Artificial Intelligence:

Redefining Future Healthcare

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Introduction

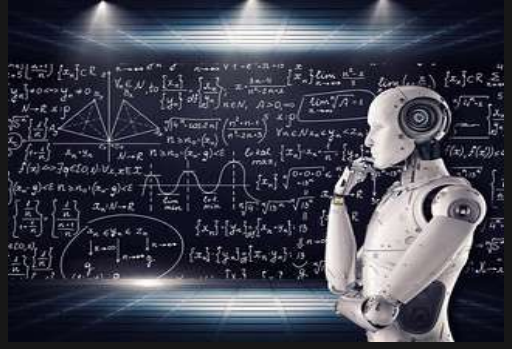
- **Artificial Intelligence:** The simulation of human intelligence by machines, programmed to think and learn

- **It encompasses –**
  - Machine learning
  - Natural language processing
  - Computer vision

Introduction

- **Artificial Intelligence in clinical medicine:**
  - Diagnostic assistance
  - Personalized treatment assistance
  - Clinical research
  - Teaching assistance
  - Administrative purposes

History of AI in Medicine



AI for diagnostics in internal medicine

1972 **INTERNIST-1**

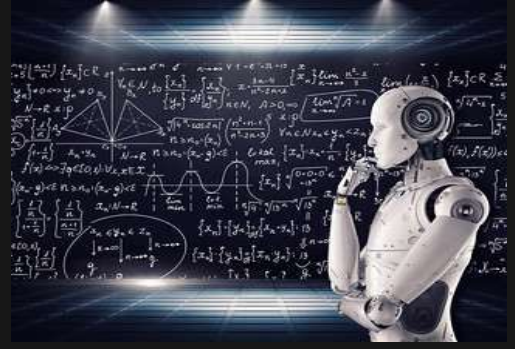
MYCIN **1972**

First true expert model for diagnosis of blood infections

Emergence of electronic health records (ERS)

1960s **ERS**

History of AI in Medicine



Decision trees and probability models for diagnosis

1997 **Naïve Bayes Model**

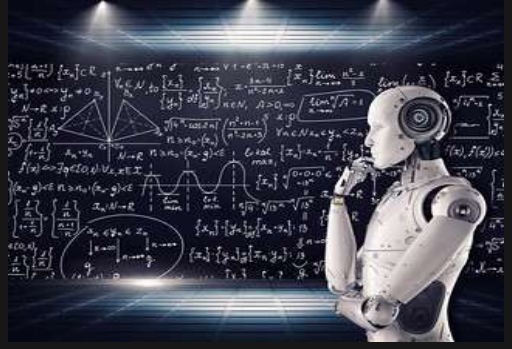
CART Models **1986**

AI based statistical approach for medical research

Glaucoma diagnosis and management

1976 **CASNET**

History of AI in Medicine



AI to automate image segmentation and anomaly detection

2009 **AI in Radiology**

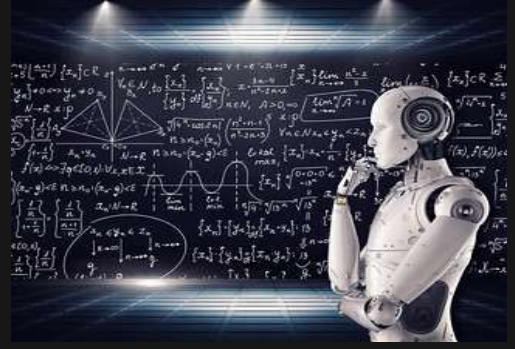
NLP extracts insights from physician notes, patient history, adverse drug events, HAIs

NLP **2004**

AI completes human genome project; analyses sequences; predicts hereditary

2001 **AI in Genomics**

History of AI in Medicine



AI accelerates identification of drug molecules

2014 **AI in Drug discovery**

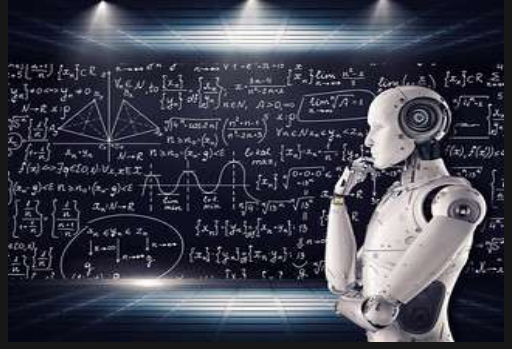
Deep Learning **2012**

Analyses clinical images and recognises diseases

Clinical diagnosis, decision making, oncology treatment and clinical trials

2011 **IBM Watson**

History of AI in Medicine



AI shows superior accuracy in diagnosis breast cancer metastasis and histopathology

