

AI in Clinical Medicine: Current State and Future Promises

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Presentation to the
Geisel College of Medicine at Dartmouth
November 5, 2026

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Disclosures:

- The presenters have no financial relationships with companies to disclose.
- The American College of Artificial Intelligence and Medicine is organized as a 501(c)(3) nonprofit organization.
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Latest from ACP on AI

Annals of Internal Medicine

POSITION PAPER

Ethics and Professionalism in Artificial Intelligence and Medical Practice: A Position Paper From the American College of Physicians

Matthew DeCamp, MD, PhD; Lois Snyder Sulmasy, JD; and Kyle E. Karches, MD, PhD; for the Ethics, Professionalism and Human Rights Committee of the American College of Physicians*

Published at Annals.org on 1 September 2026.

ACP's FOUR POSITION STATEMENTS ON AI

Ethics and Professionalism in Artificial Intelligence and Medical Practice

POSITION STATEMENT #1

AI should reinforce the patient–physician relationship.

POSITION STATEMENT #2

Physicians and trainees must recommit to competencies of caring and develop new competencies on the appropriate use of AI.

* Medical education

POSITION STATEMENT #3

When physicians use AI to support medical decision-making, it should augment rather than replace physicians' independent clinical judgment.

POSITION STATEMENT #4

Identify and mitigate algorithmic bias and its structural sources.

- Bias not unique to AI

* Bias tools

Source: DeCamp M, et al. Ann Intern Med. 2026. doi:10.7326/ANNALS-26-01792

From Principles to Practice: AI-Enabled Medical Devices

As of August 20, 2026

FDA AI-enabled medical-device authorizations increased from 1,357 in December 2025 to **1,524 as of August 20, 2026**.

76.4% of these authorizations are classified under **Radiology**.

Health systems increasingly appoint **Chief AI Officers** or equivalent leaders to guide AI governance and implementation.

References

Current totals: Paragon Health Institute. AI Medical Devices Market Overview. Updated August 20, 2026. paragoninstitute.org/ai-tools/ai-medical-devices/

Earlier total: Abulibdeh R, et al. PLOS Digital Health. 2026. doi:10.1371/journal.pdig.0001597

CAIO: WashU Center for Health AI. Which Health Systems Have AI Chiefs? centerforhealthai.wustl.edu/which-health-systems-have-ai-chiefs/

CNN (Convolutional Neural Networks)

- Images:
- X-ray, CT, Colonoscopy, Mammography, Retinal, EKG

LLM (Large Language Models)

- Language:
- Ambient, Agentic, Prior Auth, Portal Messages, etc.



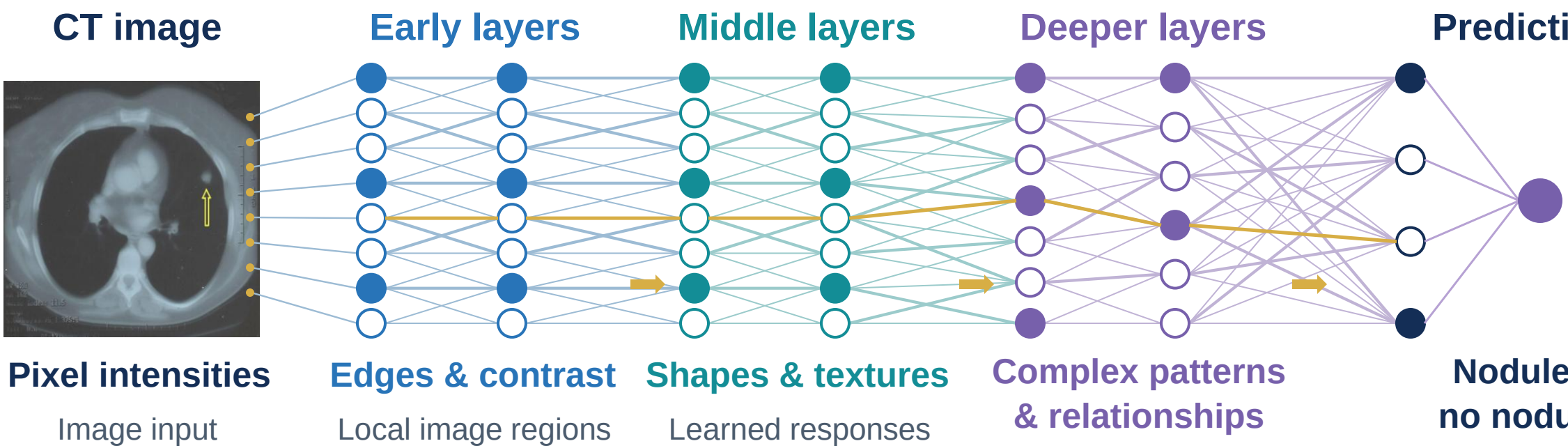
Convolutional Neural Networks

Convolutional Neural Network (CNN)

Artificial neurons and weighted connections learn patterns in images

DURING TRAINING

Labeled images guide changes in connection weights throughout the network.



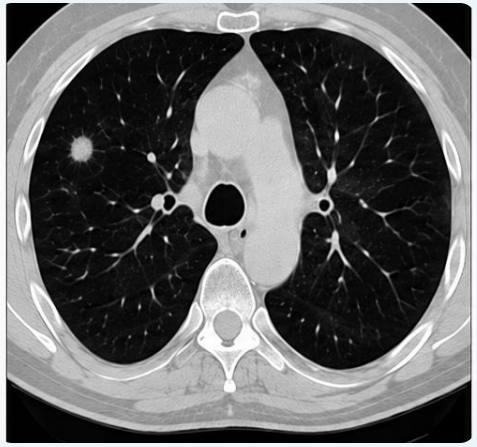
AFTER TRAINING The trained network analyzes a new CT and produces a prediction.

How a CNN Prediction Becomes a Grad-CAM Heat Map

Gradient-Weighted Class Activation Mapping (Grad-CAM)

The CNN makes the prediction. Grad-CAM explains where the CNN focused. The heat map displays that explanation.

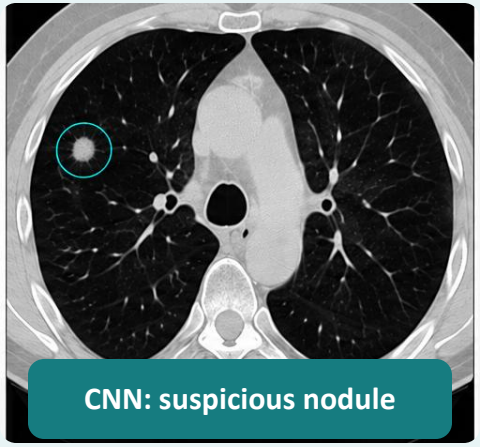
1 Original CT



CT input

The CT enters the trained CNN. A pulmonary nodule may be subtle and difficult to recognize visually.

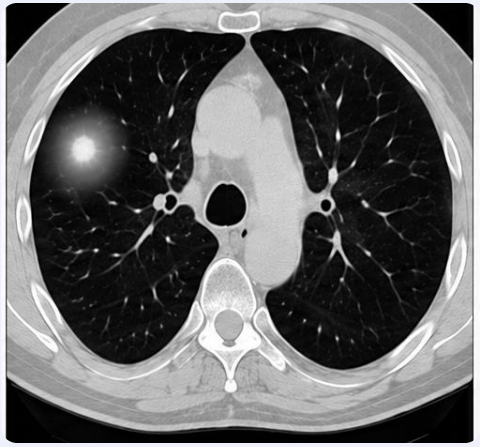
2 CNN Prediction



CNN prediction

The CNN analyzes learned image patterns and identifies a suspicious pulmonary nodule. “Analyze CT” runs the CNN.

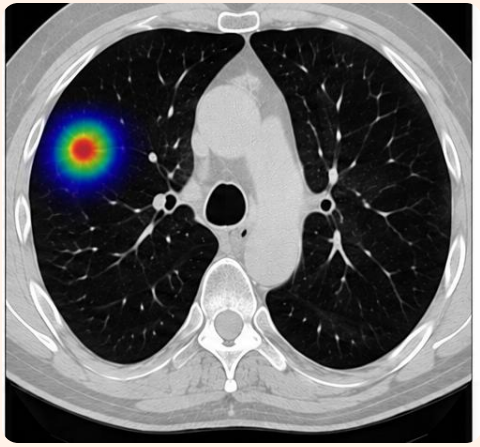
3 Grad-CAM



Grad-CAM explanation

Selecting “Explain prediction” runs Grad-CAM. It calculates which image regions most influenced the CNN prediction.

4 Heat Map Overlay



Colored display

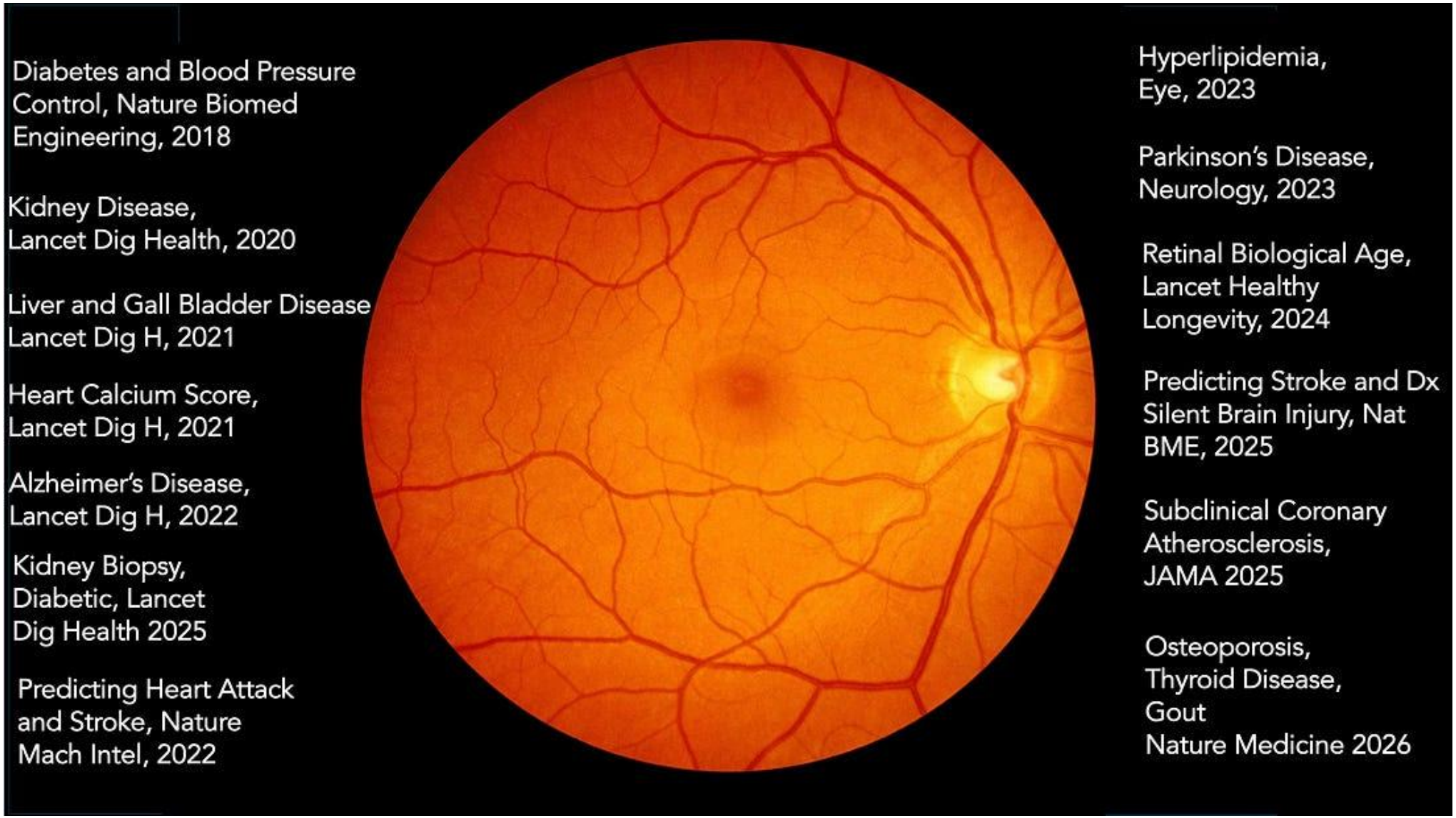
The heat map displays the Grad-CAM result. Warm colors show greater influence. They do not prove disease.

