

ROLE OF AI AND DIGITALIZATION HEALTHCARE/CARDIOLOGY/IMAGING

BHARAT DIGITAL HEALTHCARE SUMMIT 2025

Dr. Gautam Singal

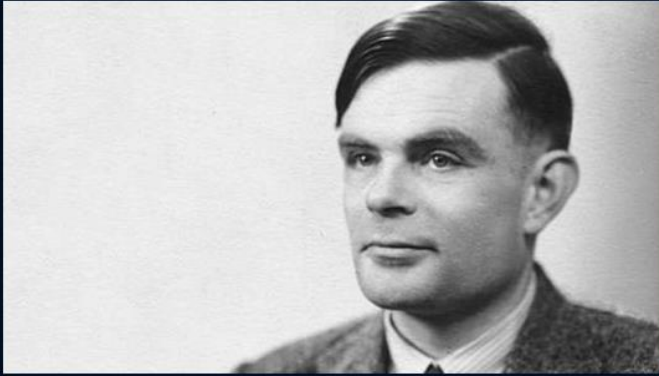
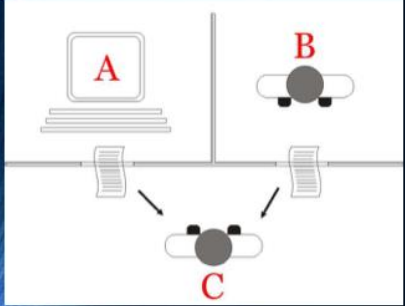
Associate Professor and Cath Lab Incharge

DMC&H

Ludhiana

Former Cardiologist to the President of India

Alan Turing – Turing test of AI

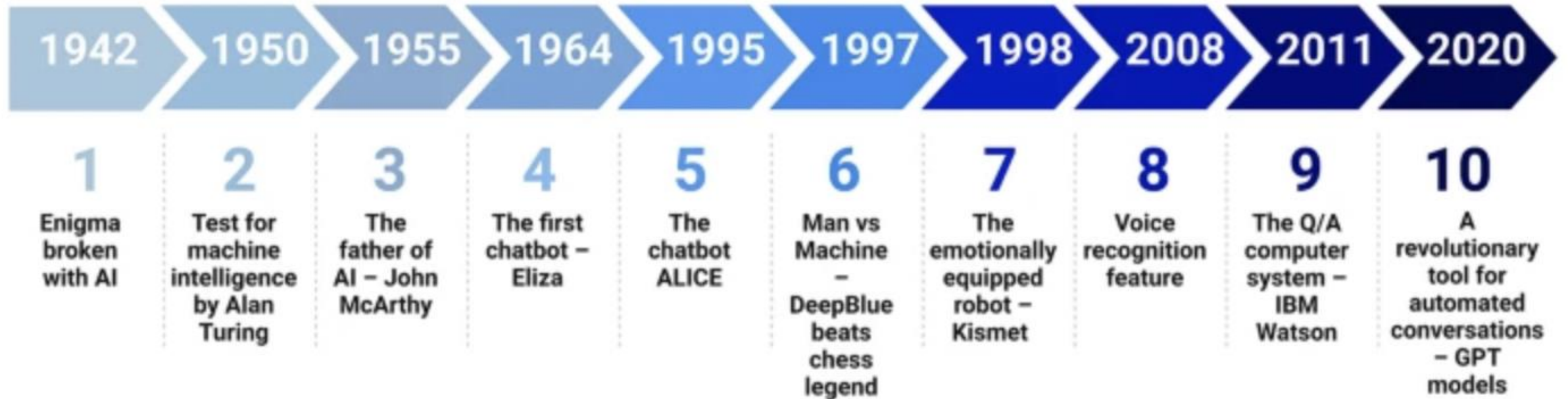


What is Artificial Intelligence?

The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

Dictionary.com

Exploring the Historical Journey of Artificial Intelligence



3 stages of AI



Narrow AI

Dedicated to assist with or take over specific tasks



General AI

Takes knowledge from one domain, transfers to other domain



Super AI

Machines that are an order of magnitude smarter than humans

Credit: Chris Noessel

Artificial Intelligence

Simulates human intelligence

Narrow AI

Specific tasks

Machine Learning

Learns on past data

Deep Learning

*A particular learning structure
- deep neural networks*

General AI

~ Human

Super AI

>> Human

Now

Future (?)

3 Types of Artificial Intelligence

Artificial Narrow Intelligence (ANI)



Stage-1

Machine Learning

- Specialises in one area and solves one problem



Siri



Alexa



Cortana

Artificial General Intelligence (AGI)



Stage-2

Machine Intelligence

- Refers to a computer that is as smart as a human across the board

Artificial Super Intelligence (ASI)



Stage-3

Machine Consciousness

- An intellect that is much smarter than the best human brains in practically every field

DIGITALIZATION & AI HAS TRANSFORMED OTHER SECTORS

- **Finance:** Online banking and digital payments (e.g. mobile wallets, UPI) have brought banking services to millions, greatly expanding financial inclusion and convenience. *Approximately 70% of organizations globally now have or are working on a digital transformation strategy, underscoring widespread adoption.*
- **Manufacturing:** Industry 4.0 with IoT sensors and automation has boosted efficiency (predictive maintenance reduces downtime) and output quality.
- **Retail & Services:** E-commerce and digital platforms have redefined shopping and service delivery, enabling on-demand access and personalization (global digital transformation spending was projected at \$6.8 trillion by 2023).
- **Governance & Education:** E-government portals and e-learning platforms have broadened access to public services and education, bridging geographic gaps digitally.



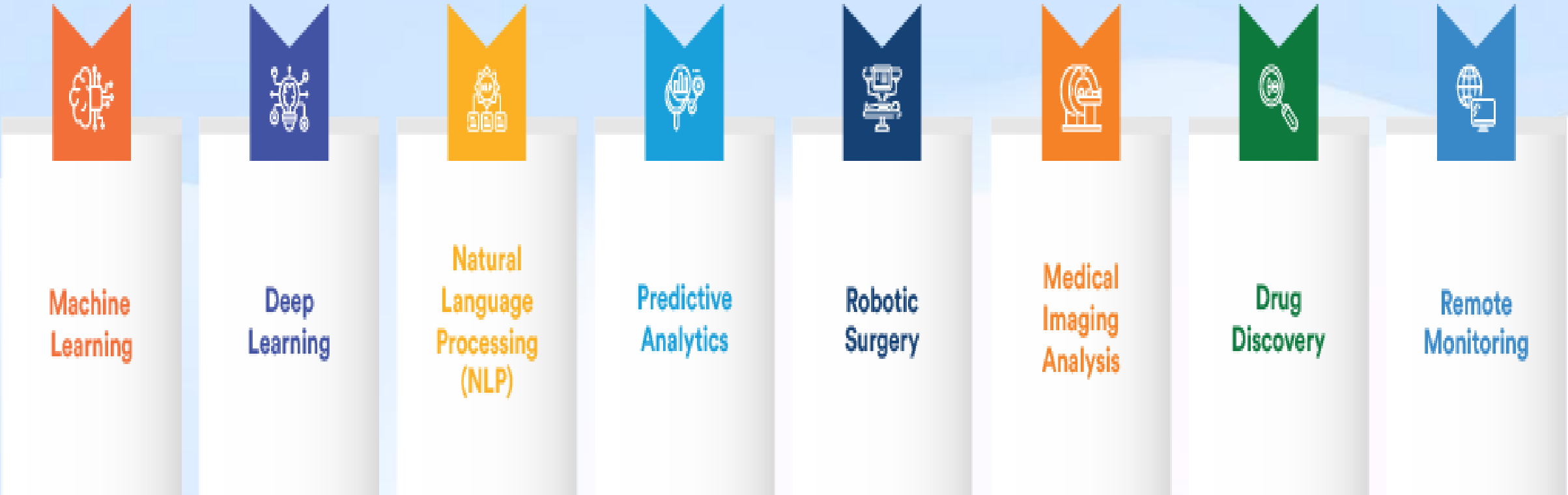
Types of AI in healthcare

AI is an umbrella term covering a variety of distinct but interrelated processes. Some of the most common forms of AI used within healthcare include the following:

- **Machine learning (ML):** Algorithms are trained using data sets, such as health records, to create models capable of performing tasks such as categorising information or predicting outcomes.
- **Deep learning:** This subset of machine learning involves greater volumes of data, training times, and layers of ML algorithms to produce neural networks capable of performing more complex tasks.
- **Natural language processing (NLP):** NLP involves using ML to understand human language, whether verbal or written. In healthcare, NLP is used to interpret documentation, notes, reports, and published research.
- **Robotic process automation (RPA):** This involves using AI in computer programs to automate administrative and clinical workflows. Some healthcare organisations use RPA to improve the patient experience and the daily function of their facilities.

What is AI in Medical Devices?

AI in Medical Devices refers to incorporating advanced computational algorithms and machine learning techniques into healthcare technology to enhance diagnostic, therapeutic, and decision-making processes. AI empowers these devices to analyze and interpret complex medical data, recognize patterns, and make informed predictions, replicating and often surpassing human capabilities. At its core, AI in medical devices encompasses various technologies, including:



- Machine Learning:** This subset of AI involves algorithms that enable devices to learn from data and improve their performance over time without explicit programming. Medical devices equipped with machine learning can recognize intricate patterns in medical images, predict patient outcomes, and aid treatment planning.
- Deep Learning:** A sophisticated form of machine learning, deep learning employs artificial neural networks to mimic human brain processes. Medical devices utilizing deep learning can understand intricate relationships within medical data, enabling accurate diagnoses from medical images like X-rays, MRIs, and CT scans.
- Natural Language Processing (NLP):** NLP enables medical devices to comprehend and respond to human language. It is crucial for applications like electronic health record (EHR) analysis, clinical documentation, and patient communication.
- Predictive Analytics:** AI in medical devices can forecast patient outcomes based on historical data and current parameters. This aids healthcare providers in making proactive decisions and preventing adverse events.
- Robotic Surgery:** AI-driven robotic surgical systems can assist surgeons in performing intricate procedures with higher precision, stability, and control, potentially reducing complications and recovery times.
- Medical Imaging Analysis:** AI can analyze medical images to detect anomalies, tumors, and other subtle changes that might escape human observation. This expedites diagnosis and treatment planning.
- Drug Discovery:** AI accelerates drug development by analyzing large datasets to predict potential drug candidates, optimizing molecular structures, and simulating drug interactions.
- Remote Monitoring:** AI-enabled devices can monitor patients remotely, collecting data on vital signs and symptoms, enabling timely intervention and managing chronic conditions.