2018 **AI in Pathology**

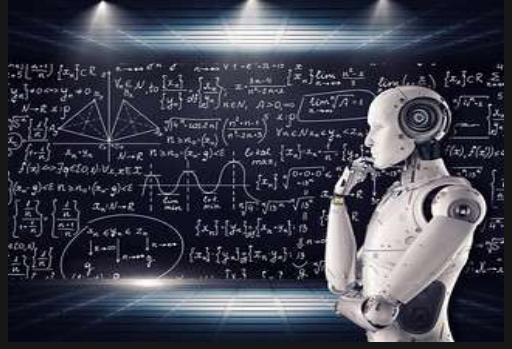
Dermatology AI **2017**

Deep learning detects and classifies skin cancer

Detects d. retinopathy & macular degeneration by retinal scans

2016 **Google Deep Mind**

History of AI in Medicine



NLP aids in patient communication, documentation and triage

2022 Chat GPT like systems

Early outbreak detection by blue dot, vaccine development, ICU monitoring

AI in Covid Pandemic 2020

FDA approves first AI Algorithm- IDx DR for diagnosis of DR without a specialist

2019 First FDA approval

AI in Clinical Diagnosis

AI in Cardiology

AI Powered Stethoscope

EKO AI Stethoscope
Cardiac: Automatically detects and interprets all murmurs and relevant structural heart diseases, HF
Automatically measures HR, detects arrhythmia

Respiratory: Automatically detects and interprets respiratory breath sounds (wheeze, crackles, Rhonchi)

AI in Cardiology

FDA approved AI Stethoscope

EKO AI Stethoscope
AI amplifies sound up to 40 times, with noise cancellation

Both traditional and digital AI modes

AI in Cardiology

FDA approved AI Stethoscope

EKO AI Stethoscope
Integrated ECG: Single lead and 3 leads
Detects Afib and Arrhythmias

Visualise and record ECG and lung sounds in App

Allows remote auscultation and ECG monitoring in Telemedicine

AI in Cardiology

ECG by AI

❑ **KardiaMobile 6L**

- The world's first AI powered FDA-approved, six-lead personal EKG

Detects -

- Atrial fibrillation
- Bradycardia
- Tachycardia
- Normal sinus rhythm

AI in Cardiology

ECG by AI

KardiaMobile 6L

6 Leads:

I, II, III, aVR,

aVF, aVL

AI in Cardiology

ECG by AI

❑ **Apple Watch** *Series 4 or later* : ***Single lead ECG by AI***

Detects by using photoplethysmography (PPG)

- Atrial fibrillation, Arrhythmias
- Bradycardia, Tachycardia
- Normal sinus rhythm

FDA approved as a Class II medical device in 2018 for detecting atrial fibrillation (AFib) in individuals aged 22 and older