AI and Oculomics



Oculomics

- AI sees patterns on Retinal photographs and OCT
- OCT (Optical Coherence Tomography) light waves
- The Eye acts as a window to a patient's systemic health



Source: Eric Topol, MD

AI and Population Health/Cancer Screening

- Colon Cancer
- Pancreatic Cancer
- Breast Cancer
- Cervical Cancer Screening
- Lung Cancer

Oncology/Cancer Screening

REVIEW

Annals of Internal Medicine

Artificial Intelligence–Assisted Colonoscopy for Polyp Detection

A Systematic Review and Meta-analysis

Saeed Soleymanjahi, MD, MPH; Jack Huebner, MD; Lina Elmansy, BS; Niroop Rajashekar, BS; Nando Lüdtke, BS; Rumzah Paracha, MD; Rachel Thompson, MD; Alyssa A. Grimshaw, MBA, MSLIS, MPH; Farid Foroutan, PhD; Shahnaz Sultan, MD, MHSc; and Dennis L. Shung, MD, MHS, PhD

Data Synthesis: Forty-four RCTs with 36 201 cases were included. Computer-aided detection–enhanced colonoscopies have higher average APC (12 090 of

Ann Intern Med. 2024;177:1652-1663.

AI-Assisted Colonoscopy

RCT (randomized controlled trials) are the highest level of evidence.

This study was a systematic review: 43 RCTs with 34,896 cases.

Compared HUMAN +Colonoscopy vs HUMAN, AI and Colonoscopy

Ann Intern Med. 2024;177:1652-1663.

Ann InAnn Intern Med. 2024;177:1652-1663. tern Med. 2024;177:1652-1663.

Key Outcomes



ADR: Adenoma Detection Rate

- Increased from 36.7% to 44.7% = 21% relative increase with AI

AMR: Adenoma Miss Rate

- 16.1% vs 35.3% (AI vs standard)
- 53% relative reduction in missed adenomas

Gut and Liver
https://doi.org/10.5009/gnl250369
pISSN 1976-2283 eISSN 2005-1212

Original Article

Clinical Efficacy of Real-Time Artificial Intelligence-Assisted Colonoscopy in Colorectal Polyp Detection: A Prospective Multicenter Randomized Controlled Trial

Han Jo Jeon[1], Bora Keum[1], Eui Sun Jeong[2], Seong-Eun Kim[2], Chang Mo Moon[3], Bomee Lee[1], Sanghyun Kim[1], Hyuk Soon Choi[1], Jae Min Lee[1], Eun Sun Kim[1], Yoon Tae Jeen[1]

[1]Division of Gastroenterology and Hepatology, Department of Internal Medicine, Korea University College of Medicine, Seoul, Korea; [2]Department of Internal Medicine, Ewha Womans University College of Medicine, Seoul, Korea; [3]Department of Internal Medicine, Gibbeum Hospital, Seoul, Korea

Colonoscopy: a January 2026 update

Multicenter randomized controlled trial, 998 patients

Adenoma detection rate

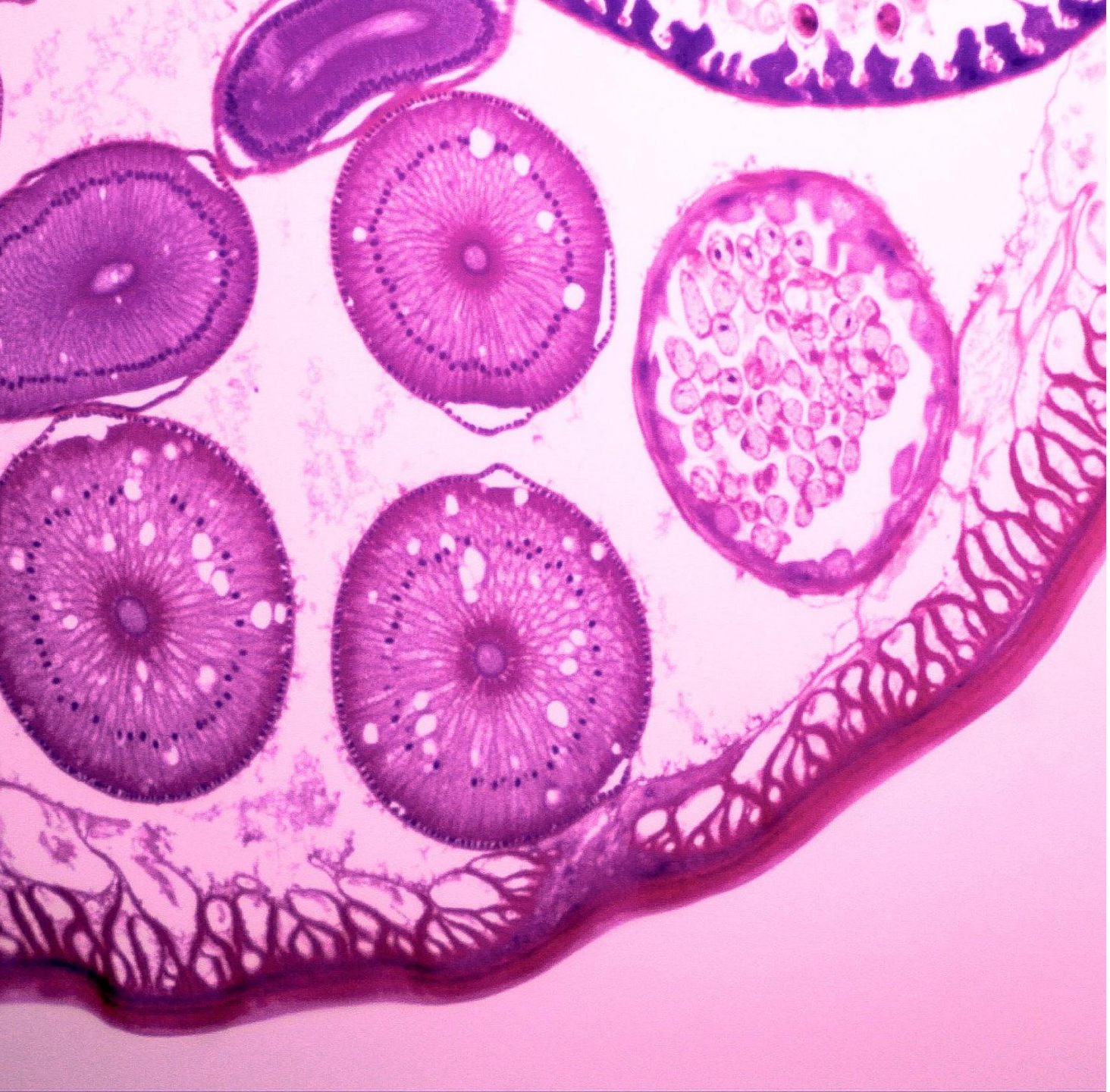
Endoscopist + AI	vs	Endoscopist alone
52.3%		**36.1%**

p < 0.001

AI helped endoscopists find adenomas in more patients.

ACP connection: AI augments the endoscopist.

Jeon HJ, et al. Gut Liver. 2026;20:97–106. doi:10.5009/gnl250369



AI and Pancreatic Cancer

OPEN ACCESS

Original research

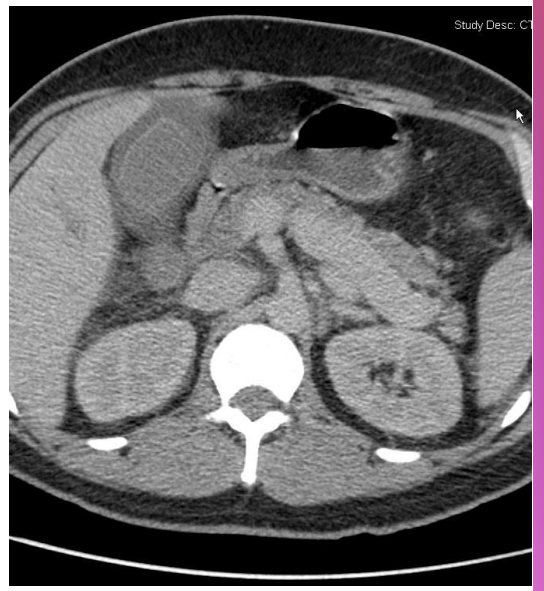
Next-generation AI for visually occult pancreatic cancer detection in a low-prevalence setting with longitudinal stability and multi-institutional generalisability

Sovanlal Mukherjee,[1] Ajith Antony,[1,2] Nandakumar G Patnam,[1,3] Kamaxi H Trivedi,[1,3] Aashna Karbhari,[1,3] Khurram Khaliq Bhinder,[1] Armin Zarrintan,[1] Joel G Fletcher,[1] Mark Truty,[4] Matthew P Johnson,[5] Suresh T Chari ,[6] Ajit Harishkumar Goenka [1]

Mukherjee S, et al. Gut 2026

Pancreatic Ductal Adenocarcinoma (PDA)

- **85%** diagnosed at an unresectable stage.
- The study developed **a** **R**adiomics-based **E**arly **D**etection **MOD**el **(REDMOD).**
- **REDMOD:** Machine-learning ensemble model.
- Retrospective **Multi-Institutional study.**
- Evaluated **Prediagnostic CT scans** from patients later diagnosed with PDA.
- Opportunistic



Mukherjee S, et al. Gut 2026

PDA Study Goals

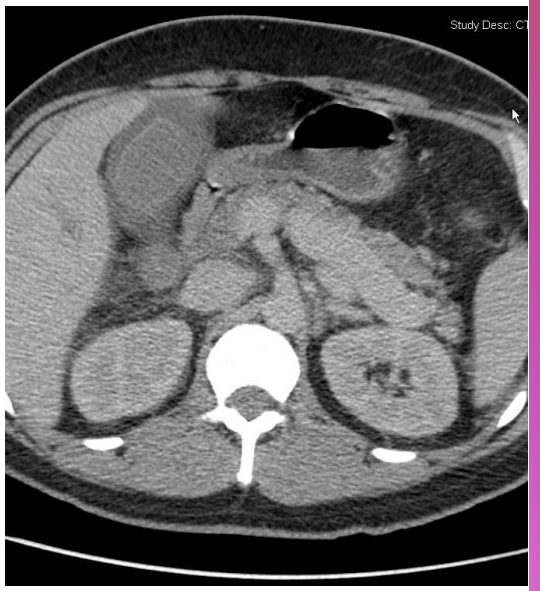
Detect occult pancreatic cancer

Compare REDMOD AI against expert radiologists

Mukherjee S, et al. Gut 2026

PDA Study Results

- Demonstrated external and multi-institutional validation.
- REDMOD surpasses radiologists in detecting occult PDA.*
- REDMOD detects pre-clinical PDA 475 days (1.3 years) before clinical diagnosis



Mukherjee S, et al. Gut 2026

Detecting Visually Occult PDA

Metric	REDMOD	Radiologist	Statistical Results
Sensitivity	**73.0%**	**38.9%**	**P<0.001**
AUC	Detects PDA 475 days before clinical diagnosis	None detected on original read	0.82
Specificity of REDMOD	1.Multi-institutional 2. Public Datasets	XXX	81.3% 87.5%

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Daraxonrasib in Previously Treated Advanced *RAS*-Mutated Pancreatic Cancer

Brian M. Wolpin, M.D., M.P.H.,[1] Wungki Park, M.D.,[2]
Ignacio Garrido-Laguna, M.D., Ph.D.,[3] Alexander Spira, M.D., Ph.D.,[4]
Alexander Starodub, M.D., Ph.D.,[5*] David Sommerhalder, M.D.,[6]
Salman R. Punekar, M.D.,[7] Minal Barve, M.D.,[8] Meredith Pelster, M.D.,[9]
Benjamin Herzberg, M.D.,[10] Nilofer S. Azad, M.D.,[11] Joel Randolph Hecht, M.D.,[12]
Sai Hong Ignatius Ou, M.D., Ph.D.,[13] Tong Lin, Ph.D.,[14] Sumit Kar, Ph.D.,[14]
Lin Tao, M.S.,[14] Rashmi Vora, M.B., B.S.,[14] Aparna Hegde, M.D.,[14]
Kyaw Aung, M.B., B.S., Ph.D.,[15] and David S. Hong, M.D.,[16]
for the RMC-6236-001 Investigators†

N Engl J Med 2026;394:1790-802.