WORKING PRINCIPLE OF HEALTH CARE USING AI



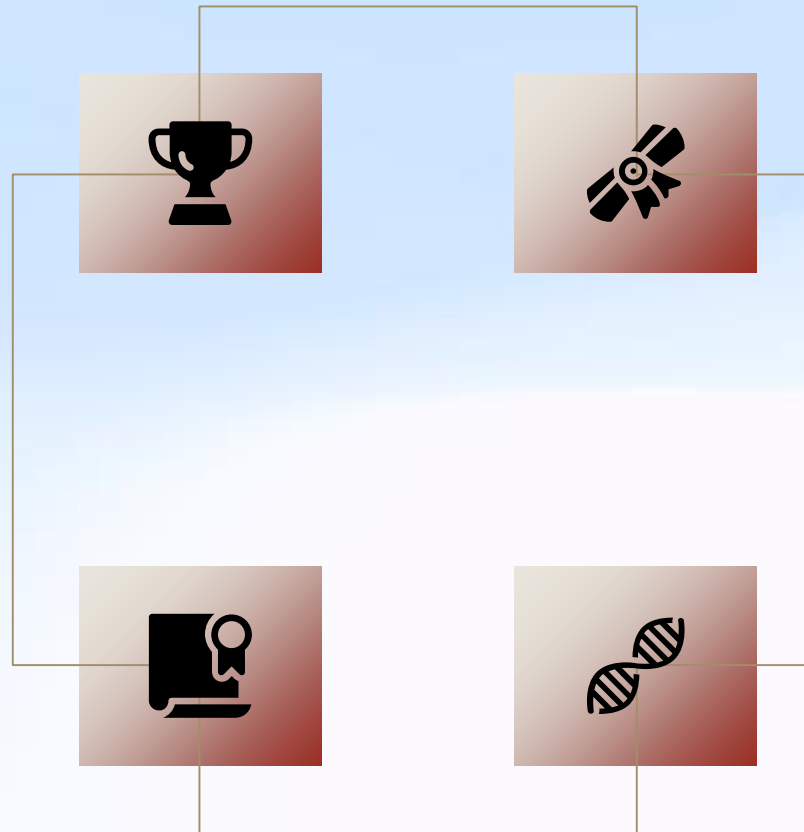
APPLICATION OF AI HEALTH CARE

Medical imaging analysis

AI algorithms can analyze medical images, such as X-rays, CT scans, MRIs, and pathology slides, to assist radiologists and pathologists in detecting abnormalities, diagnosing diseases, and identifying treatment options.

Electronic health record (EHR) analysis

AI can analyze EHRs and extract valuable insights from large amounts of patient data. It can identify patterns, predict disease outcomes, and facilitate population health management.



Drug discovery and development

AI algorithms can analyze vast databases of chemical compounds, predict their properties, and identify potential drug candidates. AI can also help in clinical trial design, patient recruitment, and monitoring drug safety.

Precision medicine

AI can analyze genetic data, biomarkers, and patient characteristics to identify personalized treatment options and predict disease risks. This enables precision medicine approaches tailored to individual patients.



Enhanced diagnostic accuracy



Personalized treatment plans



Predictive analytics and early detection



Efficient healthcare management



**Remote patient monitoring and
telemedicine**



Drug discovery and development

AI is not really new to medical imaging

An example – myocardial blood flow quantification with PET.

Tomographic image reconstruction

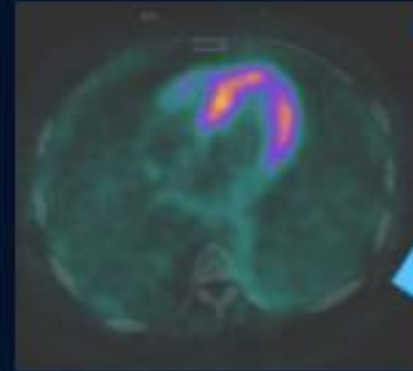
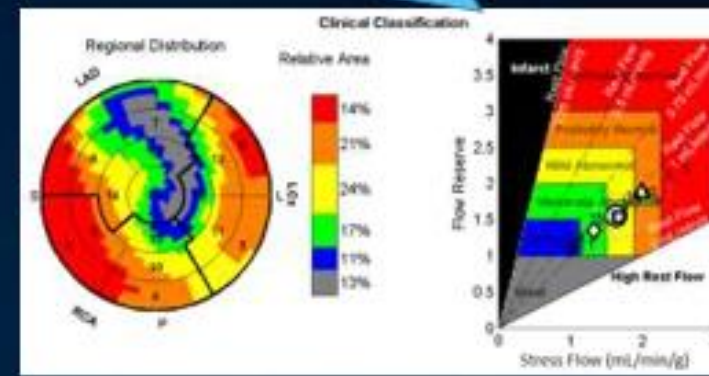


Image analysis



Data Analysis



Applications of AI in Medical Imaging

Application	Example
Image quality optimization	Auto mA
Image registration	Registration between modalities, baseline and follow-up
Image processing	Quantification of physiologic function noise reduction, image compression
Image classification	(normal/abnormal, good/bad quality, benign/malignant, non/mild/moderate severe)
Image segmentation	Anatomical regions/organ delineation
Feature detection	Tumor detection
Patient management	Recommended tests and treatment
Test interpretation/reporting	Database comparison, drafting of clinical report
Automation	RT delivery planning, drug interaction warning
Context search	Find other patients with images that look like this.
Triage	Which images need to be looked at most urgently
Business analytics	Optimize workflow and finance

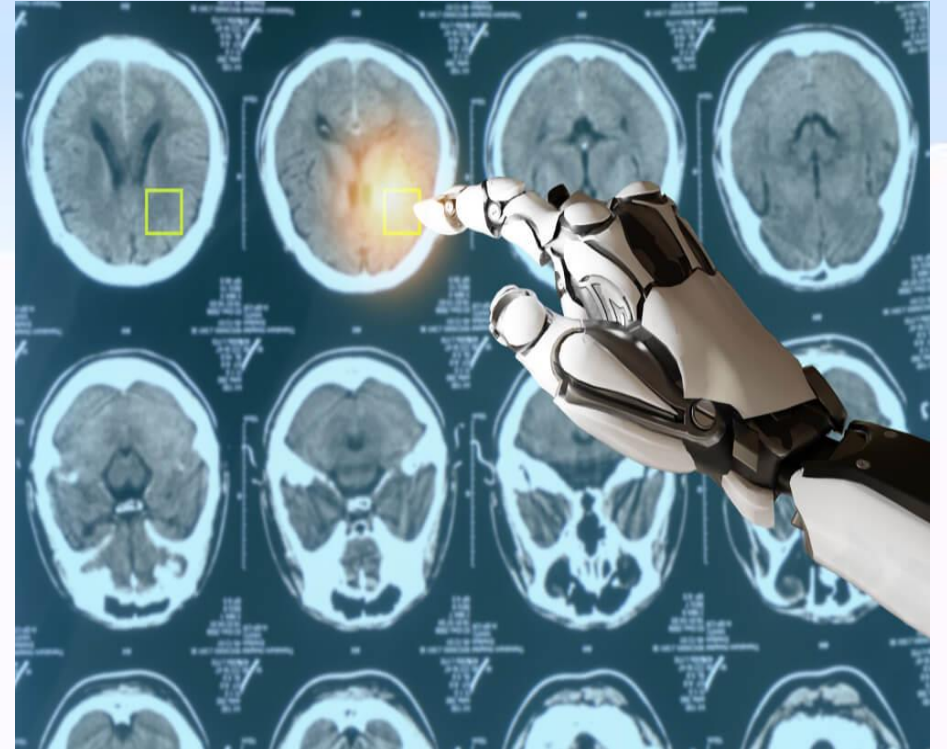
AI IN DIAGNOSIS

- AI has made significant strides in the field of medical diagnosis, contributing to faster and more accurate identification of diseases and conditions.
- Here are several ways AI is employed in medical diagnosis:



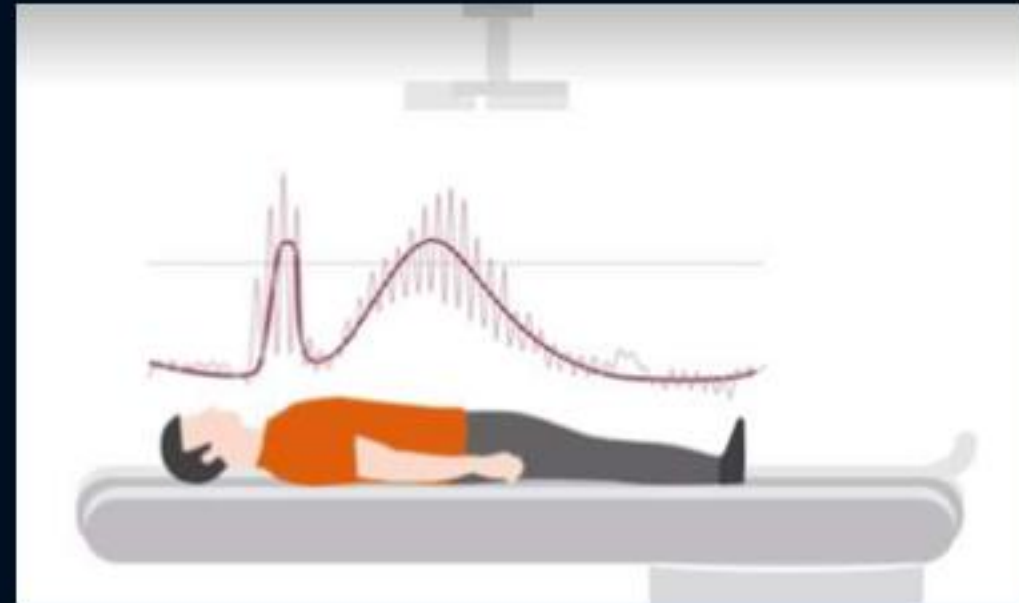
Medical Imaging Analysis

- **Radiology:** AI algorithms analyze medical images such as X-rays, CT scans, MRIs, and mammograms to detect abnormalities and assist radiologists in identifying conditions like tumors, fractures, or abnormalities in organs.
- **Pathology:** AI is used in pathology to analyze tissue samples and identify patterns or anomalies that may indicate diseases like cancer.
- Automated image analysis can assist pathologists in making more accurate and timely diagnoses.