AI in Cardiology

AI- Powered Smartwatch

automatically

called 911 & saved

57-years old man

AI in Cardiology

ECG by AI

Limitations *of* KardiaMobile 6L and Apple Watch series for ECG

- Not developed 12 lead ECG
- Cannot detect MI, Structural heart disease, others

Best for **Atrial Fibrillation** & Arrhythmia monitoring and reporting by AI

Detection of AF can prevent *Ischaemic Stroke*

AI in Cardiology

ECG by AI

❑ *Other **FDA Approved AI powered ECG** for personal use:*

Fitbit Sense:
Atrial fibrillation and Arrhythmias

Zio Patch:
Atrial fibrillation, VT, SVT, Bradyarrhythmias

Omron Complete:
ECG and BP monitoring

AI in Cardiology

ECG by AI

❑ *FDA Approved AI powered ECG for institutional use:*

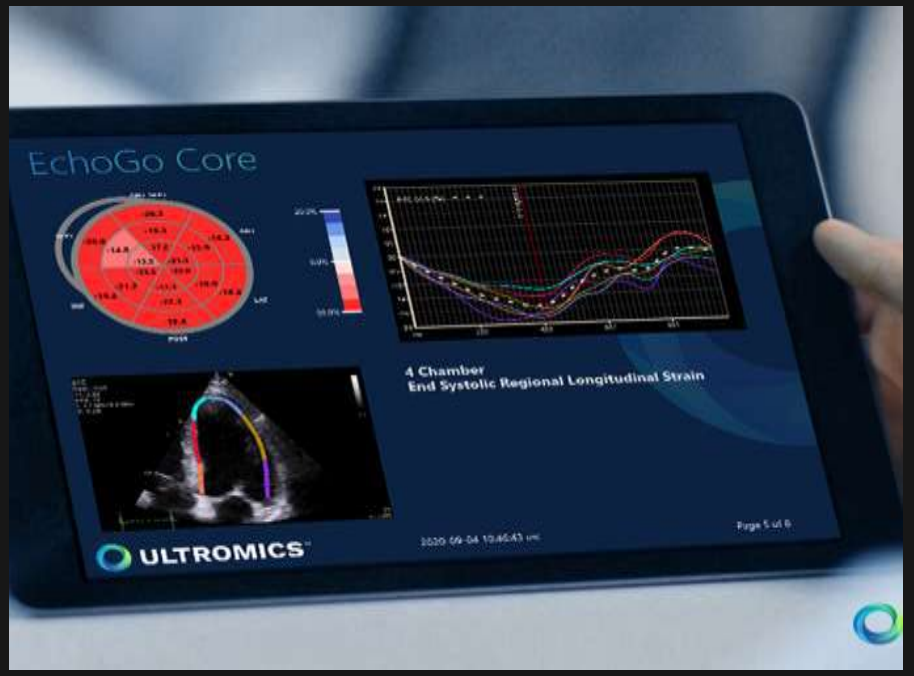
MAC VU 360:
12 lead ECG for advanced cardiology diagnostics

Philips Intellispace:
12 lead, Cloud based, advanced workflow

Medtronic Cardioinsight:
Non invasive 3D mapping of cardiac electric activity

AI in Cardiology

FDA approved AI in Echocardiogram



EchoGo: *(by ultromics)*

Caption AI

AI in Pulmonology

FDA approved Respiratory diagnostics

Spirobank Smart Spirometer
Measures FEV1, FVC, and PEF in Asthma, COPD with AI-powered interpretation of results

Propeller Health Smart Inhaler
AI tracks inhaler use, adherence, monitoring for patients with asthma or COPD

AI in Pulmonology

FDA approved Respiratory diagnostics

Masimo EMMA Capnograph
Measures end tidal CO2 in ICU settings

ResMed AirMini Auto CPAP
AI detects sleep apnoea and auto adjusts CPAP

AI in Neurology

FDA approved Neurology diagnostics

EpiWatch *for* **Epilepsy**

The first and only FDA-approved seizure detection App for **Apple Watch**

- Ongoing monitoring of seizure activity
- Provides real-time tonic-clonic seizure detection
- Sends alerts to caregiver contacts

AI in Neurology

FDA approved Neurology diagnostics

EpiWatch *for* **Epilepsy**

The first and only FDA-cleared seizure detection App for **Apple Watch**

- Supports rapid action and intervention
- Runs discreetly on your Apple Watch
- Helps reduce the risk of potential SUDEP

AI in Radiology

❑ **AI Apps** **AI DOC**

Interpretation of CT scan

Conditions	Specificity
Intracranial Haemorrhage	94 to 98%
Pulmonary Embolism	91 to 95%
Cervical Spine Fractures	92 to 97%
Pulmonary nodules	88 to 92%

Conditions	Specificity
Large Vessel Stroke	93 to 96%
Hip Fractures	90 to 94%
AA Aneurysm	89 to 93%
Rib Fractures	88 to 93%

& many more…..