Daraxonrasib for Pancreatic Cancer

NEJM 5/7/2026

RAS is a protein (On/0ff switch) for cell growth.

KRAS/RAS mutation is a genetic error resulting in cell growth permanently switched to **"ON"**

Over **90%** of pancreatic cancers contain **RAS** mutations.

Daraxonrasib: First-in-class oral RAS (ON) inhibitor. FDA- APPROVED AUGUST 26,2026

N Engl J Med 2026;394:1790-802.

Results

Conventional treatment for PDA :

- Median Progression-free survival: 2-3 months
- Median overall survival: 5-7 months

Daraxonrasib oral treatment for PDA:

- **Median Progression-free survival: 8.5 months**
- **Median overall survival: 13.1 months**

N Engl J Med 2026;394:1790-802.



AI and Breast Cancer

Interval cancer, sensitivity, and specificity comparing AI-supported mammography screening with standard double reading without AI in the MASAI study: a randomised, controlled, non-inferiority, single-blinded, population-based, screening-accuracy trial

Jessie Gommers, Veronica Hemström, Viktoria Josefsson, Hanna Sartor, David Schmidt, Annie Hjelmgren, Anna-Maria Larsson, Solveig Hofvind, Ingvar Andersson, Aldana Rosso, Oskar Hagberg, Kristina Lång

The Lancet. 2026;407:505-514

Screening Mammography

- The Mammography Screening with AI (MASAI) trial is widely regarded as the first large randomized controlled trial from Sweden.
- AI-supported mammography screening demonstrates interval outcomes in a real–world population

The Lancet. 2026;407:505-514

Trial Overview

- >105,000 participants.
- Compared Standard double reading vs AI-Supported mammography screening.

GOALS:

- Determine if AI could improve cancer detection
- Reduce interval cancers
- Reduce radiologist workload.

The Lancet. 2026;407:505-514

Two Study Arms

Standard Arm: 2 Radiologists (NO AI)

- In Sweden and other European countries, screening: traditionally, 2 radiologists, "Double Reading"
- Improves cancer detection and decreases missed cancers.

AI Arm: AI + a Radiologist

- Assigned mammogram scores: very low, intermediate and high concern
- Low risk: only 1 radiologist will review
- Higher risk: 2 radiologists
- Triage workflow and lesion detection support

The Lancet. 2026;407:505-514

Metrics	Intervention Group AI + RADs	Control Group Two RADs	P Value
Number of interval cancers	82	93	
Sensitivity	80.5%	73.8%	0.031
Specificity	98.5%	98.5%	0.88
Number of screen readings	Reduced by 44.2%		

NEJM AI

NEJM AI 2026;3(10)
DOI: 10.1056/Aloa2600270

ORIGINAL ARTICLE

Closing the Automation Gap in HPV-Based Cervical Cancer Screening: Independent External Validation of an AI Model for Dual-Stain Triage



Bernd Lahrmann, Ph.D.,[1,2,3,4] Andreas Keil, Ph.D.,[1,2,3,4] Felipe Miranda Ruiz, MSc.,[1,2,3,4] Megan A. Clarke, Ph.D.,[5] Didem Egemen, Ph.D.,[5] Kiranjit K. Grewal, M.S.,[6] Finley P. Grabe,[2,3] Liam Bartels, M.A.,[1,2,3,4,7,8] Alexandra Krauthoff,[3,7,8] Carolann Risley, Ph.D.,[5,9] Sydney Reaves, M.S.,[9] Laurie A. Fuller, M.H.A.,[6] Walter Kinney, M.D.,[6] Nancy Poitras,[6] Patricia E. Goldhoff, M.D.,[6] Betty Suh-Burgmann, M.D.,[6] Thomas S. Lorey, M.D.,[6] Philipp Ströbel, M.D.,[1] Nicolas Wentzensen, M.D, Ph.D.,[5] and Niels Grabe, Ph.D.[1,2,3,4,8]

Received: March 1, 2026; Revised: June 23, 2026; Accepted: July 20, 2026; Published: September 24, 2026

AI in HPV-positive cervical screening

Cytoreader-Fusion reads dual-stained cervical slides

Independent external validation: 4,996 cases

Researchers compared AI and human slide readings with biopsy-confirmed diagnoses.

Sensitivity

Among patients WITH CIN3+

AI 88.3% vs human 78.1%

Specificity

Among patients WITHOUT CIN3+

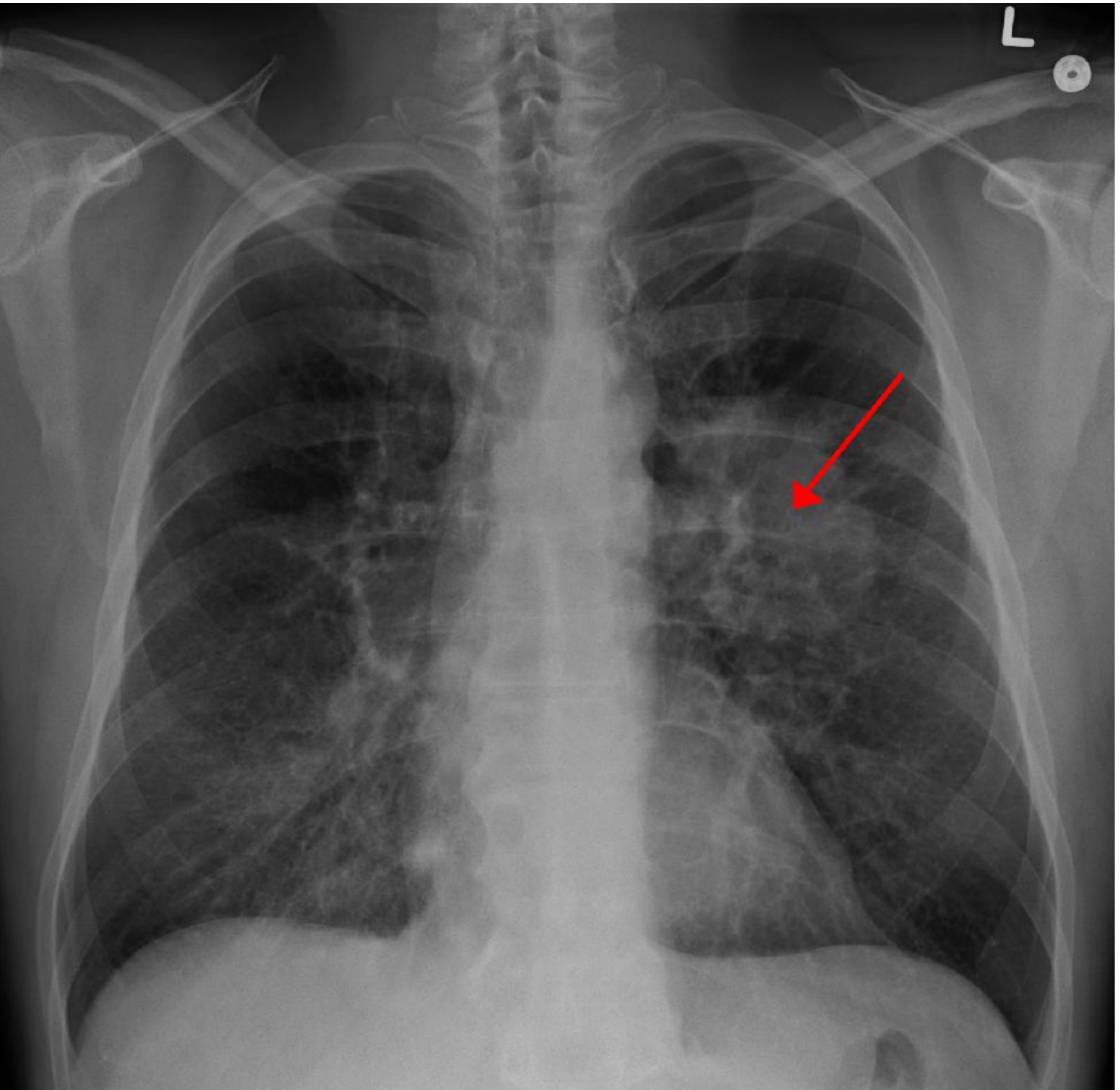
AI 54.4% vs human 63.2%

AI missed fewer serious precancers, while human reading produced fewer false alarms.

CIN3+ means severe cervical precancer or worse.

AI automates slide reading. The physician retains clinical judgment.

Lahrmann B, et al. NEJM AI. 2026. doi:10.1056/AIoa2600270

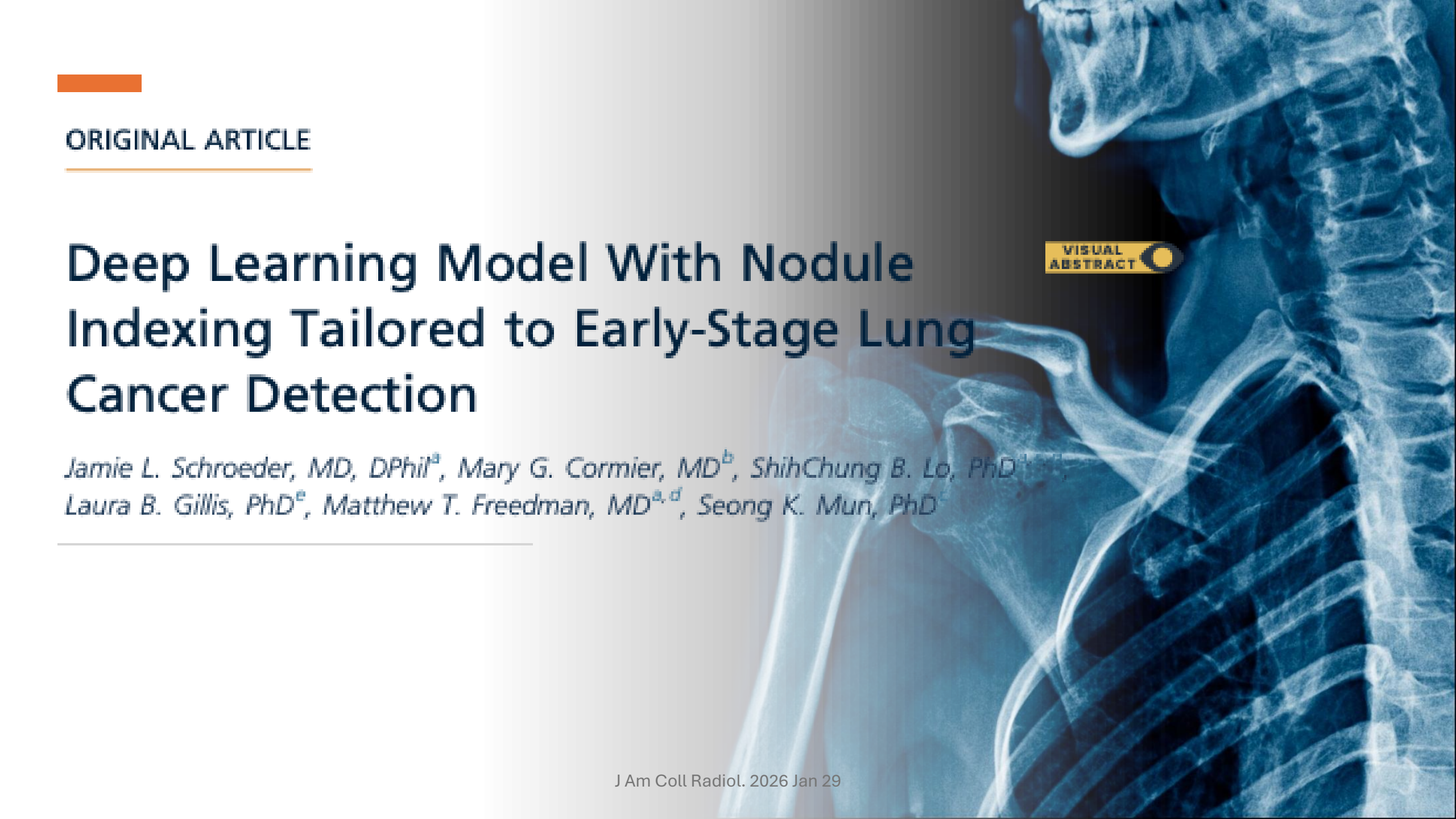


AI and Lung Cancer

ORIGINAL ARTICLE

Deep Learning Model With Nodule Indexing Tailored to Early-Stage Lung Cancer Detection

Jamie L. Schroeder, MD, DPhil[a], Mary G. Cormier, MD[b], ShihChung B. Lo, PhD[c], Laura B. Gillis, PhD[e], Matthew T. Freedman, MD[a,d], Seong K. Mun, PhD[c]



J Am Coll Radiol. 2026 Jan 29

Results

- This was an AI-assisted diagnostic augmentation study.
- Radiologists were the final interpreters.
- AI served as a **decision-support tool NOT a replacement.**
- Having AI assistance increased radiologist **sensitivity** by **24.3%.**
- **Specificity was essentially unchanged.**
- **These findings support integrating AI into chest CT workflows to enhance early-stage lung cancer detection**

J Am Coll Radiol. 2026 Jan 29

SMARTWATCHES

SMARTWATCH:
FDA Cleared Medical Notification Features

- **Alert the wearers that they require clinical follow-up**
- **Atrial Fibrillation (Sept. 2018)**
- **Obstructive Sleep Apnea (Sept. 2024)**
- **Hypertension (Sept. 2025)**
- **Loss of Pulse Detection (February, 2025)**

Apple Watch and Hypertension

On September 12, 2025, The US FDA cleared:

- **Hypertension Notification Feature** (HTNF)
- An App for the Apple watch that analyzes heart rate data to **alert users** of possible high blood pressure.