Siemens Fast3D (Fully Assisting Scanner Technologies)

- Ceiling mounted IR camera guides:
 - Recommended patient positioning
 - Determines scan range
 - CT current modulation
- Promises:
 - Dose/image quality consistency
 - User independent
 - Reduce errors





Please analyze the attached image and share your observations, including potential findings and their implications share whatever you can with your limitation, Use guess work if possible share with reference with referene to images

This is a chest X-ray in a posterior-anterior (PA) view.

Observations:

1. **Elevated Right Hemidiaphragm** – The right hemidiaphragm appears elevated compared to the left. Possible causes include:
 - Phrenic nerve palsy
 - Subdiaphragmatic pathology (liver abscess, subphrenic collection)
 - Eventration of the diaphragm
2. **Gas under the Right Hemidiaphragm** – There is a crescent of radiolucency (air) under the right hemidiaphragm, suggestive of **pneumoperitoneum**, indicating free air in the peritoneal cavity. This can be due to:
 - Perforated peptic ulcer (most common)
 - Bowel perforation (secondary to trauma, ischemia, malignancy)
3. **Well-aerated Lung Fields** – The lung fields appear relatively normal with no obvious signs of consolidation, effusion, or mass lesions.
4. **Mediastinal and Cardiac Silhouette** – The mediastinal structures and cardiac borders appear unremarkable, with no significant shift or widening.

Possible Clinical Implications:

- **Pneumoperitoneum** is a surgical emergency, often requiring urgent intervention to address a possible bowel perforation.
- **Elevated right hemidiaphragm** could be secondary to an underlying pathology such as phrenic nerve palsy, subdiaphragmatic abscess, or eventration.

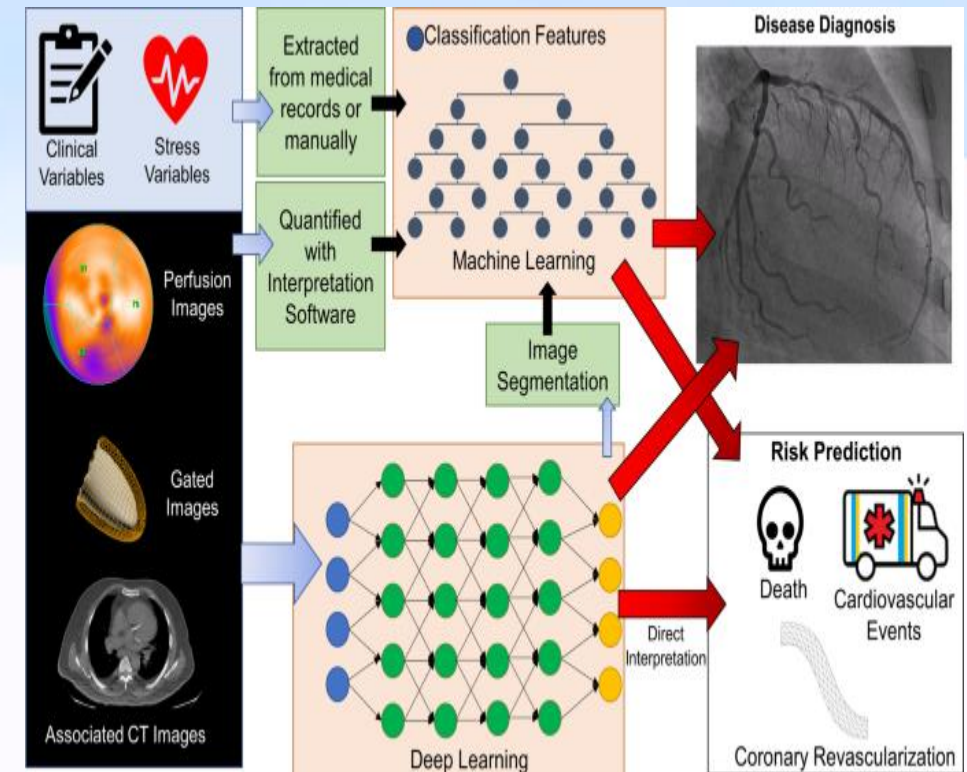
Suggested Next Steps:

- **Urgent clinical correlation** with abdominal examination and symptoms like acute abdominal pain, tenderness, or peritonitis.
- **CT Abdomen** for confirmation of pneumoperitoneum and identification of the source of perforation.
- **Surgical consultation** if pneumoperitoneum is confirmed.

Would you like me to analyze further or suggest possible differentials?

Disease Prediction and Risk Assessment

- AI models analyze patient data, including electronic health records and genetic information, to predict the likelihood of developing certain diseases.
- This can enable preventive measures and personalized treatment plans based on an individual's risk profile.



Genomic Medicine

- AI is instrumental in genomic analysis, helping identify genetic variations associated with diseases.
- This information is crucial for personalized medicine, tailoring treatments based on an individual's genetic makeup.



Neurological Disorders

AI IS EMPLOYED IN THE DIAGNOSIS OF NEUROLOGICAL DISORDERS SUCH AS ALZHEIMER'S DISEASE AND PARKINSON'S DISEASE.

ADVANCED ALGORITHMS ANALYZE BRAIN IMAGING DATA TO DETECT SUBTLE PATTERNS INDICATIVE OF THESE CONDITIONS.



CARDIOVASCULAR DISEASE DIAGNOSIS

AI ASSISTS IN THE EARLY DIAGNOSIS OF CARDIOVASCULAR DISEASES BY ANALYZING DATA FROM VARIOUS SOURCES, INCLUDING MEDICAL IMAGING, ELECTROCARDIOGRAMS (ECGS), AND PATIENT HISTORY. PREDICTIVE MODELS CAN IDENTIFY INDIVIDUALS AT RISK AND HELP PREVENT HEART-RELATED ISSUES.



Applications of
Artificial Intelligence
in Cardiovascular
Medicine

BIG DATA IN PUBLIC HEALTH AND CARDIOLOGY

- **Epidemiological Insights:** For cardiovascular diseases (CVD), big data analysis helps identify trends such as rising heart disease rates in certain regions or correlations (for example, linking air pollution data with heart attack incidence in a city).
- **Public Health Programs & Predictive Analytics:** Machine learning models can predict which population groups are at higher risk of hypertension or diabetes (which contribute to heart disease) by analyzing demographics, diet, and lifestyle data.
- **Big Data for Research:** Large datasets, like biobanks and health system databases, allow researchers to uncover new knowledge. In cardiology, analyzing big data has led to discoveries of unknown risk factors and drug effects.



DIGITALIZATION AND AI IN CARDIOLOGY: CURRENT APPLICATIONS

- **Early Detection of Heart Disease:** Machine learning algorithms can analyze images like angiograms, cardiac CT scans, and echocardiograms to spot **subtle signs of heart disease early**. For instance, AI models can detect coronary calcium on routine chest CT scans (even when the scan was done for other reasons), flagging patients with hidden atherosclerosis so they can start preventive therapy.
- **Risk Stratification:** Cardiology has long used risk scores (like Framingham). Now AI can enhance this by considering far more data points. Similarly, combining EHR data (labs, vitals, genetics) with AI yields more precise risk stratification, ensuring **high-risk patients receive quick attention** while low-risk patients avoid unnecessary interventions.
- **Decision Support:** AI can suggest optimized treatment plans. AI-based decision support systems in cath labs assist cardiologists during coronary interventions, analyzing angiography in real-time to guide stent placements.
- **Personalized Treatment:** AI can predict which heart failure patients will respond to a medication or who might need a device, by learning from past patient outcomes.



DIGITALIZATION AND AI IN CARDIOLOGY: CURRENT APPLICATIONS

- **AI-Powered Cardiac Imaging:** In ECG analysis, AI algorithms (like one from Mayo Clinic) can detect signals of asymptomatic left-ventricular dysfunction from a standard ECG.
- **Wearables and Remote Monitoring:** For post-surgery or heart failure patients, connected devices can track vitals (heart rate, blood pressure, weight) and AI can alert care teams to signs of deterioration (for example, detecting fluid buildup in heart failure before the patient even feels symptoms).
- **AI in Cardiac Monitoring Devices:** Implantable cardioverter-defibrillators (ICDs) and pacemakers now have algorithms to detect arrhythmias and even predict worsening heart failure by measuring trends in heart rhythms or thoracic impedance. Wearable defibrillators and smart patches can auto-detect life-threatening arrhythmias and alert emergency services



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Accelerate program



The NEW ENGLAND
JOURNAL of MEDICINE

Featuring multimedia and clinical findings from
The New England Journal of Medicine