AI in Radiology

❑ AI Apps

AI DOC

Human Review: It flags findings for radiologist review; it acts as an assistive tool, not a replacement for human decision-making

More than 1200 institutional use worldwide (paid)

- Fosters team coordination
- Automates patients triage systems and follow ups

FDA approved *Multiple* AI Doc Algorithms

AI in Radiology

❑ **AI Apps**

- **Lunit insight:**
- Early cancer detection, lesion marking, probability scores
- Widely used in screening programs and hospital settings globally

FDA approved it for detection of

- Early breast cancer detection in **mammograms**
- Tuberculosis, pneumonia, lung cancer etc in **Chest X-rays**

AI in Radiology

❑ **AI Apps**

- **Qure.Ai:**
- Analyses Chest X-rays & CT scans for diagnosis
- Integrates with PACS system for radiologists

FDA approved it for detection of

- Intracranial haemorrhage, skull fracture, midline shifts in **CT scans**
- Tuberculosis, pneumonia, effusion, nodules etc in **Chest X-rays**

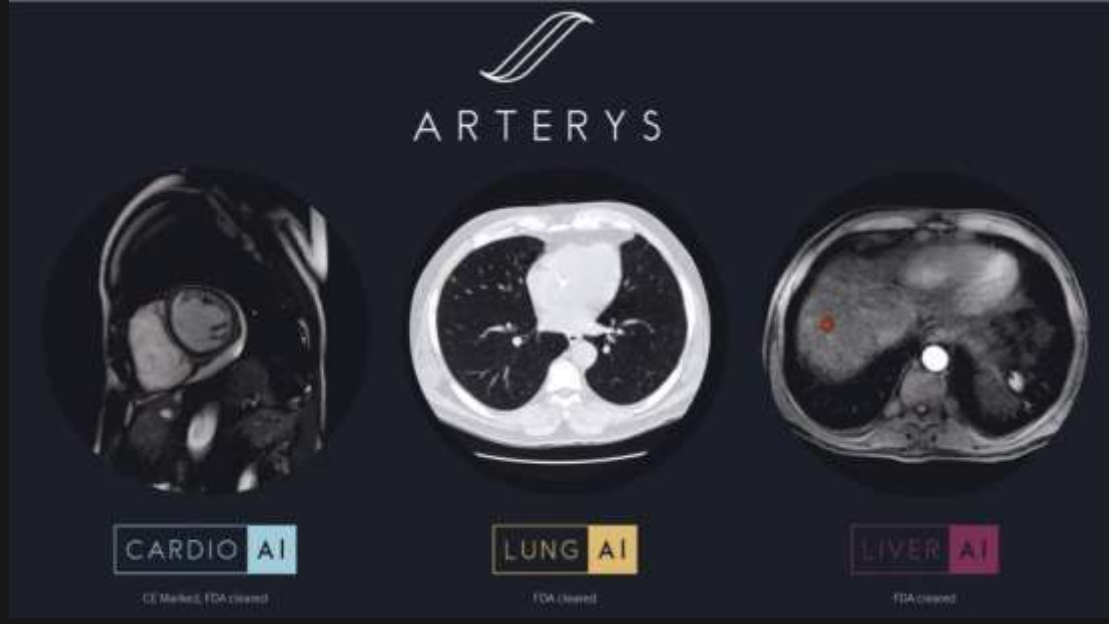
AI in Radiology

- **AI Apps**
  - **Zebra Medical Vision:** Identifies abnormalities like osteoporosis, fatty liver, and emphysema from imaging

    Generates population health insights and predictive analytics

FDA approves it for detection of
Coronary Artery Calcification,
Vertebral compression fracture,
Breast cancer detection

AI in Radiology



❑ **AI Apps**

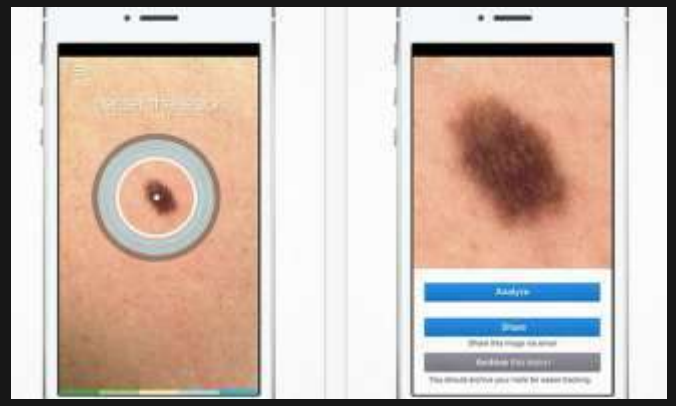
- **Arterys:**
- Assists cardiologists, pulmonologists and oncologists
- FDA cleared multiple imaging applications, CE marked for global use

