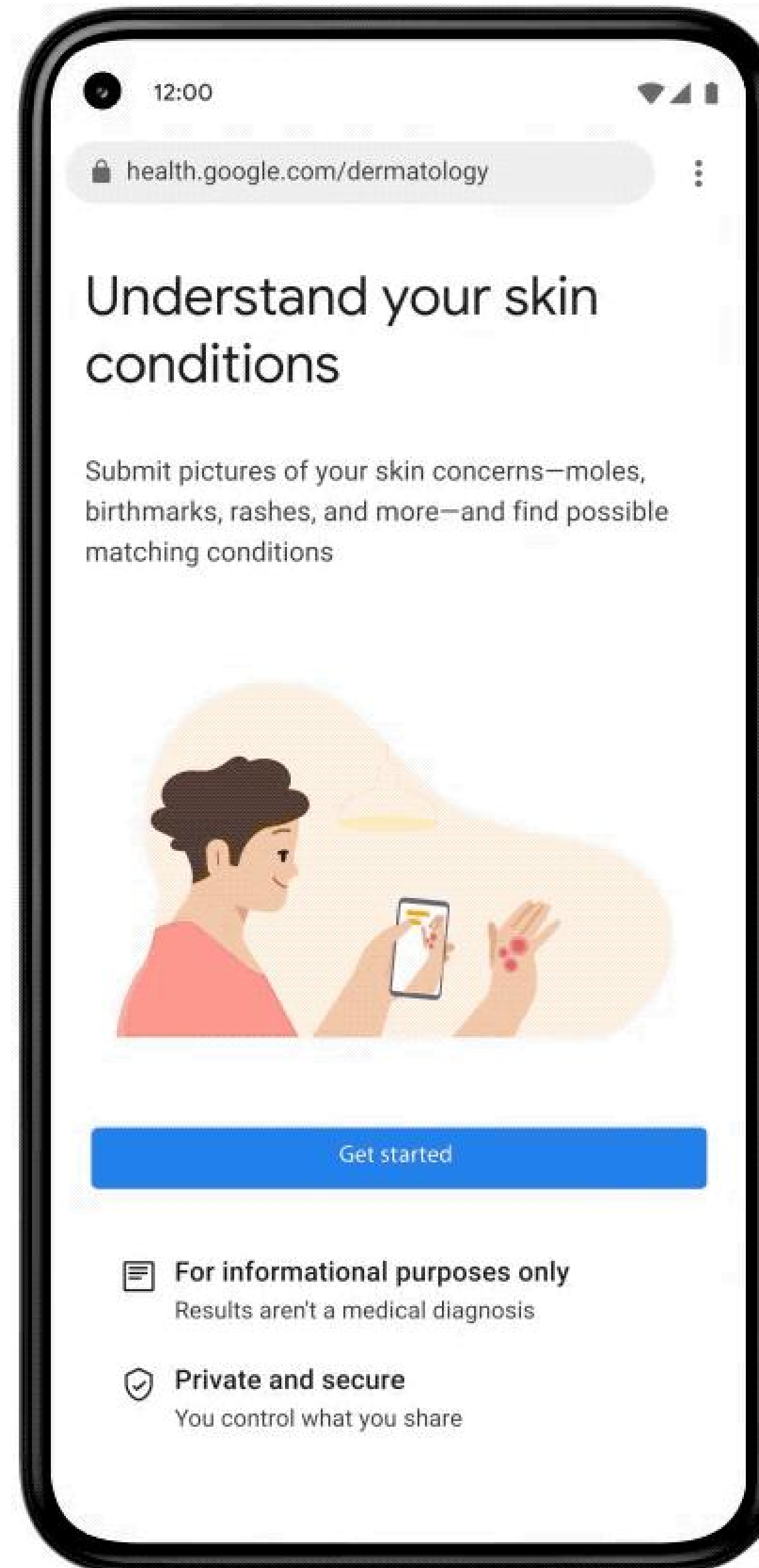
Missing: intermittent, strength, reflexes, NCVT,

On the Horizon

Google Derm Assist

- AI smartphone app
 - machine learning research with dermatologist input
 - trained with millions of skin images over 3 years
- Class 1 medical device (CE-marked) in the EU
 - not available in USA
- Upload 3 photos and answer a few questions
 - in seconds, users are given a list of possible matching conditions
 - personalized health information on 266 dermatology conditions
 - data is stored securely, encrypted, and not used for advertising

DermAssist is intended for informational purposes only and does not provide a medical diagnosis.



DermAssist is not available in the United States and the FDA has not evaluated this tool for safety or efficacy.

Artificial Intelligence Literature Review

- Most of the articles are industry supported
- Many are technologic feasibility studies by software engineers
 - overly optimistic demonstrating tremendous success vs physicians
 - technology has not yet been implemented clinically
 - need further validation and large clinical trials
- Many dermatology articles using AI involve dermatoscopes
 - dermoscopy offers superior results vs cell phone clinical photos
 - onychomycosis study and benign vs malignant melanoma

Literature about Onychomycosis

- Greatest impact of AI will be in laboratory pathology
 - AI detection is now equal to board certified dermatopathologists
 - will increase productivity of pathologists, not replace them
- Largest AI onychomycosis study is from Korea
 - claimed AI is superior to dermatologists in diagnosing onychomycosis
 - research involved 50,000 photo images via visual detection
 - studies did not confirm pathology with PAS/GMS or PCR lab tests
- AI studies from China are based on using dermatoscope images



Artificial Intelligence Diabetic Foot Ulcers

- Probably the greatest area for using AI in podiatry
- Improving wound assessments using image recognition
 - measuring precise wound boundaries
 - differentiating between the types of tissue involved
 - ability to segment the area of ill-defined ulcers
 - ability to classify granulation, slough and necrotic tissue
- Foot ulcer risk prediction tools leveraging data in EMR

AI Concerns

- Reliance on data – GIGO and misinformation
 - quality of cell phone photo vs dermatoscope vs microscope slides
- Lack of transparency
 - balancing profit vs privacy and advertising
- Social and economic bias
 - empowering patients may underdiagnose or overdiagnose
- Lack of creativity, absence of empathy
- Security risk of hackers, cybercrime, development of evil AI

What are you working on?

+ Chat GPT will you replace my job as a podiatrist?  

Conclusions /Thoughts

- Currently, AI will not threaten or replace podiatrists
- AI does not replace the need for skin biopsy or nail biopsy or proper documentation
- Need for some form of regulation such as FDA
-medical-legal implications and malpractice
- The future of AI looks very, very, very promising!!!

Thank You

bela_pandit@hotmail.com
www.panditfootandankle.com



Drhighheels