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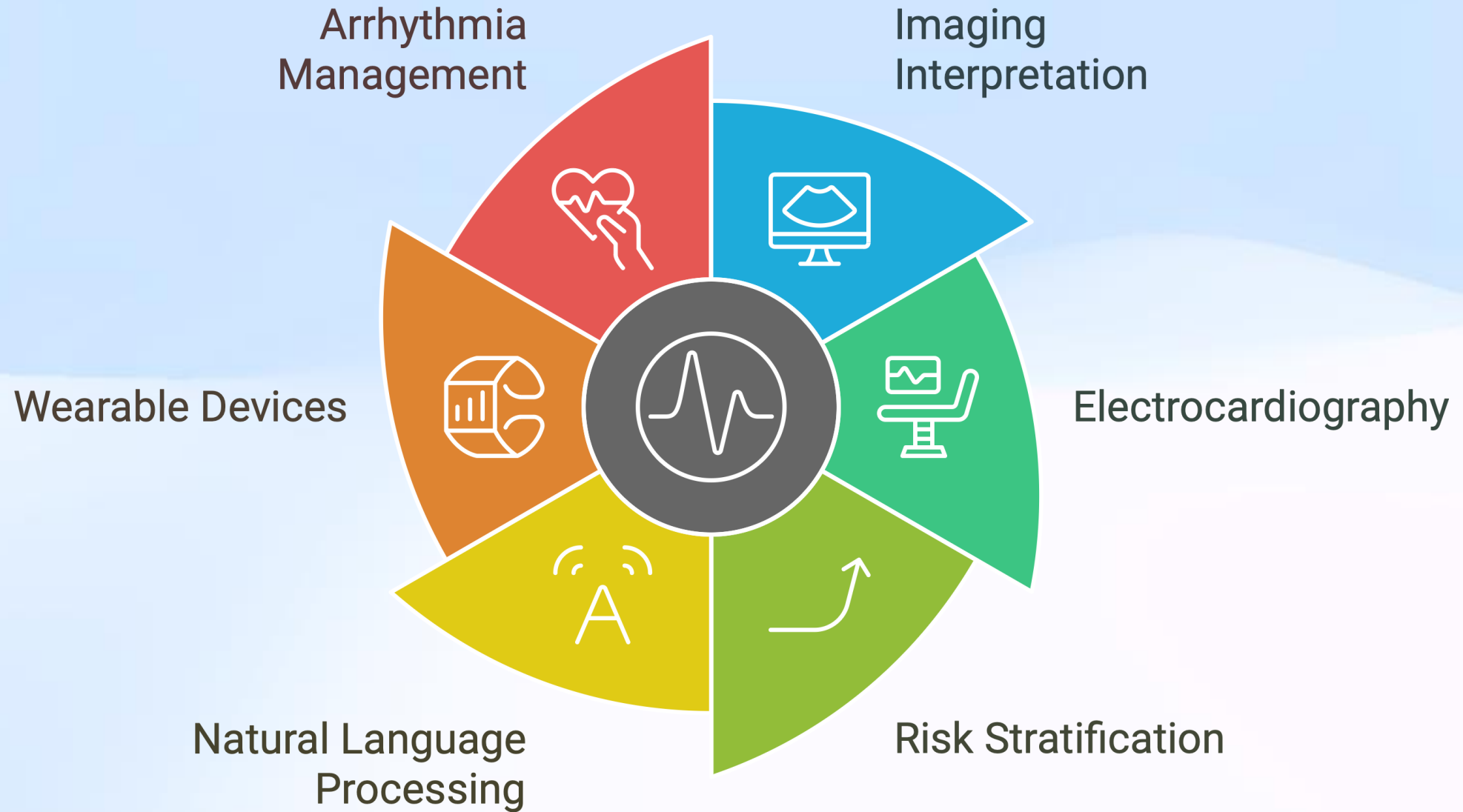
Trusted by medical professionals at 7,000+ care centers across the US.



UC San Diego Health



AI Transformations in Cardiology




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2

3

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Leading Journal

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New Research

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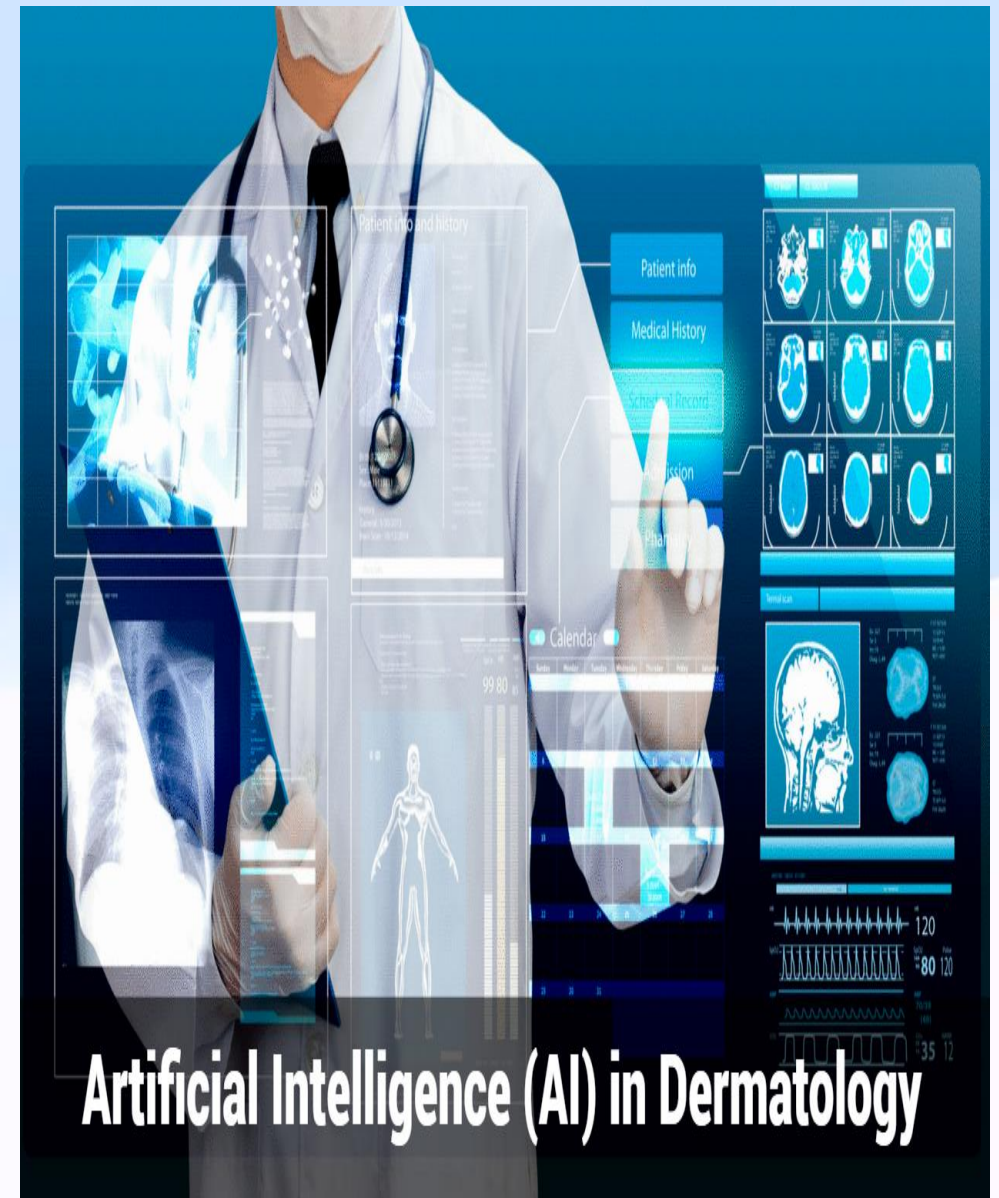
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Dermatology

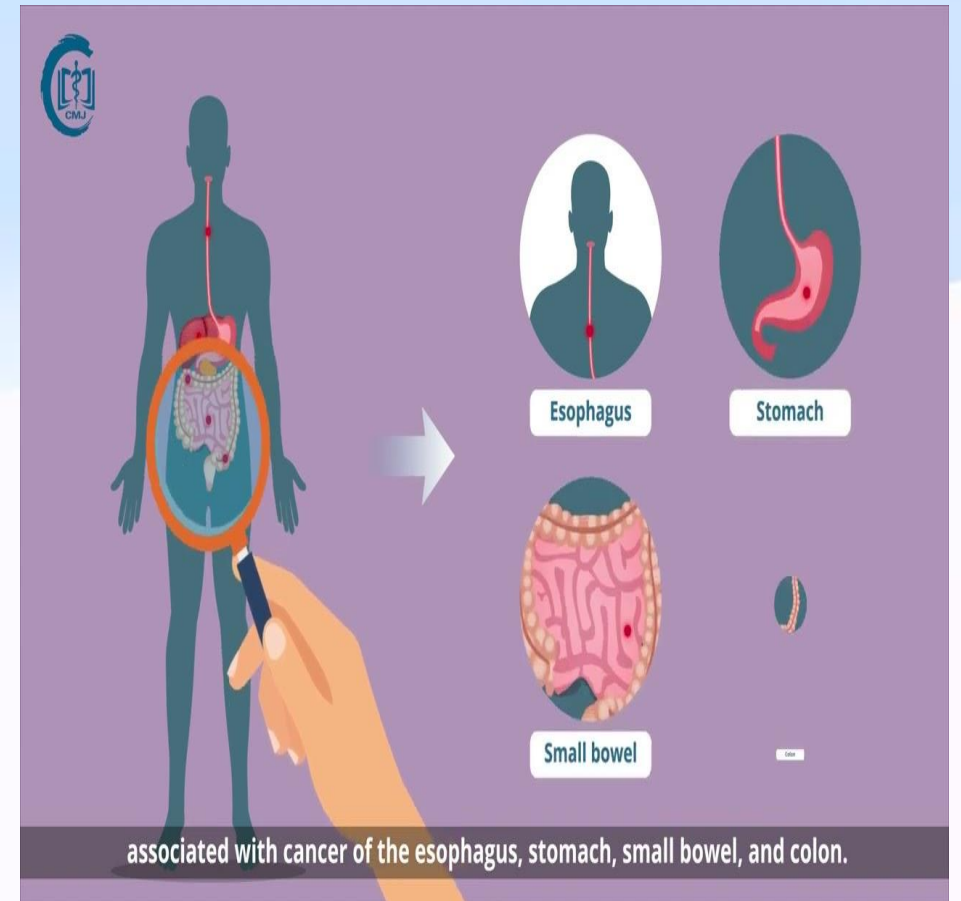
- **AI-powered tools analyze images of skin lesions to aid in the early detection of skin cancers. These systems can provide**
- **AI-powered tools analyze images of skin lesions to aid in the early detection of skin cancers. These systems can provide dermatologists with additional insights to improve accuracy in diagnosis.**



Artificial Intelligence (AI) in Dermatology

GASTROINTESTINAL DISORDERS

- AI is employed in the analysis of endoscopic images to detect abnormalities in the gastrointestinal tract.
- This can aid in the early diagnosis of conditions such as colorectal cancer



AI systems working together



Oncology



Radiology



Pulmonology



Cardiology



Overview of authorized AI-enabled medical devices by specialty

There are 692 devices on the FDA's new list.