FDA approved models:
Cardio AI: Assists in cardiac MRI analysis, including ventricular function and blood flow quantification.
Lung AI: Detects lung nodules and evaluates pulmonary conditions.
Oncology AI: Tracks tumor growth and changes

AI in Dermatology

FDA approved Dermatology diagnostics

SkinVision



Skin Vision *for* Skin Cancer

FDA approved for AI based analysis of skin lesions for skin cancers

- AI analyses image of mole or a doubtful lesion for risk of skin cancer
- For preliminary dermatological screening
- Approved only for basal cell carcinoma, squamous cell carcinoma and melanoma

AI for Differentials

FDA approved AI symptoms checker for patients

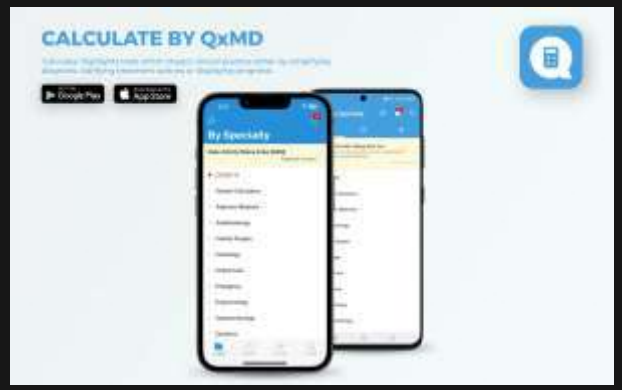
ADA Health

FDA approved as class II medical device symptom assessment and differential diagnosis

- It covers 20,000 + medical conditions
- Mainly tailored for **patients use**
- May also assist doctors for quick AI driven differentials
- Generates differential diagnoses based on patient symptoms, demographics, and medical history

AI Medical Calculator

QxMD for Calculation and Risk stratification



QxMD
Calculator

- It has 3000 + AI based medical calculators
- It integrates PubMed papers for reference and read
- It’s easily available

GPTs & Open AI

ChatGPT in Clinical Medicine

Chat GPT

- For clinicians
- For medical education and training
- For patient education and communication
- For research assistance

GPTs & Open AI

Chat GPT

Limitations of GPTs’

- Sometimes inaccurate information with potential errors
- Sometimes outdated information or guidelines
- Sometimes lacks region specific guidelines
- Lacks empathy, compassion, cultural sensitivity
- Lacks proper adherence to ethical principles
- Misses atypical presentations

NOT Approved by FDA for autonomous direct clinical use without expert clinicians supervision

GPTs & Open AI

Medical Chat: *medical.chat-data.com*

Medical Chat

- Immediate evidence-based medical answers
- Answers from most relevant and updated research articles from **PubMed**
- Generates differential diagnoses and patient specific treatment plan