Watch/Wearables and HTN

- Apple Watch Series 9 or later.
- **Does not** take actual blood pressure but based on its readings, it gives you **hypertension notifications.**
- Works by **Photoplethysmography (PPG)** which **measures how light bounces off of your blood vessels** and **AI uses ML and pattern recognition.**
- **End result:** Wearable data can be shared with physicians or integrated into remote patient monitoring programs

JACC: ADVANCES VOL. 4, NO. 2, 2025
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ORIGINAL RESEARCH

Diagnostic Accuracy of Apple Watch Electrocardiogram for Atrial Fibrillation

A Systematic Review and Meta-Analysis

Sufyan Shahid, MBBS,[a] Minahil Iqbal, MBBS,[b] Humza Saeed, MBBS,[c] Sara Hira, MBBS,[d] Amna Batool, MBBS,[d] Salman Khalid, MD,[e] Naeem Khan Tahirkheli, MD[e]

JACC Adv. 2025 Jan 9;

AI and Atrial Fibrillation

- ECG has been the gold standard for diagnosing A-fib.
- Eleven studies with 4,241 participants, mean age **62.**
- **Sensitivity: Detected AF when present - 94.8%**
- **Specificity: Identified when AF was absent - 95.0%**
- **AUROC: A**rea **U**nder the **R**eceiver **O**perator **C**haracteristic curve: Overall test of accuracy for identifying disease vs non-disease - **0.96**

JACC Adv. 2025 Jan 9;

Sleep and Breathing (2025) 29:91
https://doi.org/10.1007/s11325-025-03255-w

SLEEP BREATHING PHYSIOLOGY AND DISORDERS · ORIGINAL ARTICLE

Detection of sleep apnea using only inertial measurement unit signals from apple watch: a pilot-study with machine learning approach

Junichiro Hayano[1] · Mine Adachi[2] · Yutaka Murakami[3] · Fumihiko Sasaki[2] · Emi Yuda[1,4]

Received: 16 October 2024 / Revised: 27 December 2024 / Accepted: 22 January 2025 / Published online: 1 February 2025
© The Author(s) 2025

Abstract

Purpose Despite increased awareness of sleep hygiene, over 80% of sleep apnea cases remain undiagnosed, underscoring the need for accessible screening methods. This study presents a method for detecting sleep apnea using data from the Apple Watch's inertial measurement unit (IMU).

Wearables and OSA

- Smartwatches can be used as screening tools for OSA
- **Inertial Measurement Unit (IMU):** A small electronic sensor that measures motion and orientation.
- The authors developed a **machine learning model** to estimate sleep apnea severity from Apple Watch IMU signals.

Sleep Breath. 2025 Feb 1;29(1):91.

Results

- Method: Machine-learning algorithm (Random Forest) analyzed subtle wrist movements during sleep.
- **100% Sensitivity:** all true positives were caught (moderate-to-severe)
- **90% Specificity:** people without disease

were correctly classified. 10% false positives**

Sleep Breath. 2025 Feb 1;29(1):91.

Humans Are Not perfect

AI Is Not Perfect

TOGETHER...ENDLESS POSSIBILITIES



LLMs
Ambient
Agents



LLMs

- ChatGPT
- Claude
- Gemini

LLMs used by MDs

- OpenEvidence
- DAX Copilot
- Abridge

Research

JAMA | Original Investigation | AI IN MEDICINE

Clinician Use of an Artificial Intelligence–Enabled Clinical Information Platform

Vishal R. Patel, MD, MPH; Samuel G. Finlayson, MD, PhD; Michael Liu-Hass, MD, MPhil; Mondira Ray, MD, SM; Jesse Burk-Rafel, MD, MRes; Travis I. Zack, MD, PhD; Anupam B. Jena, MD, PhD

JAMA Published online October 15,2026

Open Evidence

Clinicians National Provider Identifier–verified use of Open Evidence, from January1, 2024, through June 30,2026

CONCLUSIONS AND RELEVANCE

Over2.5years, more than 950000 US clinicians submitted 270million queries

Patel, JAMA Published online October 15,2026

RESEARCH ARTICLES

MACHINE LEARNING

Performance of a large language model on the reasoning tasks of a physician

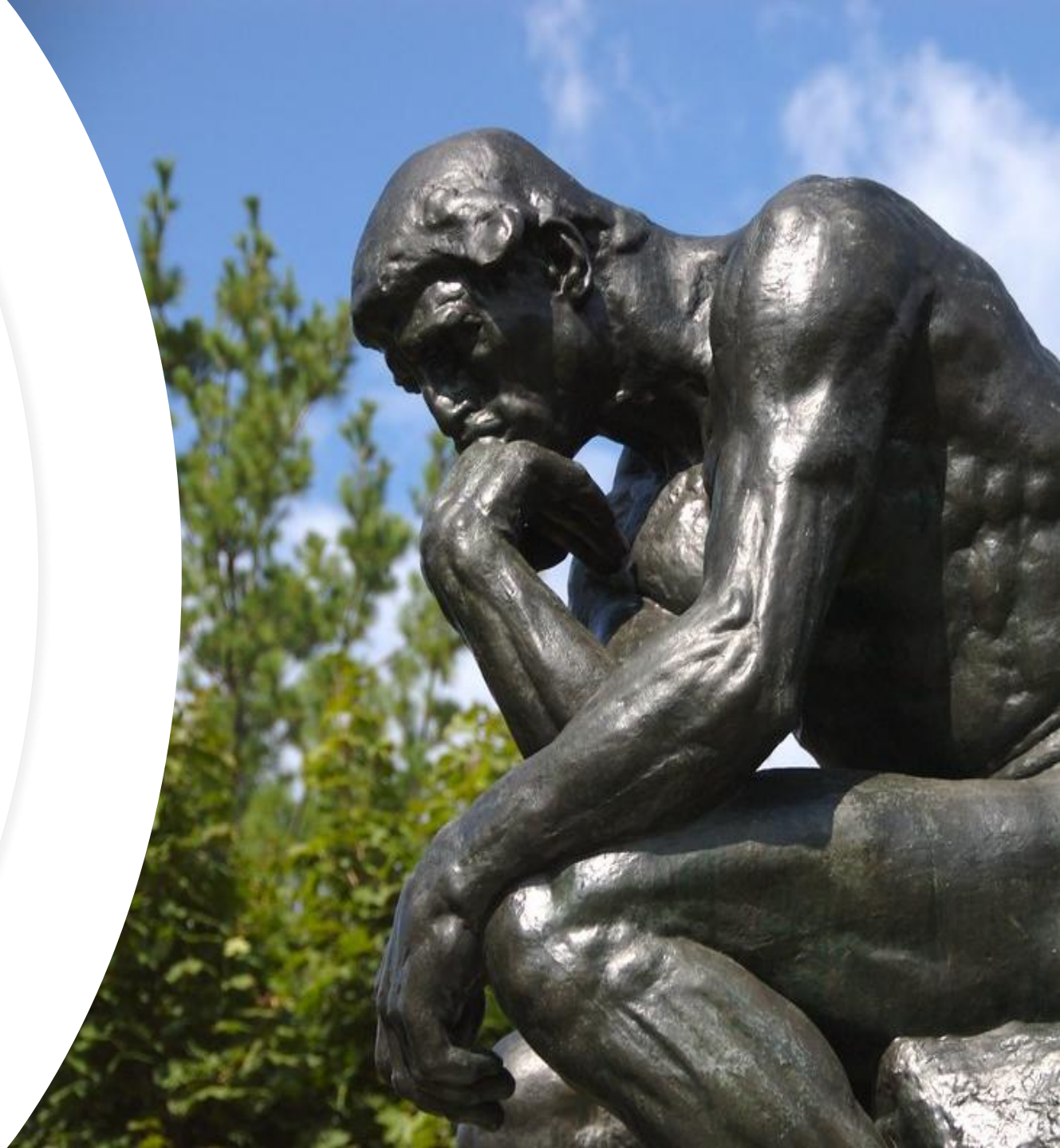
Peter G. Brodeur[1]†, Thomas A. Buckley[2]†, Zahir Kanjee[1], Ethan Goh[3,4], Evelyn Bin Ling[5], Priyank Jain[6], Stephanie Cabral[1,7], Raja-Elie Abdulnour[8], Adrian D. Haimovich[9], Jason A. Freed[10], Andrew Olson[11], Daniel J. Morgan[12,13], Jason Hom[5], Robert Gallo[14,15], Liam G. McCoy[1,16,17], Haadi Mombini[18], Christopher Lucas[1], Misha Fotoohi[1], Matthew Gwiazdon[1], Daniele Restifo[1], Daniel Restrepo[19], Eric Horvitz[20,21], Jonathan Chen[3,4,22]‡, Arjun K. Manrai[2]‡*, Adam Rodman[1]‡*

Science. 2026 Apr 30;392(6797):524-527.

ChatGPT for Clinicians

The o-series reasoning models:

- Unlike Standard GPT: uses multiple reasoning steps before answering
- Improved accuracy
- Good for medical decision reasoning



LLMs

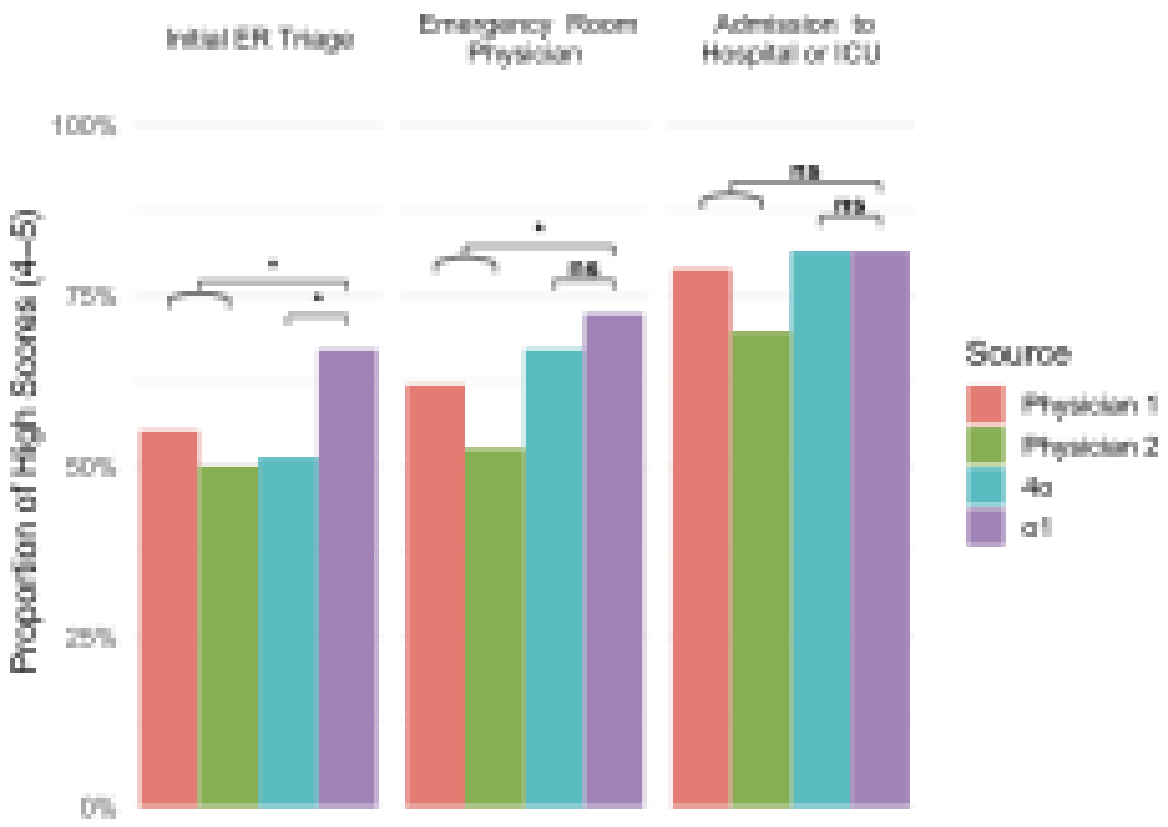


Fig. 5. Blinded assessment of AI and human expert second opinions on real ER cases. Bar plot comparing two internal medicine attending physicians, o1, and GPT-4o diagnostic performance on 76 clinical cases at three diagnostic touchpoints (triage in the ER, initial evaluation by a physician, and admission to the hospital or ICU).