- 76% are in Radiology: 531 devices
- 10% are in Cardiovascular: 71 devices
- 3% are in Neurology: 20 devices
- 2% are in Hematology: 15 devices

The following areas make up less than 1% of the FDA cleared AI enabled devices

- Gastro & Urology: 11 devices
- Ophthalmic: 9 devices
- Anesthesiology: 6 devices
- Clinical Chemistry: 6 devices
- General and Plastic Surgery: 5 devices
- Microbiology: 5 devices
- Pathology: 4 devices
- General Hospital: 3 devices
- Ear Nose and Throat: 2 devices
- Immunology: 1 device
- Obstetrics and Gynecology: 1 device
- Orthopedic: 1 device
- Dental: 1 device



Nearly all doctors feel burnout, but many are encouraged by potential of AI, survey says

PUBLISHED WED, FEB 21 2024•6:00 AM EST

KEY POINTS

- Doctors in the U.S. are struggling to contend with burnout, staffing shortages and overwhelming administrative workloads, according to a new survey.
- Despite these challenges, 83% of doctors in the survey said they believe AI could eventually help.
- More than 1,000 doctors were surveyed between Oct. 23 and Nov. 8 in the study, commissioned by Athenahealth.



DIGITALIZATION'S POTENTIAL IN HEALTHCARE

- **Better Access:** Telemedicine and mobile health apps can connect patients and doctors across distances, bringing care to rural and underserved areas. (India's eSanjeevani telemedicine platform, for example, now handles ~400,000 consultations per day.)
- **Higher Quality & Efficiency:** Electronic Health Records (EHRs) enable quick information sharing and reduce errors from illegible paper records. Nearly all U.S. hospitals (96%) have adopted certified EHR systems, indicating how digital records have become standard.
- **Personalized Care:** Digital tools harness big data – analyzing genetics, lifestyle, and clinical data – to tailor treatments. AI-driven insights can predict disease risks and suggest preventive measures for individuals (the global digital health market is forecast to reach ~\$660 billion by 2025, reflecting rapid growth).
- **Public Health & Outreach:** Health portals and mobile notifications allow for broad dissemination of health information (e.g. appointment reminders, medication adherence apps), improving prevention and chronic disease management.



HOW DIGITAL TECH HAS REVOLUTIONIZED HEALTHCARE ALREADY

Telemedicine enables specialists to consult on cases remotely, as shown here with a cardiologist conducting a video pre-op consultation 400 miles away (screen displays patient data and even an ultrasound) .

- **Electronic Records & Connectivity:** Hospitals and clinics worldwide have adopted EHRs, allowing instant access to patient histories and test results.
- **Wearables & Mobile Health:** Consumers actively monitor health via smartwatches and apps, tracking metrics like heart rate and activity. These devices have alerted people to issues (e.g. atrial fibrillation notifications from smartwatches), prompting earlier medical visits.
- **Improved Outcomes:** Digital tools are already saving lives. For instance, faster communication and data-sharing in hospitals can speed up treatments (stroke care networks, digital COVID-19 dashboards accelerating responses, etc.). Early studies show that algorithm-driven early warning systems in hospitals cut unexpected mortality by ~26%



AI AND DIGITALIZATION IN HEALTHCARE TODAY

- **Diagnostics:** AI can review medical images (X-rays, CT, MRI) or lab data faster and often as accurately as experts. For example, AI software in the UK doubled the accuracy of stroke brain scan interpretation compared to human clinicians , and AI can flag more fractures on X-rays than busy ER doctors.
- **AI-Powered Medical Devices:** Many modern devices come with AI inside – from smart ECG machines that automatically detect arrhythmias, to infusion pumps that adjust dosing using predictive algorithms.
- **Operational Efficiency:** Beyond clinical care, AI improves hospital operations. Machine learning models predict patient admissions, optimize staff scheduling, and manage supply chains in “smart hospitals.” This leads to reduced wait times and better resource allocation.
- **Real-World Impact:** Early results are promising. One AI-based early warning system (“CHARTWatch”) monitoring hospital patient data reduced unexpected deaths by 26% in a Canadian hospital unit, by alerting staff to intervene sooner.



Virtual Assistants

Virtual assistants are computer programs that can perform tasks such as making appointments, providing information about medical conditions, and even giving reminders about taking medications.

Google Now and Alexa are examples of virtual assistants that many people have access to. These programs can provide information about nearby hospitals, pharmacies, and doctors' offices. They also:

- Find medical information online about symptoms and diseases
- Offer advice on implementing treatments
- Suggest doctors in the area
- Keep track of medications and their schedules
- Provide reminders for medications and appointments



Virtual assistants provide patients with convenient access to information and care with fewer in-person visits. This can help to save time and money for both patients and healthcare providers.

Medical practitioners' offices use virtual assistants as well. In this capacity, the AI streamlines a multitude of tasks:

- Send reminders and confirmations to patients
- Maintain office schedules
- Handle most incoming patient inquiries
- Manage automated billing and payments
- Access the patient's digital file for visits
- Alert the doctor to any new changes in the patient's files
- Send prescriptions to the pharmacy



Virtual assistants and AI chatbots

AI chatbots (such as those used in Babylon (www.babylonhealth.com ) and Ada (<https://ada.com> ) are being used by patients to identify symptoms and recommend further actions in community and primary care settings. AI chatbots can be integrated with wearable devices such as smartwatches to provide insights to both patients and caregivers in improving their behaviour, sleep and general wellness.





Glowing Results: AI-Powered SSI Surveillance

Sonalika **Sharma** | Tanveer **Kaur** | Anant Kaur **Virk** | Madhav **Mehta** | Anmol **Singh** | Vinayak S **Rengen*** | Ashvind **Bawa**



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The Promise of AI:

A New Paradigm in Infection Detection

- AI can process complex data **rapidly**
- Machine learning **improves** over time
- Potential for **real-time**, objective assessment

The background features a vibrant, abstract design with overlapping organic shapes in shades of pink and orange. The shapes are soft and fluid, creating a layered, bokeh-like effect. The colors range from a bright magenta to a warm, golden-orange.

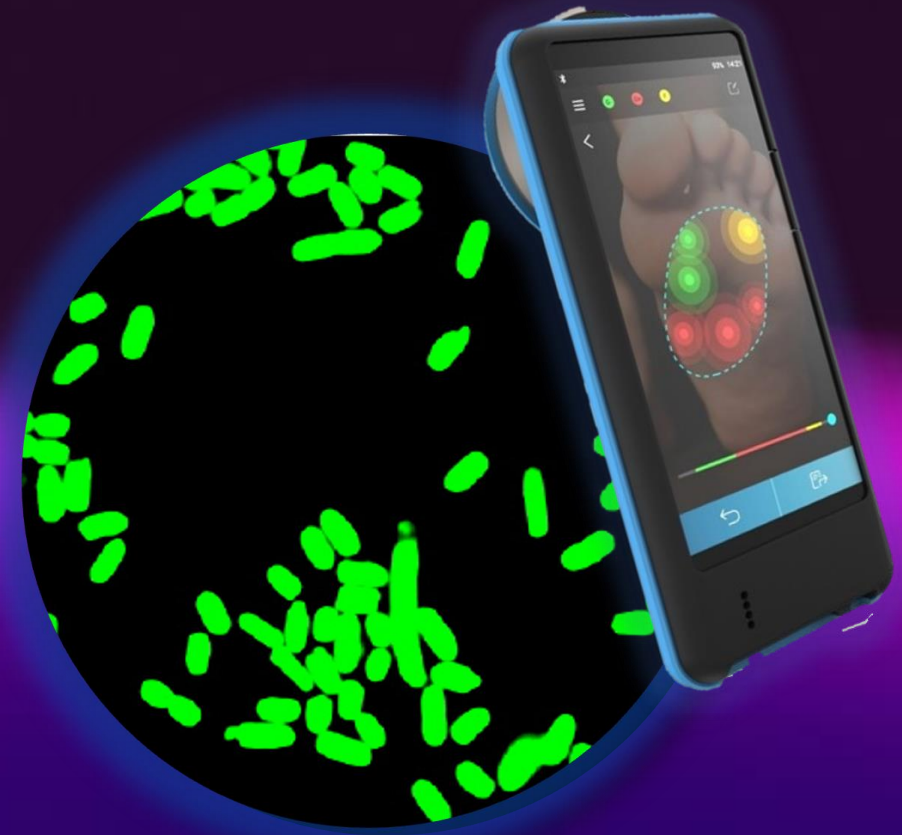
CAN AI SEE



WHAT WE CAN'T?