GPTs & Open AI

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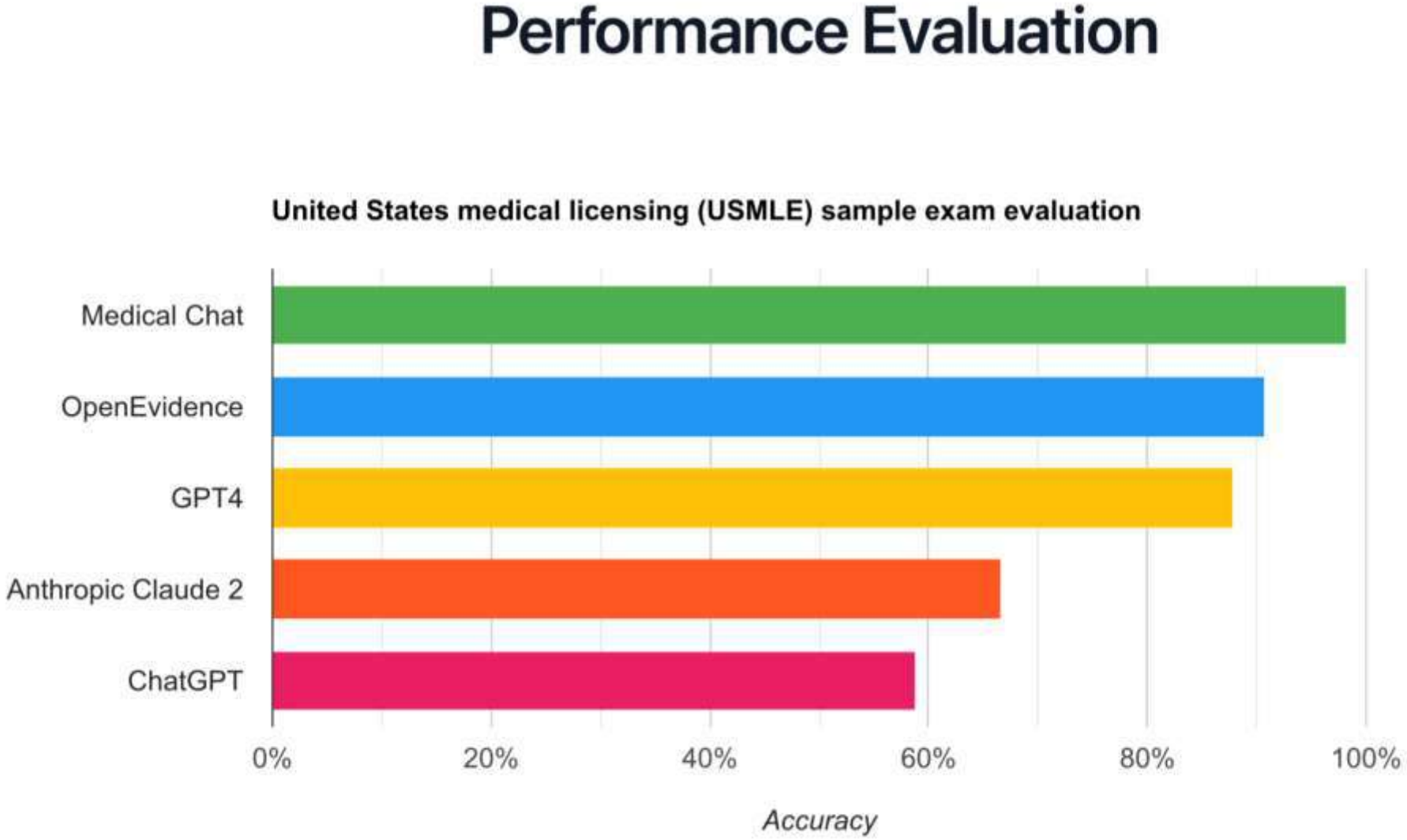