Science. 2026 Apr 30;392(6797):524-527.

npj | digital medicine

Published: 18 March 2026

From tool to teammate in a randomized controlled trial of clinician-AI collaborative workflows for diagnosis

NPJ Digit Med. 2026 Mar 18.

LLMs: ChatGPT 4

- Physicians **without AI:** Correct diagnosis:**75%**
- Physicians WITH AI: Correct diagnosis: 85%
- p=0.00039
- mean difference=9.9%



NPJ Digit Med. 2026 Mar 18.

nature medicine

Brief Communication

https://doi.org/10.1038/s41591-026-04431-5

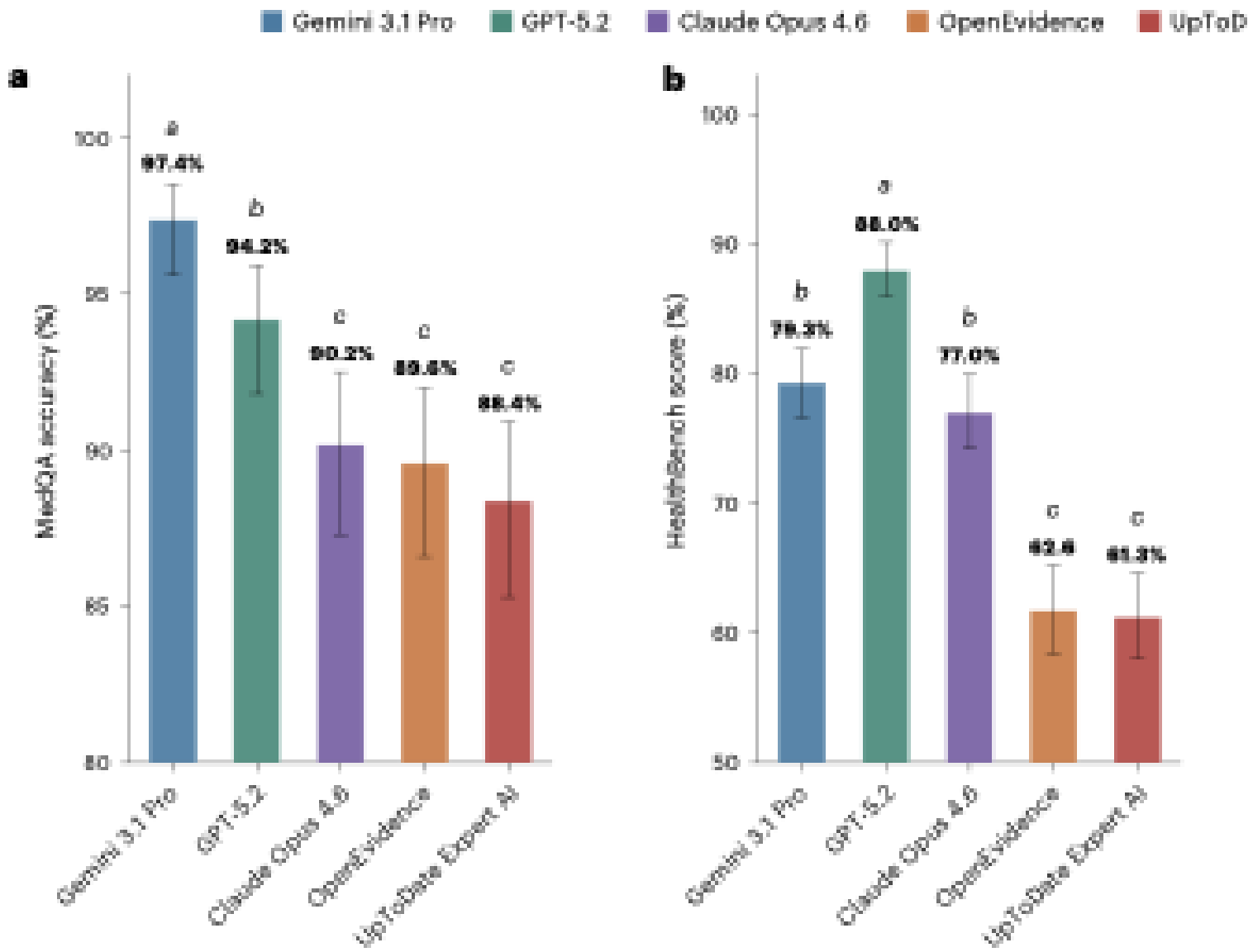
General-purpose large language models outperform specialized clinical AI tools on medical benchmarks

Received: 1 December 2025

Accepted: 29 April 2026

Published online: 12 June 2026

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Nature Med June12, 2026

LLMs ✅ Ambient Agents



NEJM AI

NEJM AI 2025;2(12)
DOI: 10.1056/AIoa2501000

ORIGINAL ARTICLE

Ambient AI Scribes in Clinical Practice: A Randomized Trial

Paul J. Lukac, M.D., M.B.A., M.S.,[1,2] William Turner, B.S.,[3] Sitaram Vangala, M.S.,[3] Aaron T. Chin, M.D.,[2,4] Joshua Khalili, M.D.,[5] Ya-Chen Tina Shih, Ph.D.,[5,6,7,8] Catherine Sarkisian, M.D., M.S.H.S.,[3,9] Eric M. Cheng, M.D., M.S.,[2,10] and John N. Mafi, M.D., M.P.H.[3,11]

Received: September 2, 2025; Revised: September 30, 2025; Accepted: October 8, 2025; Published: November 26, 2025

Ambient

- Reduced Burnout
- Reduced Task Load
- Reduced Work Exhaustion

Ambient

NEJM AI

NEJM AI 2025;2(12)
DOI: 10.1056/AIoa2500945

ORIGINAL ARTICLE

A Pragmatic Randomized Controlled Trial of Ambient Artificial Intelligence to Improve Health Practitioner Well-Being

Majid Afshar, M.D., M.S.,[1,2,3] Mary Ryan Baumann, Ph.D.,[1,4,5] Felice Resnik, Ph.D.,[1] Josie Hintzke, M.S.,[1] Anne Gravel Sullivan, Ph.D.,[1] Graham Wills, Ph.D.,[3] Kayla Lemmon, M.S.,[1] Jason Dambach, M.D.,[2,3] Leigh Ann Mrotek, Ph.D.,[1] Mariah Quinn, M.D., M.P.H.,[2,3] Kirsten Abramson, M.D.,[2,3] Peter Kleinschmidt, M.D.,[2,3] Thomas B. Brazelton, M.D., M.P.H.,[3,6] Margaret A. Leaf, M.S.,[3] Heidi Twedt, M.D.,[2,3] David Kunstman, M.D.,[3,7] Brian Patterson, M.D., M.P.H.,[3,8] Frank Liao, Ph.D.,[3,8] Stacy Rasmussen, B.S.,[3] Elizabeth S. Burnside, M.D., M.S.,[1,3] Cherodeep Goswami, M.B.A.,[1] and Joel Gordon, M.D.[3,7]

Received: August 20, 2025; Revised: September 19, 2025; Accepted: September 28, 2025; Published: November 26, 2025

Ambient

Real world randomized trial:

- Time in note decreased by 21 min/day
- 30 min less per day of after-hours work
- Reduced burnout (Stanford scale)
- Reduced work exhaustion
- Interpersonal Disengagement
- Improved ICD 10 coding/billing

Ambient

JAMA | Original Investigation | AI IN MEDICINE

Changes in Clinician Time Expenditure and Visit Quantity With Adoption of Artificial Intelligence–Powered Scribes
A Multisite Study

Lisa S. Rotenstein, MD, MBA, MSc; A. Jay Holmgren, PhD; Robert Thombley, BS; Aditi Sriram, MPH; Reema H. Dbouk, MD; Melissa Jost, MS; Debbie Aizenberg, MD, MBA; Scott MacDonald, MD; Naga Kanaparthy, MD, MPH; Brian Williams, MD; Allen Hsiao, MD; Lee Schwamm, MD; Sara Murray, MD, MAS; Maria Byron, MD; Jacqueline G. You, MD, MBI; Amanda J. Centi, PhD; Christine Iannaccone, MPH; Michelle Frits, BS; Adam B. Landman, MD; Karandeep Singh, MD, MMSc; Ming Tai-Seale, PhD, MPH; Jie Cao, PhD; Katharine Lawrence, MD, MPH; Devin Mann, MD, MS; Christopher Holland, MBA; Bryan Blanchette, BS; Jesse Ehrenfeld, MD, MPH; Edward R. Melnick, MD, MHS; David W. Bates, MD, MSc; Julia Adler-Milstein, PhD; Rebecca G. Mishuris, MD, MS, MPH

JAMA April 28, 2026 Volume 335, Number 16

Key Points

Question How is adoption of artificial intelligence (AI) scribes associated with changes in electronic health record (EHR) time expenditure and weekly visit volume?

Findings In 5 academic medical centers, AI scribe adoption was associated with decreases in total EHR and documentation time of 13.4 and 16.0 minutes, respectively, and an increase of 0.49 visits per week. Changes associated with AI scribe adoption were greatest for primary care specialists, advanced practice clinicians, female clinicians, and clinicians who used AI scribes in 50% or more of visits.

Meaning These findings indicate initial, moderately beneficial associations of AI scribes with changes in key EHR activity measures and visit volume.

LLMs ✅
Ambient ✅
Agents



Agentic AI

JAMA Health Forum

JAMA Forum | AI in Health Policy

Overseeing Agentic AI in Medicine From First Principles

Joshua M. Sharfstein, MD

The rapid emergence of artificial intelligence (AI) agents in health care, known as *agentic AI*, is outpacing oversight. Developers are designing agents to act autonomously in ordering tests, changing drug regimens, prescribing medications, and even, in concert with robotic advances, performing surgery.[1] But as states set up "regulatory sandboxes" (as Utah did) to permit experimentation with autonomous agentic AI in performing clinical roles, the future of regulation of these powerful technologies is unsettled.

Previsit agent workflow

A simulated internal medicine example

TOMORROW 9:00 AM

M

Maria, age 67

Diabetes
Hypertension
Chronic kidney disease

1

Review chart

Medication list, laboratory results and prior visits

2

Identify care gaps

A1C overdue and colonoscopy follow-up due

3

Check clinical context

Kidney function, pathology report and medication history

4

Prepare drafts

Previsit summary, suggested orders and patient message

PHYSICIAN CHECKPOINT

Review
Modify
Approve or reject

CONFLICT FOUND **Allergy list: none** **Prior note: lisinopril angioedema**

Would you allow the agent to send the message and place the orders automatically?

Agentic AI in Medicine: LLM vs AI Agent

- A **large language model (LLM)** can **write, summarize, answer questions, and generate text**.
- **Agentic AI** is an AI system that can **take actions, make plans, use tools, and complete multi-step tasks with less human prompting**.

Agentic AI in Medicine: LLM vs AI Agent

An **LLM** might help a doctor write a clinic note or answer a medical question.