Meet Our Glowing Detective

- Non-invasive imaging technology
- Detects bacterial autofluorescence
- Provides real-time Results in 2 minutes
- No sample collection needed
- Colour-coded infection mapping classifying bacteria into gram types

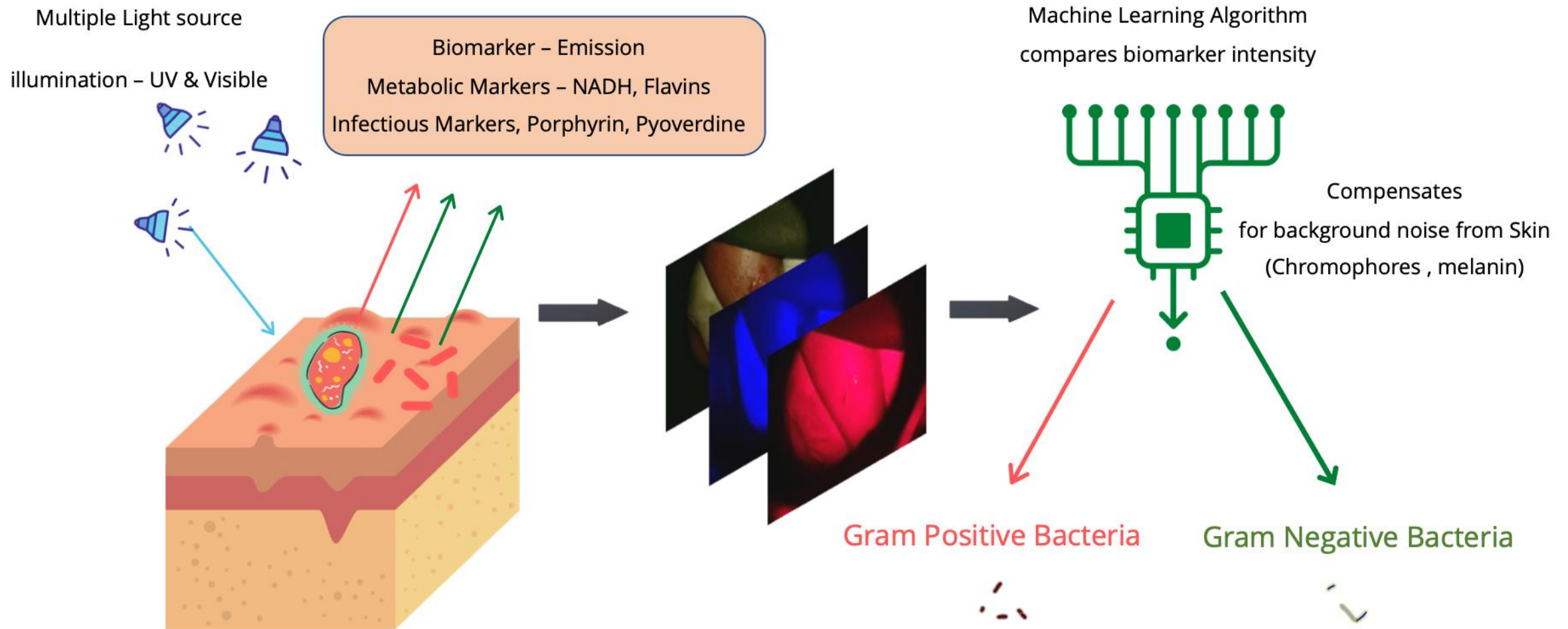


The Science Behind the glow



GAMECHANGER IN THE **WOUND CARE** SPACE

AI can enable reagent-less Bacterial classification



Training Ongoing - Deep learning model on existing Multispectral images towards genus level classification

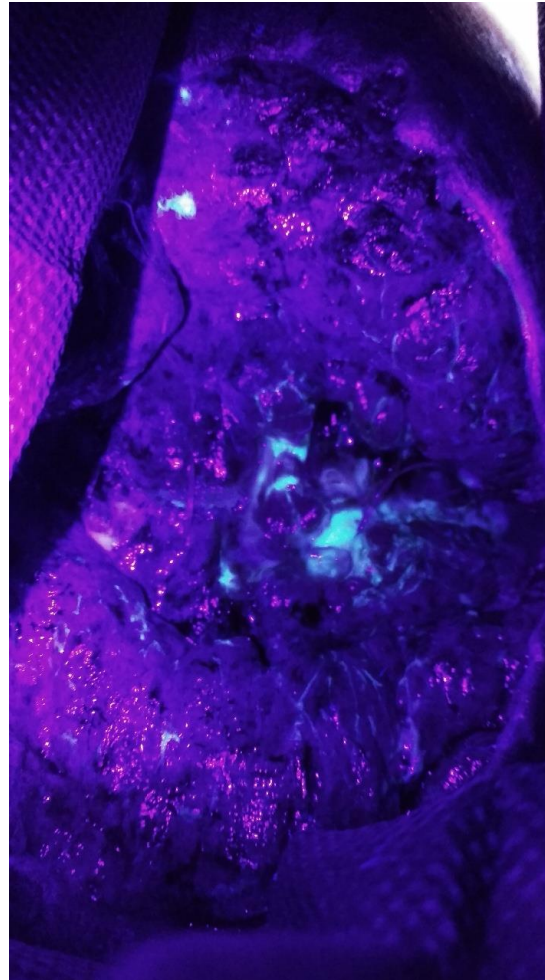
CASE STUDIES

Isolated Organism- *Escherichia Coli*, *Acinetobacter Baumannii*

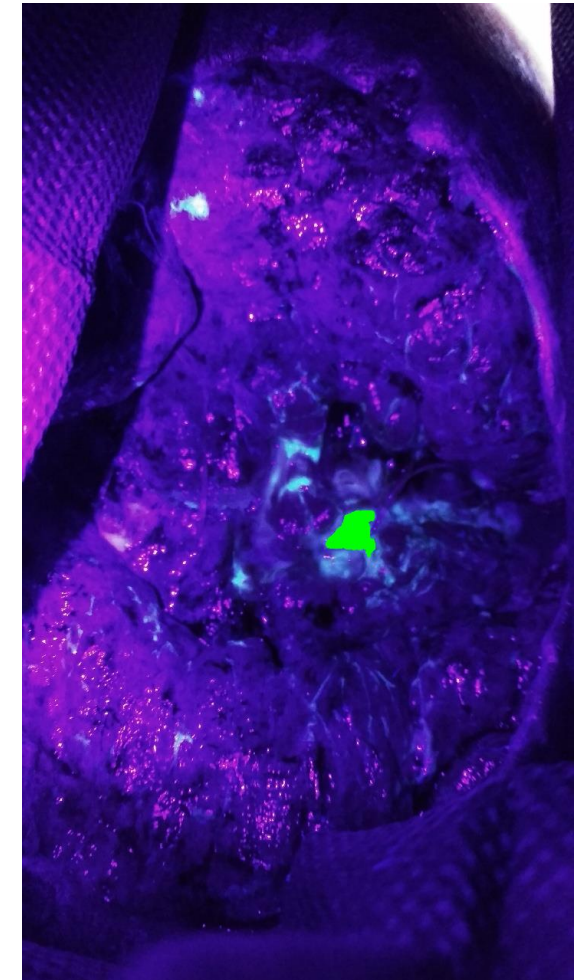
White Light Image



Multi-spectral Image



AI-enabled Image

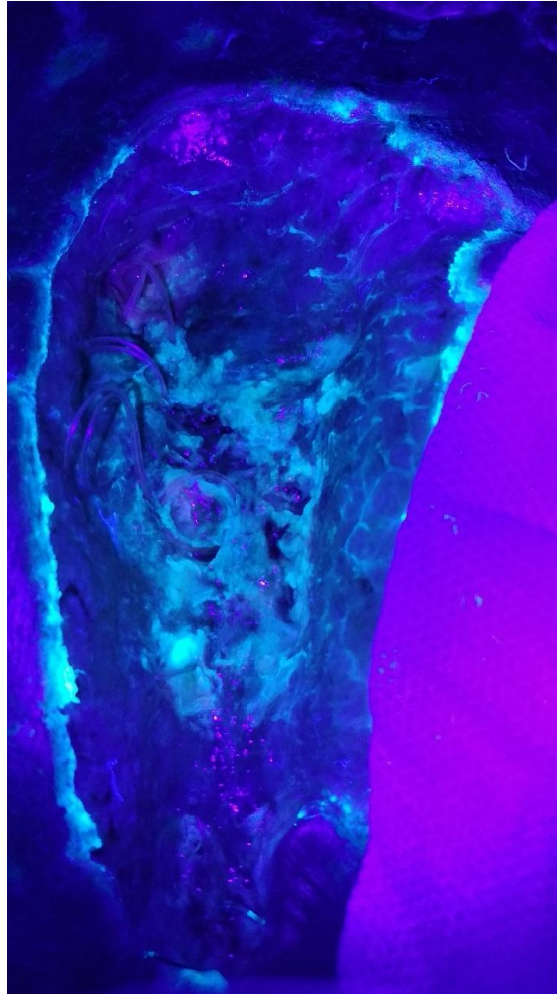


Isolated Organism- *Pseudomonas Aeruginosa*, *Klebsiella Pneumoniae*

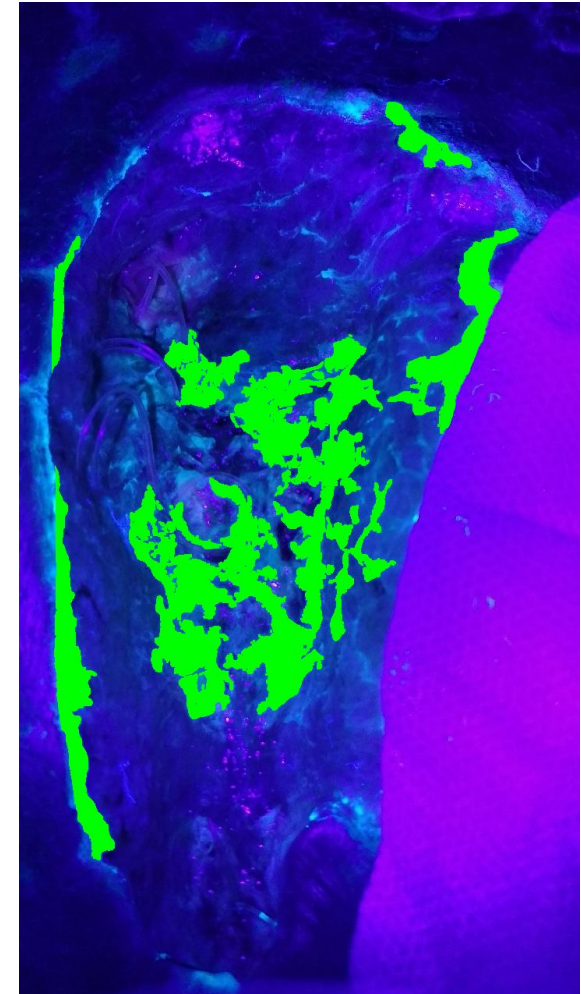
White Light Image



Multi-spectral Image



AI-enabled Image



Isolated Organism- *Escherichia Coli*, *Staphylococcus Aureus*

White Light Image



Multi-spectral Image



AI-enabled Image



CAVEATS: CHALLENGES AND RISKS

- **Data Privacy & Security:** With massive digitalization comes the responsibility to protect sensitive health information. Healthcare data breaches have become a serious concern. Strong cybersecurity measures and regulations (like HIPAA, GDPR) are needed to safeguard patient information.
- **Bias and Inequity in AI:** AI systems learn from data, and if that data is biased or unrepresentative, the AI can perpetuate or even worsen disparities. For example: pulse oximeter devices tend to **overestimate oxygen levels in patients with darker skin**, potentially delaying care for those patients. Similarly, an algorithm used in US hospitals was found to underestimate illness severity in Black patients because it used health costs as a proxy for need, reflecting historical underinvestment.
- **Over-Reliance and Errors:** Technology can create a false sense of security. Clinicians might over-rely on an AI recommendation without applying clinical judgment, which is dangerous if the AI is wrong. There is also the risk of alert fatigue if systems generate too many warnings, causing staff to ignore them (including the important ones). Balancing automation with human oversight is key.
- **Ethical and Legal Questions:** Digital health raises new ethical dilemmas. Who is responsible if an AI makes a wrong prediction that affects a patient? How do we obtain truly informed consent for AI's use in care decisions?