GPTs & Open AI

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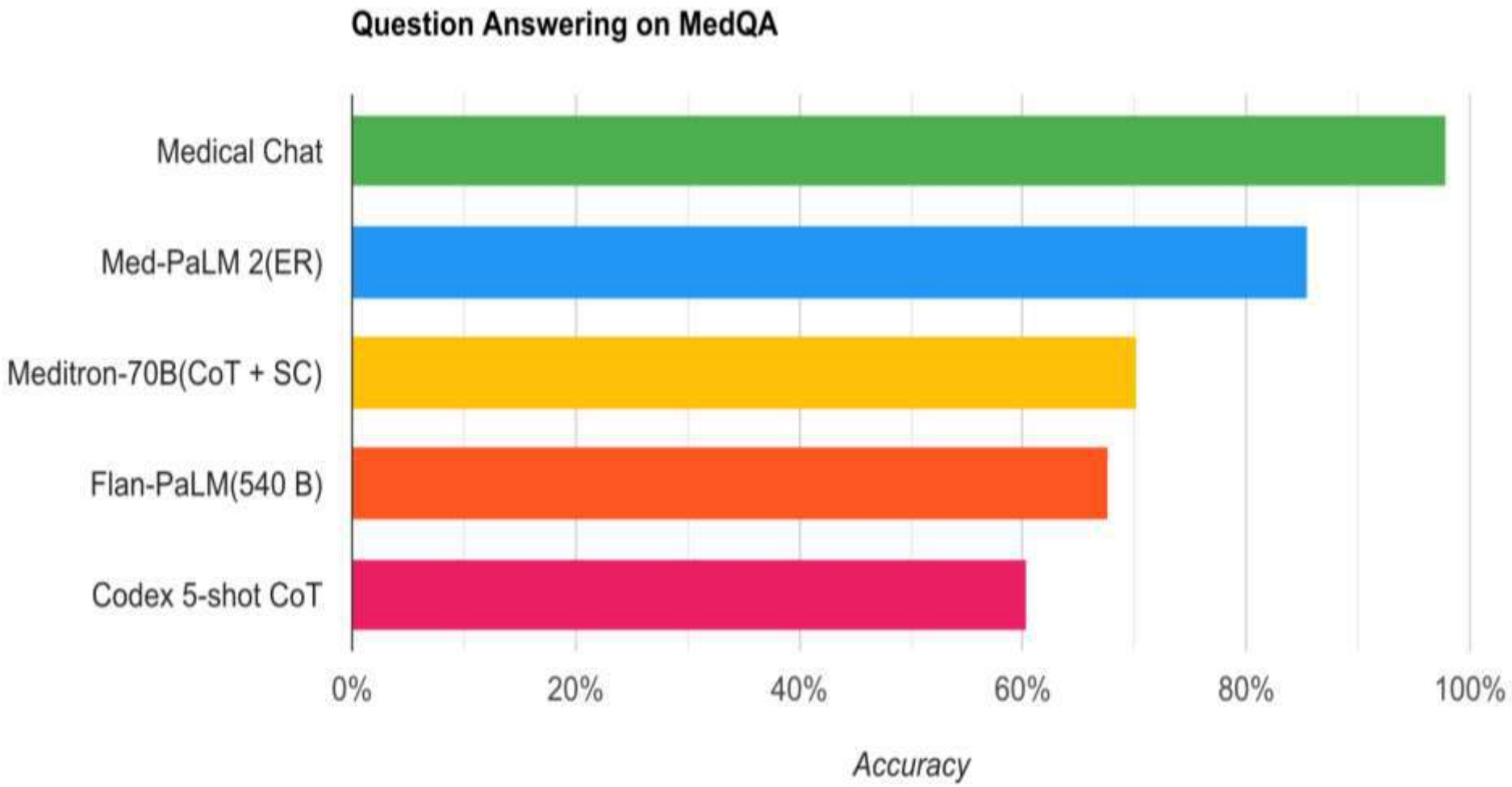
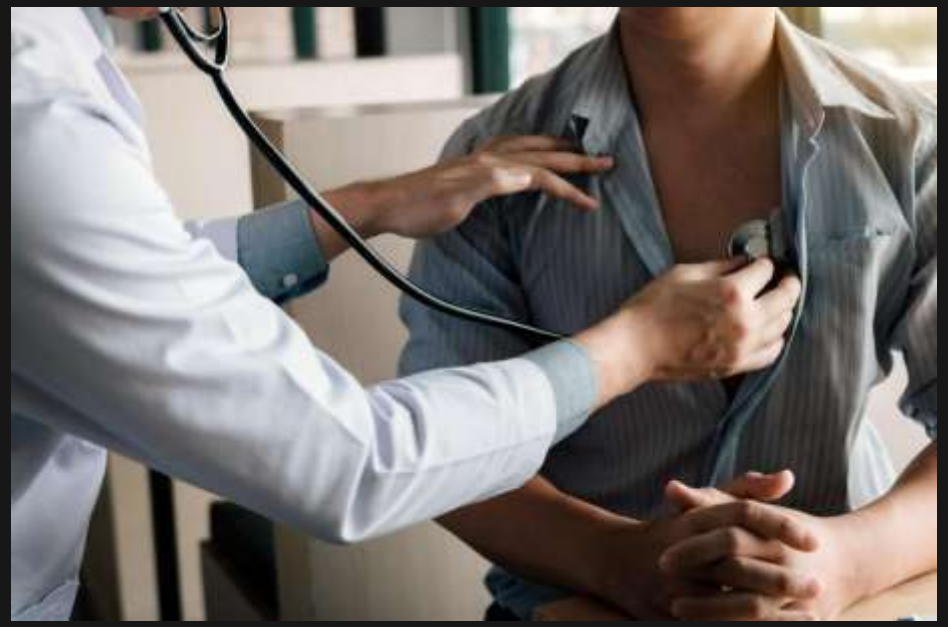