An **agentic AI system** could:

- Read the chart,
- Check guidelines,
- Draft recommendations,
- Message the care team,
- Schedule follow-up,
- Monitor for new lab results,

All with minimal human prompting.

Agentic AI in Medicine

JAMA Network Open

Original Investigation | Health Informatics

Physician-Reported Safety Outcomes of AI-Generated Hospital Course Summaries

François Grolleau, MD, PhD; April S. Liang, MD; Timothy Keyes, PhD; Stephen P. Ma, MD, PhD; Thomas Lew, MD; Tridu R. Huynh, MD; Natasha Steele, MD, MPH; Philip Chung, MD, MS; Paige Qin, MD; Gowri Chandra, MD; Stephanie F. Wang, MD; Evan Mullen, MD, MSc; Lauren Carpenter, MD; Mita Hoppenfeld, MD; Matthew Morrin, MD; Baffour A. Kyeremateng, MD; Nerissa Ambers, MPH; Nikesh Kotecha, PhD; Emily Alsentzer, PhD; Jason Hom, MD; Nigam H. Shah, MBBS, PhD; Kevin Schulman, MD, MBA; Jonathan H. Chen, MD, PhD

JAMA Network Open.May 8, 2026

Agentic AI in Medicine

DESIGN, SETTING, AND PARTICIPANTS This single-arm prospective pilot quality improvement study encompassed hospital discharges at 1 academic inpatient medicine unit from August 1 to October 11, 2025, with baseline comparisons drawn from April 9 to July 31, 2025.

INTERVENTION A custom agentic LLM workflow using Gemini 2.5 Pro generated draft hospital course summaries nightly using patient history and physical and daily progress notes. Drafts were securely emailed to physicians daily for review and optional use.

JAMA Network Open.May 8, 2026

Agentic AI in Medicine

CONCLUSIONS AND RELEVANCE In this study, an LLM-based agentic workflow produced hospital course summaries that were frequently used with minimal risk of harm identified. The intervention was associated with a reduction in physician burnout, supporting the viability of AI summarization to mitigate documentation burden.

JAMA Network Open.May 8, 2026

Agentic AI in Medicine

These findings suggest that agentic LLM workflows with reasoning models may be integrated into active clinical care with minimal safety risk and may be associated with reduced physician burnout, even when objective time savings are modest.

JAMA Network Open.May 8, 2026

Agent built on the LLM Gemini

AMIE: Articulate Medical Intelligence Explorer



nature medicine

Article

https://doi.org/10.1038/s41591-025-04190-9

A large language model for complex cardiology care

Received: 15 October 2024

Accepted: 11 December 2025

Published online: 06 February 2026

A list of authors and their affiliations appears at the end of the paper

The scarcity of subspecialist medical expertise poses a considerable challenge for healthcare delivery. This issue is particularly acute in cardiology,

Jack O Sullivan Nat Med. 2026 Feb;32(2):616-623.

Nine participating general cardiologists were provided with access to both clinical text reports and raw diagnostic data—including electrocardiograms, echocardiograms, cardiac magnetic resonance imaging scans and cardiopulmonary exercise testing—and were randomized to manage these cases, either with or without assistance from AMIE.





AI agents

- **AMIE-assisted cardiology assessments were better 46.7% of the time.**
- **Cardiologists alone had more clinically significant errors (24.3% versus 13.1%, *P* = 0.033) and more missing content (37.4% versus 17.8%, *P* = 0.0021) than cardiologists assisted by AMIE.**



AI agents

Cardiologists who used AMIE reported that AMIE helped their assessment more than half the time (57.0%) and saved time in 50.5%

Testing AI agents in the real world

100 adult patients completed an AMIE text-chat interaction up to 5 days before their appointment.

A prospective trial at Beth Israel Deaconess Medical Center done in the ambulatory primary care clinic

AMIE conducted a text-chat clinical history, then produced:

01 **a clinical summary**

02 **a differential diagnosis**

03 **suggested diagnostic/management considerations**

The **physician remained responsible for the actual clinical care**

Brodeur, The Lancet, 2026 Oct

LLMs ✅
Ambient ✅
Agents ✅

AI and Mortality Reduction

JAMA Network Open

Original Investigation | Health Informatics

Early Warning Scores With and Without Artificial Intelligence

Dana P. Edelson, MD, MS; Matthew M. Churpek, MD, MPH, PhD; Kyle A. Carey, MPH; Zhenqiu Lin, PhD; Chenxi Huang, PhD; Jonathan M. Siner, MD; Jennifer Johnson, MSN, APRN; Harlan M. Krumholz, MD, SM; Deborah J. Rhodes, MD

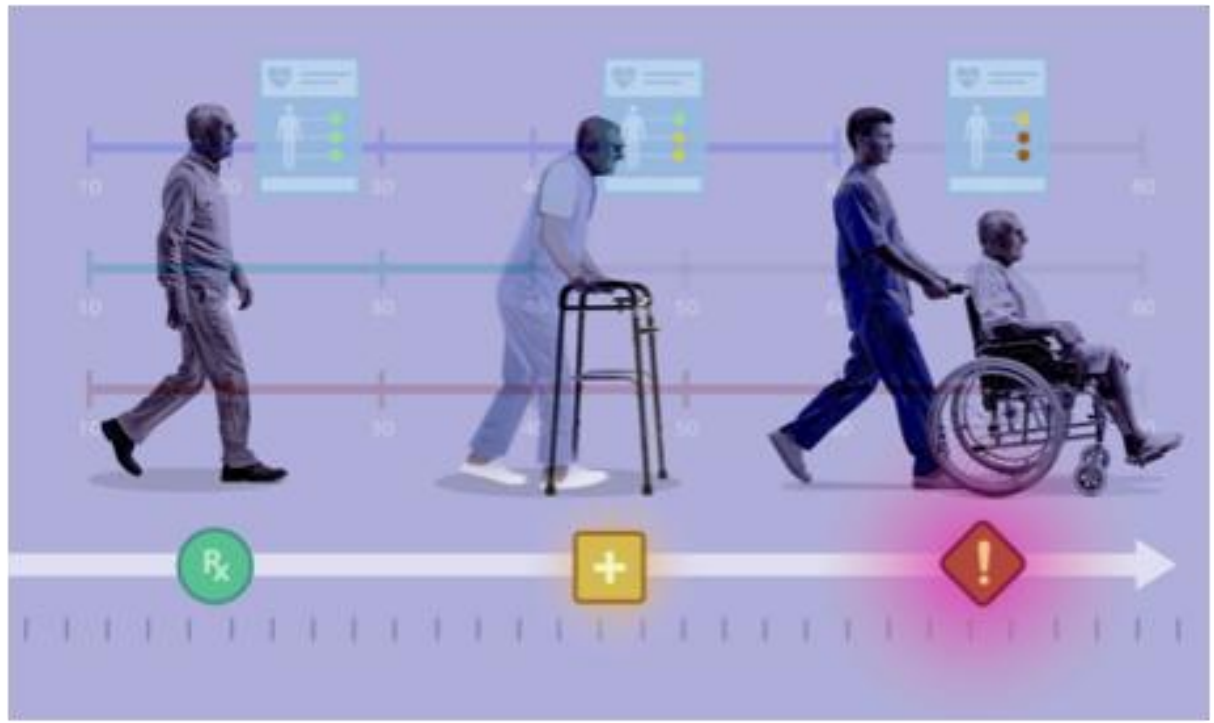
JAMA Network Open. 2024;

NEJM AI

NEJM AI 2026;3(9)
DOI: 10.1056/AIoa2500973

ORIGINAL ARTICLE

Implementation of an AI-Triggered Rapid Response — Association with Mortality



Thomas A. Nahass, M.D, M.S., F.A.M.I.A.,[1,2] Joseph S. Hanna, M.D., Ph.D., F.A.C.S.,[2,3] Nancy Liu, Sc.M.,[4] Nicole Martinez, M.S.N.,[1] Ethan A. Halm, M.D., M.P.H., M.B.A.,[2] Amy Rockman, M.Sc.,[5] Jason Roy, Ph.D.,[4] Christopher Gilligan, M.D.,[3] Amy P. Murtha, M.D.,[2] Vicente Gracias, M.D., F.A.C.S., F.C.C.P., F.C.C.M.,[1,2,5] Ruric (Andy) Anderson, M.D., M.B.A.,[1,6] and Stephen P. O'Mahony, M.D., F.A.C.P.[1,6]

Received: August 26, 2025; Revised: May 12, 2026; Accepted: June 4, 2026; Published: July 29, 2026

AI and Mortality Reduction

BACKGROUND:

- Use of a real- time, machine learning–enabled clinical deterioration prediction model combined with an automated rapid response team (RRT) activation could reduce inpatient mortality.
- The objective was to assess reduction in risk- adjusted inpatient mortality following implementation of the Epic Deterioration Index (EDI) combined with an automated RRT activation in a large regional health system.

Nahaas NEJM AI 2026;3(9)

AI and Mortality Reduction

Methods:

- We evaluated the clinical impact of deploying real-time, targeted

electronic health record (EHR) alerts and RRT push notifications

- primary outcome was risk- adjusted inhospital

mortality.

Nahaas NEJM AI 2026;3(9)

Results

In hospital mortality was lower

2297 [18.6%] vs. 2500 [23.1%]

4.5% absolute difference in mortality rates.

Nahaas NEJM AI 2026;3(9)

Results

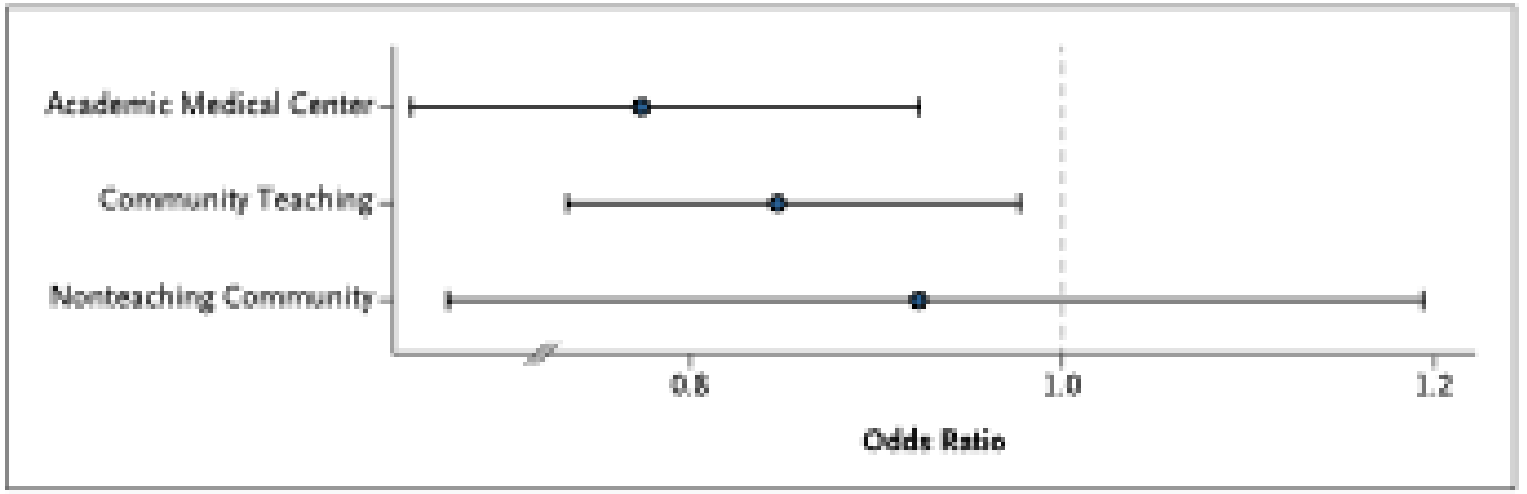


Figure 2. Pre- and Postintervention Inpatient Mortality in High-Risk Patients Aggregated by Hospital Type.

This figure compares the adjusted odds of inpatient mortality across the three hospital types we have in our health system. The inpatient mortality rates for these high-risk patients fell from 21.23% to 17.24% (adjusted odds ratio, 0.77 [95% confidence interval (CI), 0.65 to 0.92]), 28.5% to 25.1% (adjusted odds ratio, 0.85 [95% CI, 0.73 to 0.98]), and 19.90% to 17.70% (adjusted odds ratio, 0.89 [95% CI, 0.67 to 1.19]) for academic medical center, community teaching, and nonteaching community hospital types, respectively.