WHERE DIGITALIZATION CAN'T REPLACE THE HUMAN TOUCH

- **Empathy and Human Connection:** No matter how advanced AI becomes, it cannot truly replicate a physician's empathy. Patients with heart disease often need emotional support – delivering a difficult diagnosis or comforting a worried family requires human understanding.
- **Clinical Judgment and Complex Decision-Making:** Medicine can be as much art as science. Experienced cardiologists draw on nuanced clinical judgment honed by years of practice – understanding patient preferences, social context, or spotting when “something just isn't right” beyond the numbers.
- **Procedural Skills and Hands-On Care:** In cardiology, procedures like catheterizations, heart surgeries, or even a simple physical exam cannot (yet) be fully automated. Robotic surgical systems exist, but a skilled surgeon is still in control.
- **Trust and Accountability:** Patients often say they want a person responsible for their care. If an AI makes a mistake, patients and families still turn to the medical team for answers. Maintaining trust means being there to explain decisions.





Lack of human touch and empathy



Potential for errors and biases



Privacy and data security concerns



Limited interpretability and transparency



Integration challenges and resistance to adoption



Ethical dilemmas and accountability

TO SUMMARIZE...

- **Digitalization is Transformative:** Across industries and now in healthcare, digitalization drives efficiency, accessibility, and innovation. Embrace of telemedicine, EHRs, and wearables is revolutionizing patient care.
- **AI Augments Care:** Artificial Intelligence is a game-changer in healthcare – from early detection of silent heart disease to assisting in surgeries. It performs data-crunching tasks at superhuman speed.
- **Smart Hospitals & Devices:** The vision of smart hospitals – with interconnected systems, AI-powered devices, and big data analytics – is becoming reality. Such hospitals can deliver safer, more personalized care (think ICU monitoring AI or AI-guided catheter labs).
- **Challenges Require Caution:** With great power comes great responsibility. We must address data privacy vigilantly and actively work to eliminate bias in algorithms to ensure equitable care.
- **Human-Centric Approach:** Ultimately, digital tools are exactly that – tools in the hands of humans. They should empower healthcare professionals, not replace the human elements of care. The **patient-doctor relationship, empathy, and human judgment remain irreplaceable.**



CONCLUSION & FUTURE OUTLOOK

- **Embracing Innovation:** Cardiology and healthcare are entering a digital renaissance. As we look to 2030 and beyond, expect AI to be as commonplace as the stethoscope – an everyday assist for clinicians.
- **Continued Integration in Bharat (India) & Globally:** India's healthcare is on the cusp of a major digital leap with initiatives like ABDM. This will likely yield one of the world's largest health datasets, fueling AI solutions tailored to Indian population needs.
- **Patients as Partners:** We foresee more patient-facing AI apps – virtual health coaches nudging heart patients to stick to diets and exercise, chatbots answering medication questions, and platforms where patients can view and contribute to their health data.
- **Need for Education & Workforce Training:** A digital health future means we need digitally savvy healthcare professionals. Medical curricula and ongoing training will evolve to include data science basics and AI literacy for doctors, nurses, and technicians



AI Resident: Never Tired, Always Learning



AI SYSTEMS AS TIRELESS
ASSISTANTS IN MEDICAL
EDUCATION



CONTINUOUS ANALYSIS OF
SURGICAL TECHNIQUES AND
OUTCOMES



REAL-TIME FEEDBACK AND
SUGGESTIONS DURING
PROCEDURES



ADAPTIVE LEARNING
ALGORITHMS FOR
ONGOING IMPROVEMENT

FINAL THOUGHT

Digitalization and AI are not ends in themselves but means to our ultimate goal – better heart health for our population. The **future is bright** if we continue to innovate responsibly. A quote to remember: *“AI won’t replace doctors, but doctors who use AI will perhaps replace those who don’t.”*

Together – tech experts, healthcare providers, policymakers, and patients – we can create a smarter healthcare ecosystem that delivers compassionate, high-quality cardiology care to every person in need.





Patient care will likely involve human contact.



The H2O.ai logo consists of the text "H2O.ai" in a bold, black, sans-serif font, centered within a solid yellow rectangular background.

H2O.ai

Builds models to analyze data, identify patterns, and accurately predict patient outcomes.



PathAI

Its AI-powered models improve diagnostics and as of today, they perform best in drug development for complex diseases.



Viz.ai

AI-driven model for stroke diagnosis, treatment, and prevention. The core of the system is an extensive library of scans.



FWA360Leads

Automatically Identifies fraud, waste, abuse, and error schemes and prioritizes FWAE leads based on importance and impact severity.



NVIDIA for healthcare

AI Enterprise software package with tools for medical imaging, natural language processing, and drug discovery.

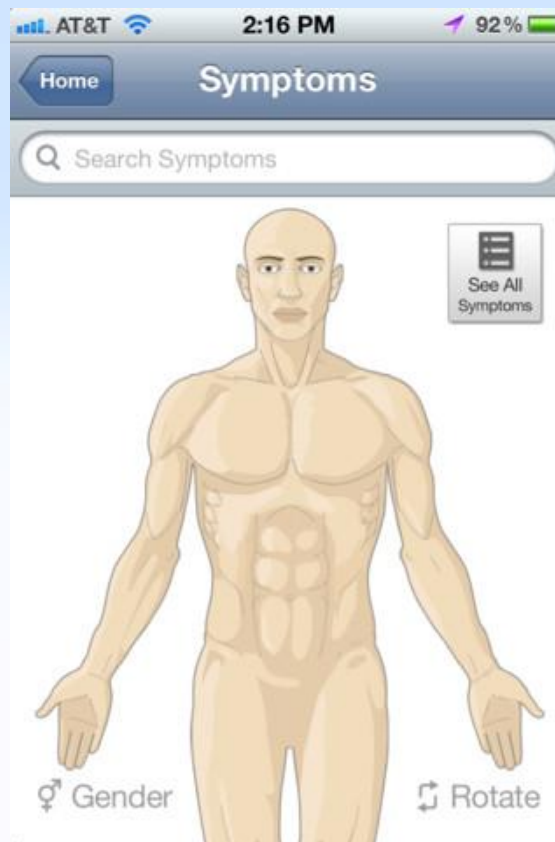
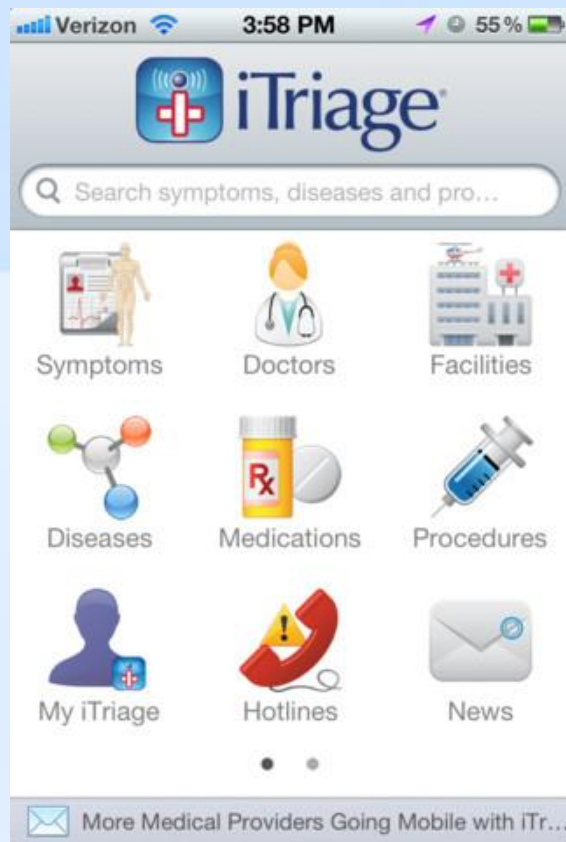




MEDICAL CONTENT AND FIRST AID

ITRIAGE

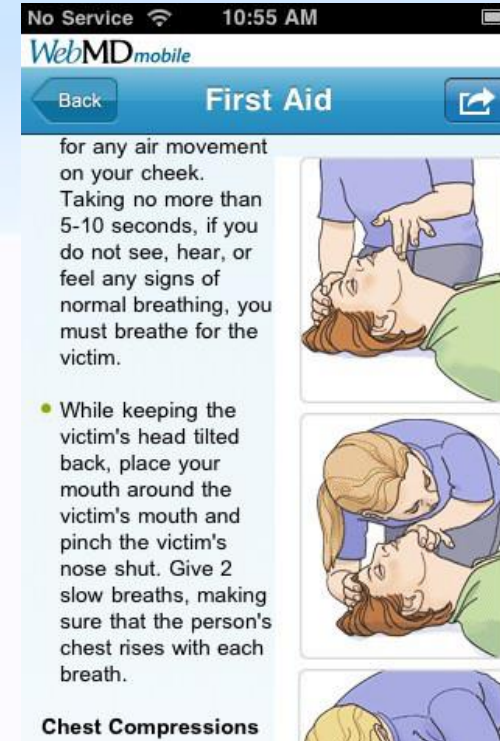
Created by two ER docs, iTriage helps you answer the questions: “What medical condition could I have?” and “Where should I go for treatment?”