AI in Clinical Approaches

History taking

No AI Assistance



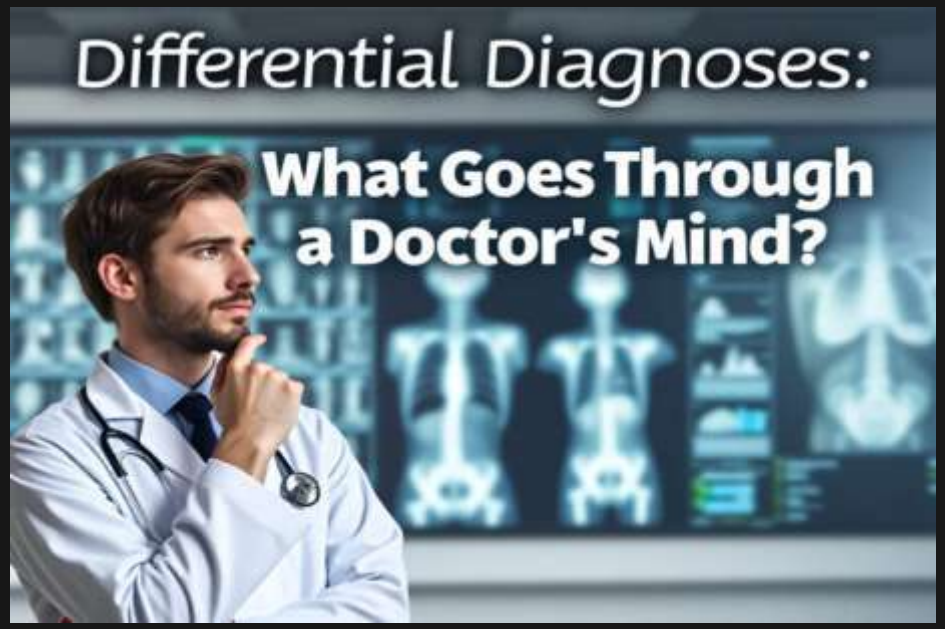
Physical examination

No AI Assistance

AI in Clinical Approaches

Case history documentation & notes

AI Assistance available



Differential Diagnoses

AI Assistance available

Not FDA Approved, Need specialists review

AI in Clinical Approaches

Initial treatment

AI Assistance available

Not FDA Approved, Need doctor's review

Initial investigations

AI Assistance available

Not FDA Approved, Need doctor's review

AI in Clinical Approaches

Interpretation of tests

AI Assistance available

FDA Approved in certain cases

Definitive and Long-term treatment

AI Assistance available

Not FDA Approved, Need specialist's review

AI in Clinical Approaches

Patient counseling, communication & concerns

Little AI Assistance available

Not FDA Approved, To be done by doctors

Patient monitoring & Follow up

AI Assistance available

FDA Approved in certain cases

AI in Clinical Research

Sci Space, Scholar GPT, Scholar AI, QuillBot AI, Grammarly AI etc. helps in research from the very beginning to the end.

Expert Opinion on AI

In 2025, Bill Gates predicted 3 jobs that are irreplaceable by AI in the future:

- **Healthcare**
- **Teaching**
- **Construction and Repair**

Ethical Issues

- Ensure privacy, confidentiality, protection of patient data
- Obtain clear and comprehensive patient consent for usage of data in AI
- Ensure accountability and responsibility for AI driven errors or adverse outcomes
- AI driven decisions should be transparent and explainable to ethical questions
- Avoid overreliance on AI, which may lead to dehumanized care
- Prioritize human judgement over AI

Summary

- FDA approved AI powered stethoscope, ECG and diagnostic tools are reliable
- Single lead to 6-lead ECG can be useful initial diagnostics, but not yet an alternative to traditional 12 lead ECG
- FDA approved radiology AI can be used in institutional settings, due to high sensitivity and specificity
- Non-FDA approved radiology Apps and other diagnostic tools should be reviewed by respective specialists

Summary

- Regarding differentials, the experience, expertise, and skills of clinical specialists should be prioritized, while AI may assist
- Empathy, Sympathy, Compassion, and human interaction for patients are irreplaceable by AI
- **Artificial intelligence is not an alternative of doctors, rather it may assist the doctor.**


THANK
YOU