Nahaas NEJM AI 2026;3(9)

AI and Mortality Reduction

CONCLUSIONS

Implementation of the EDI combined with RRT activation was associated with a reduction in risk-adjusted inpatient mortality across different types of hospitals in a large health system.

FDA 510K clearance, September 18, 2026

- Device: Epic Deterioration Index Version 2.
- Regulatory decision: FDA found it substantially equivalent to a legally marketed predicate device, eCARTv5.
- Algorithm: Static gradient-boosted random forest trained with LightGBM.
- Inputs: 195 EHR-derived variables.
- Intended use: Help clinicians identify adult patients at risk of escalation of care within 24 hours or mortality within 72 hours.
- Validation: Retrospective testing across three U.S. sites, with a reported AUROC of 0.83 for the combined outcome.

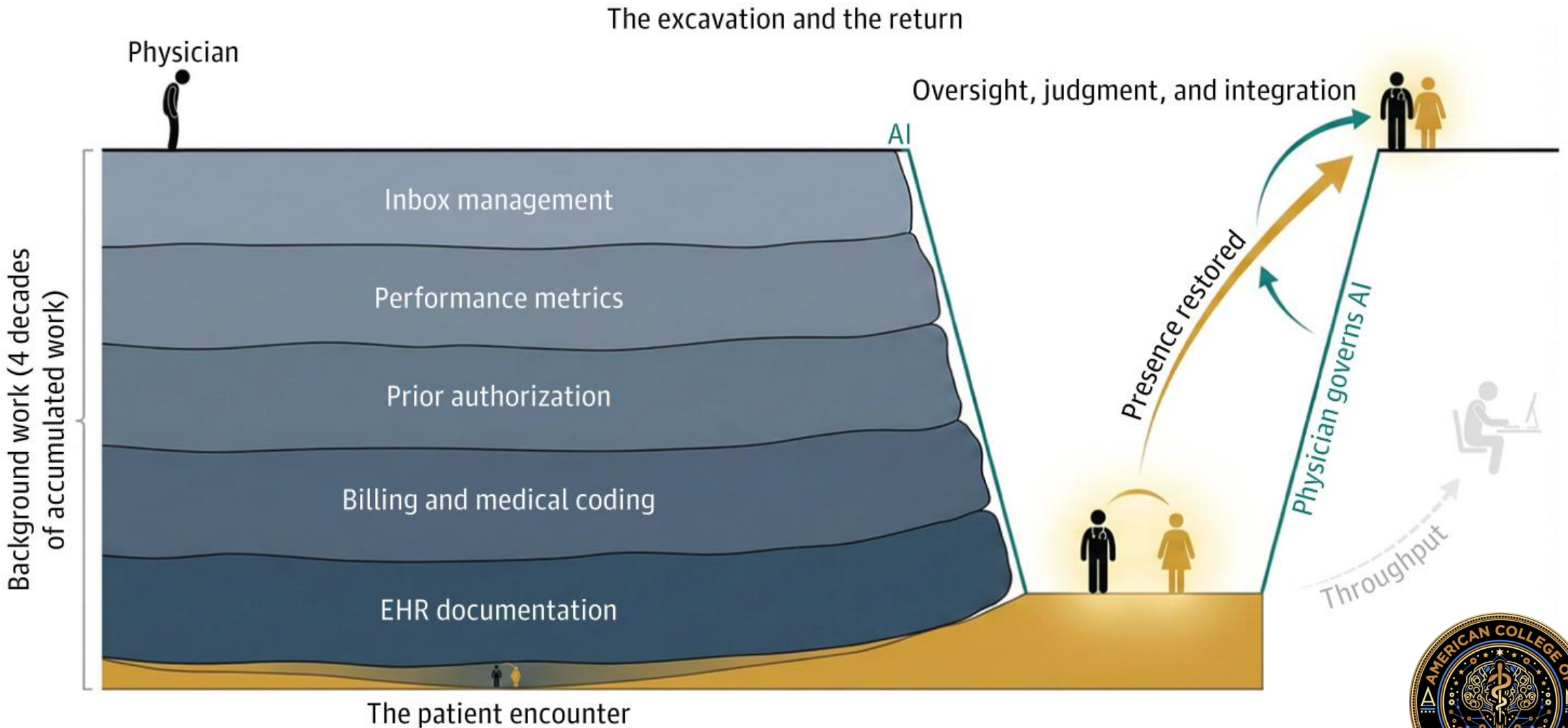
Why you chose Medicine

- **The Doctor-Patient relationship, spending time listening, creating trust and empathy**
- **Being a difference maker for another human being suffering from a medical Illness**
- **Knowing that your knowledge, judgement, and physical presence in the room matters in a profound way**
- **A calling with deep meaning and purpose**

AI IN MEDICINE

Artificial Intelligence Is Not the End of the Physician

Canio Martinelli, MD, MSc; Vincenzo Carnevale, PhD, MSc; Alfredo Ercoli, MD, PhD; Antonio Giordano, MD, PhD



Martinelli, JAMA, May 26, 2026 Volume 335, Number 20



The NEW ENGLAND JOURNAL of MEDICINE

Perspective

SEPTEMBER 17, 2026

Artificial Intelligence and the Future of the Clinical Workforce

Dhruv Khullar, M.D., M.P.P.[1,2]

VIEWPOINT

AI IN MEDICINE

Physician Training for the AI Era
Rethinking a Century-Old Wager

Jesse Burk-Rafel, MD, MRes; Robert M. Wachter, MD

JAMA Published online October 14, 2026

Take Home Points



Take Home Points

- **CNNs use computer vision** to analyze patterns beyond what is visible to the human eye to read X-rays, CT scans, EKG's, Images of the Eye, Mammograms, and Colonoscopy images.
- **Smartwatches** can be used to detect Afib, OSA, HTN
- **LLMs** when used by physicians can improve patient care.
- **Ambient Listening** systems are currently deployed in many U.S. hospital systems reducing administrative burdens.
- **Agentic AI** is the next frontier in Medicine and holds enormous potential for the future.

Final Thoughts

- The release of the large language model ChatGPT in November of 2022 has transformed medicine in ways previously unimaginable by using AI as a tool to solve problems.
- As a physician-scientist, this moment in time is truly magical as life-altering breakthroughs are happening at a pace unheard of in the world of medical research.
- Our goal is to encourage you to learn as much as possible about the intersection of AI and Medicine and to join us on this journey into the future of AI enabled precision medicine and preventive care.


The price of greatness is responsibility.
Winston Churchill
BrainyQuote


DARTMOUTH
Sian Leah Beilock
President
AI AT 70
DARTMOUTH

DARTMOUTH SUMMER RESEARCH PROJECT ON ARTIFICIAL INTELLIGENCE



1956 FIRST AI CONFERENCE

Ways to get involved in our AI for Good Movement?

- Visit our website: join as a member

free for medical students www.americancollegeaim.org

- Apply for our Summer Research Internship Program on our website above (entirely virtual).
- Attend our Chicago McCormick Place AI conference September 10 & 11, 2027 (present AI research poster)
- Listen to the podcast of the American College of AI and Medicine on Apple podcasts or Spotify

Questions

Contact us via email with any questions:

mspeismanmd@americancollegeaim.org

MIRA (Medical Intelligence for Reasoning and Action)

Article

Towards autonomous medical artificial intelligence agents

https://doi.org/10.1038/s41586-026-10675-5

Received: 29 April 2025

Accepted: 18 May 2026

Published online: 17 June 2026

Open access

Dyke Ferber[1,2], Lars Hilgers[2,3], Christiane Höper[2], Benedict Kinny-Köster[4,5], Jan-Niklas Eckardt[2,3], Katharina Egger-Heidrich[3], Marius Bill[3], Martin M. K. Schneider[3], Jan Clusmann[2,3,6,7], Lejla Kadric[8], Marcel Oehme[9], Maximilian Mayrhofer-Schmid[10,11], Alexander Oeser[11], Georg Wölflein[2], Isabella C. Wiest[2,6], Jan Moritz Middeke[2,3], A. John Iafrate[12], Daniel Truhn[13], Dirk Jäger[1] & Jakob Nikolas Kather[1,2,3]✉

CNN Explanation

- The circles represent artificial neurons,mathematical units, and the lines are weighted connections that change during training.

- Across this network, learned responses to edges and intensity differences develop into increasingly complex image patterns that contribute to the prediction.

- Now let’s see the CNN prediction and how Grad-CAM highlights the image regions that influenced it.

What can Humans see on an EKG?



What can Computer Vision (AI) see on an EKG?

Ejection Fraction
Development of AF
Diabetes
Anemia
Hypothyroidism
Chronic Kidney Disease



MIRA

In simulations on real patient cases spanning multiple diagnoses:

outperformed physicians in diagnostic accuracy and made guideline-concordant, medication-safe and appropriate admission decisions.

MIRA

- obtain patient histories;
- order and interpret laboratory, imaging and microbiology tests;
- generate differential diagnoses; and
- formulate treatment plans such as prescribing medications, scheduling surgical procedures and planning admissions.

Agentic AI in Medicine

Digital medicine

The rise of agentic AI teammates in medicine

www.thelancet.com Vol 405 February 8, 2025

Agentic AI in Medicine

- **Currently, separate AI tools exist for tasks** such as transcribing clinic visits, analyzing medical images, and searching clinical guidelines,
- **In the future, an AI agent could orchestrate all these tools** while maintaining an understanding of patient histories and clinic visits.
- Instead of juggling multiple tools, the clinician could interact with a single AI agent.