MEDICAL CONTENT AND FIRST AID WEBMD

WebMD helps you with your decision-making and health improvement efforts by providing mobile access 24/7 to mobile-optimized health information and decision-support tools including WebMD's Symptom Checker, Drugs & Treatments, First Aid Information and Local Health Listings.



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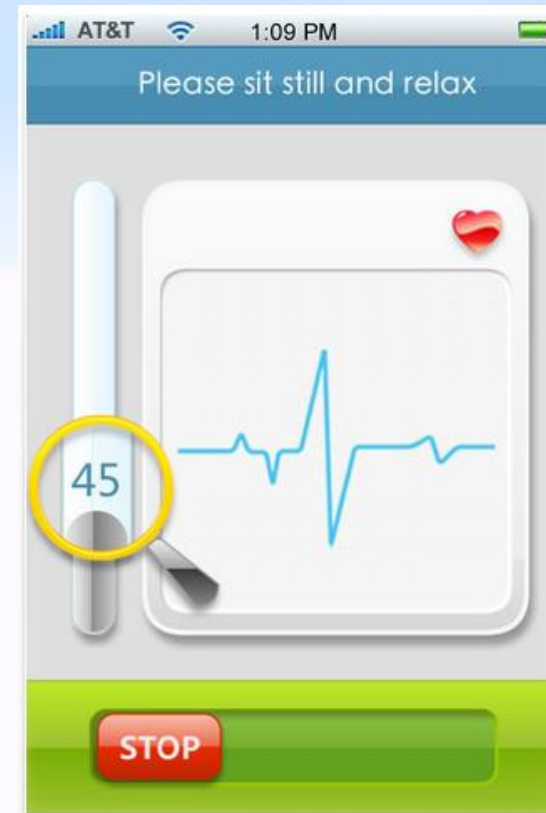


HEALTH MONITORING AND TREATMENT

IHEALTH



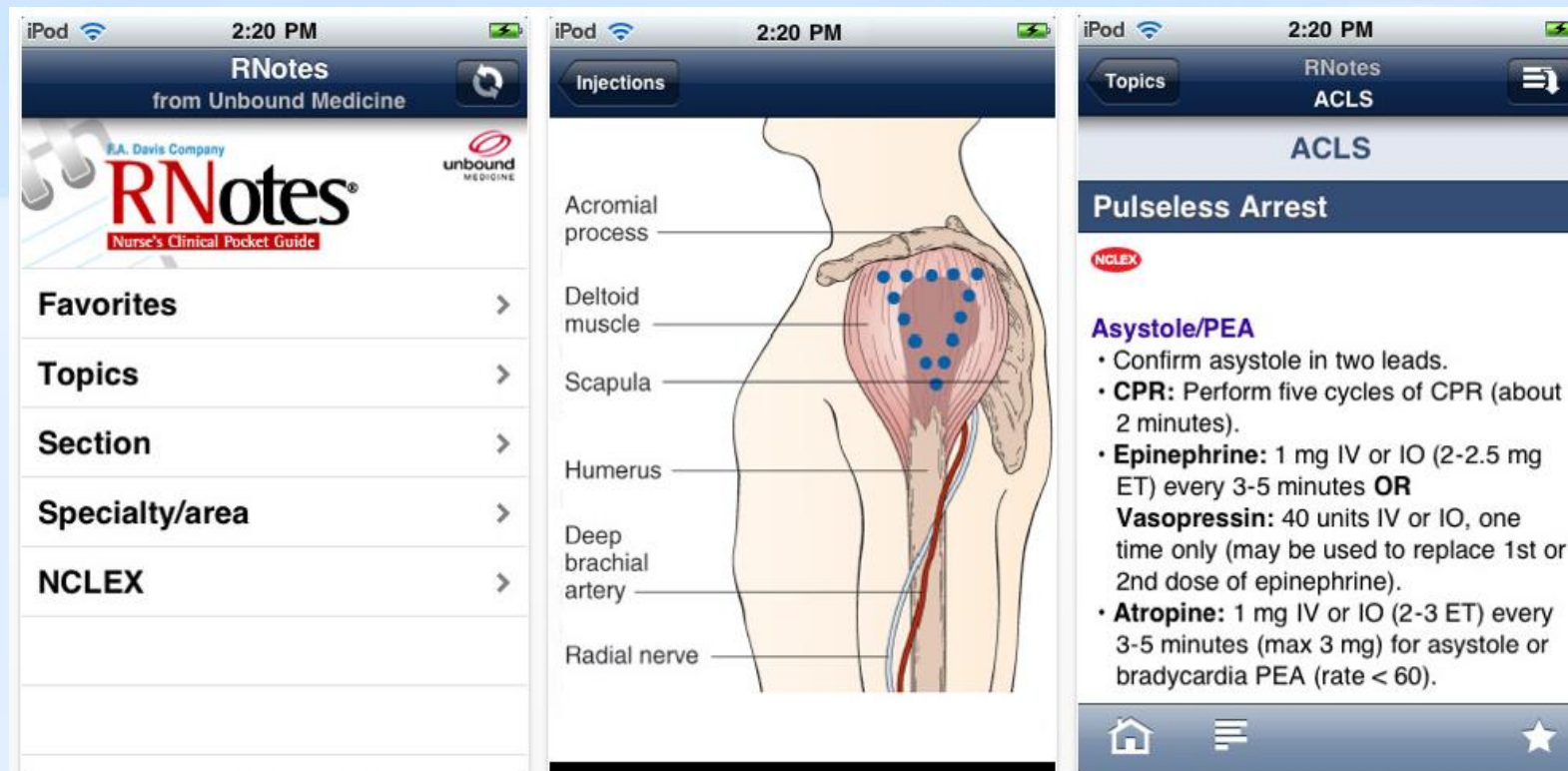
iHealth's Blood Pressure Dock lets you take more control of your personal healthcare using iPhone 4, iPad and iPod touch (4th Gen.).



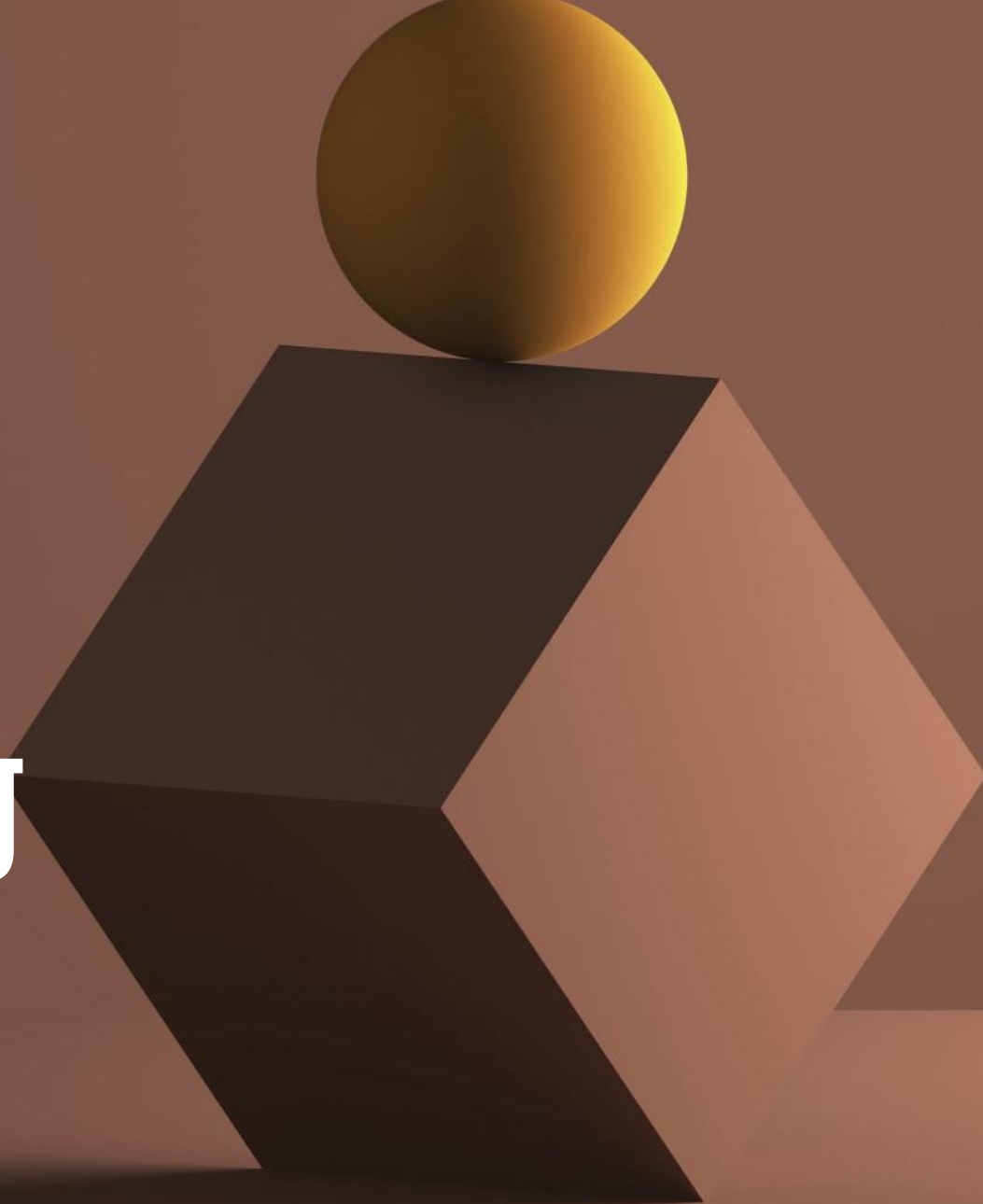


TRAINING ON THE GO RNOTES: NURSE'S CLINICIAN POCKET GUIDE

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