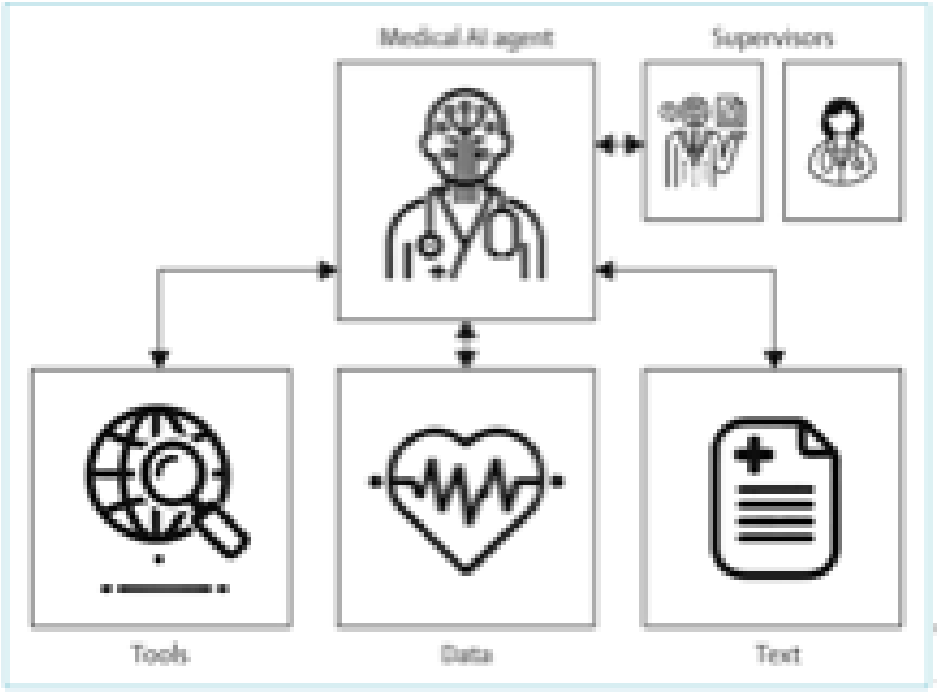
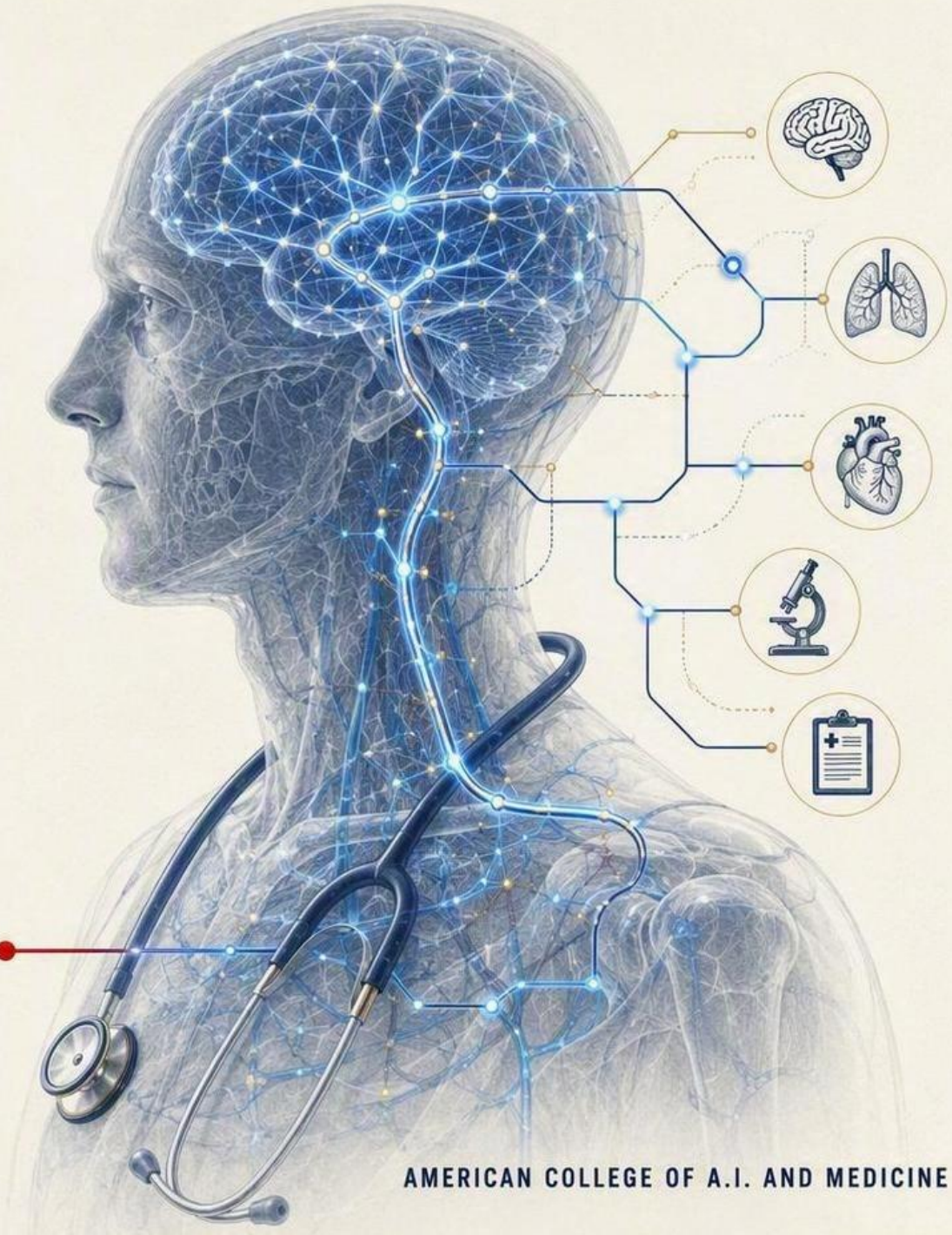


Figure: Medical AI agent orchestrating tools and data while monitored by human clinician and AI reviewer

RESEARCH ARTICLE • MACHINE LEARNING

Performance of a large language model on the reasoning tasks of a physician

Science. 2026 Apr 30;392(6797):524-527.



AMERICAN COLLEGE OF A.I. AND MEDICINE

Ambient Listening System

MAYO CLINIC

MAYO CLINIC PROCEEDINGS:
DIGITAL HEALTH

RESEARCH LETTER

Impact of Ambient Artificial Intelligence Documentation on Cognitive Load

Taina J. Hudson, DO[a], Michael Albrecht, MD[a], Timothy R. Smith, MD[a], Gregory A. Ator, MD[a], Jeffrey A. Thompson, PhD[a], Tina Shah, MD, MPH[b,c], Denton Shanks, DO, MPH[a]



NEJM AI

NEJM AI 2026;3(9)
DOI: 10.1056/AIoa2501034

ORIGINAL ARTICLE

Physician Edits to AI-Drafted Patient Messages and Their Impact on Clinical Workload

Lily Poursoltan, Ph.D.,[1,2] Jie Cao, Ph.D., M.A., M.P.H.,[2] Wei Chen, Ph.D.,[3] Eileen Kim, M.D.,[4] Tejpreet K. Nakai, D.O.,[4] Aaron Boussina, Ph.D.,[2,3] Andrew Chua, M.P.H.,[2] Jeffrey Pan, M.B.A.,[2] Marlene Millen, M.D.,[4] Ming Tai-Seale, Ph.D., M.P.H.,[2,3,6] Christopher A. Longhurst, M.D., M.S.,[2,3] Kevin Zhu, Ph.D.,[1] and Karandeep Singh, M.D., M.M.Sc.[2,3]

Received: September 11, 2025; Revised: July 1, 2026; Accepted: July 14, 2026; Published: August 27, 2026

Ambient Listening Systems

NEJM AI

NEJM AI 2024;1(12)
DOI: 10.1056/AIoa2400659

ORIGINAL ARTICLE

Does AI-Powered Clinical Documentation Enhance Clinician Efficiency? A Longitudinal Study

Tsai-Ling Liu, Ph.D.,[1] Timothy C. Hetherington, M.S.,[1,2] Ajay Dharod, M.D.,[3,4,5,6,7] Tracey Carroll, M.B.A.,[8] Richa Bundy, M.P.H.,[3] Hieu Nguyen, M.S.,[1] Henry E. Bundy, Ph.D.,[1] McKenzie Isreal, M.P.H.,[1] Andrew McWilliams, M.D., M.P.H.,[2,9] and Jeffrey A. Cleveland, M.D.[10]

Received: June 27, 2024; Revised: August 30, 2024; Accepted: September 3, 2024; Published: November 27, 2024

Abstract

BACKGROUND Nuance's Dragon Ambient eXperience (DAX) Copilot is an artificial intelligence (AI)–driven ambient clinical documentation software platform. Atrium Health, a large multisite academic learning health system, was the first to use DAX Copilot. This study evaluates outcomes for participating clinicians after DAX implementation.

Our Patients Are Not Strangers

- Parents
- Spouses
- Children
- Friends
- Colleagues



History Repeats Itself

- Stethoscope
- Anesthesia
- X-rays
- Minimally Invasive Surgery
- Organ Transplant
- Internet
- Acceptance
- Balance



Knowledge is Power

- Stay informed
- Understand the Evidence
- Separate Hype from Difference Making
- Focus on what Improves Patient Care

Behind Every Chart is a Human Being

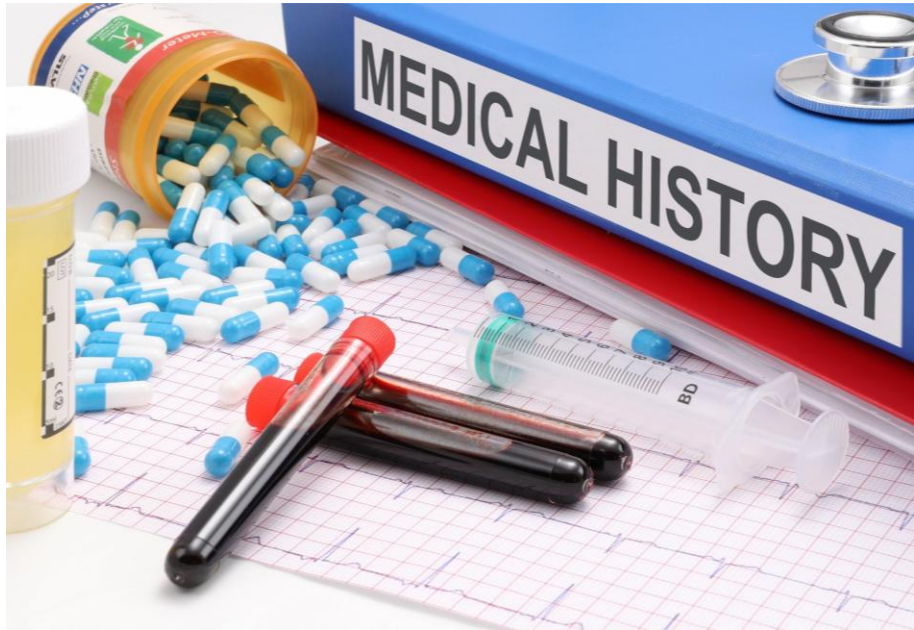
The Promise Of AI Is Powerful



Our Concerns Are Powerful

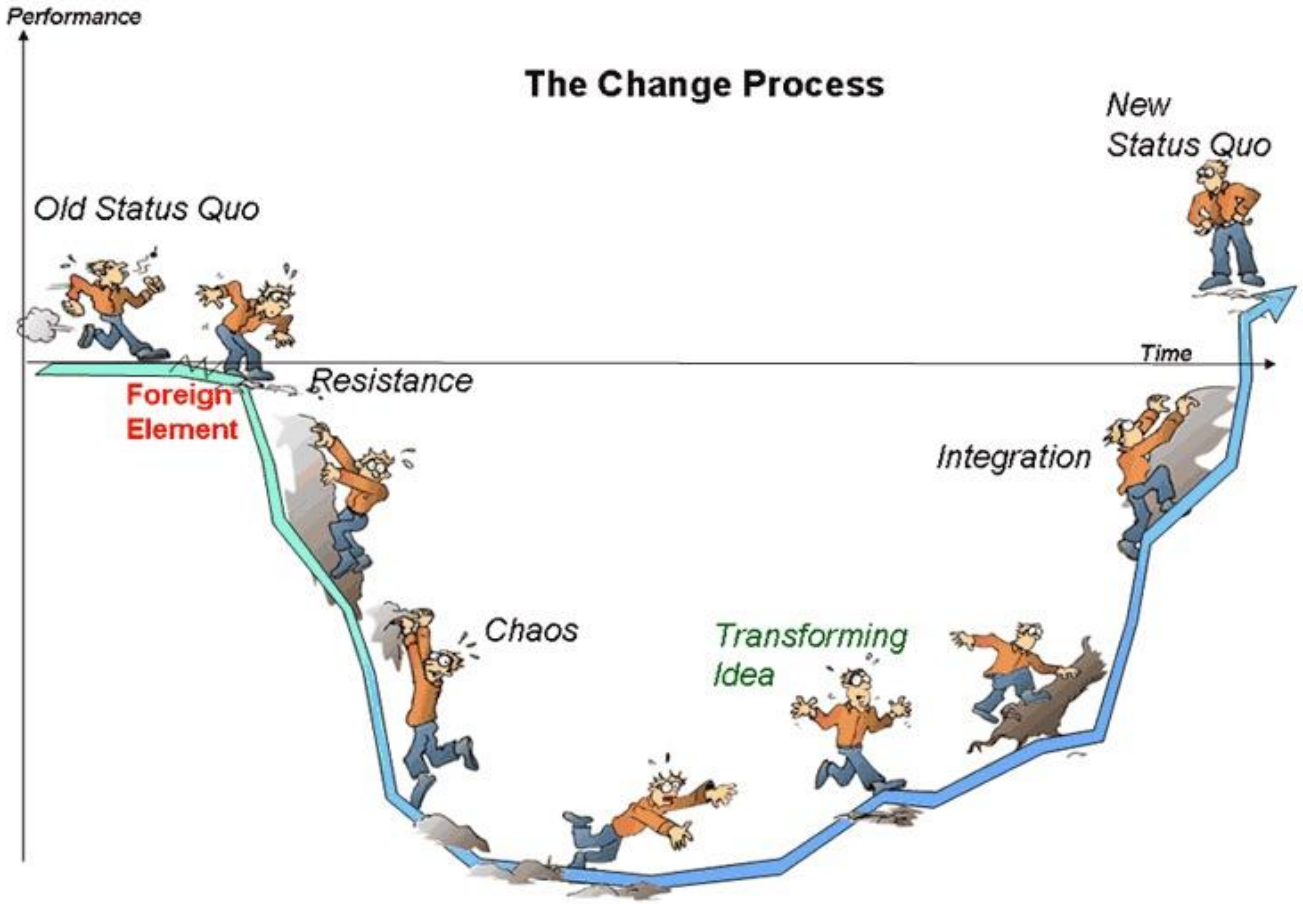


Transformational Moment in Medicine



CHANGE

- Uncertainty
- Skepticism
- Blind acceptance?
- Responsibility
- Education



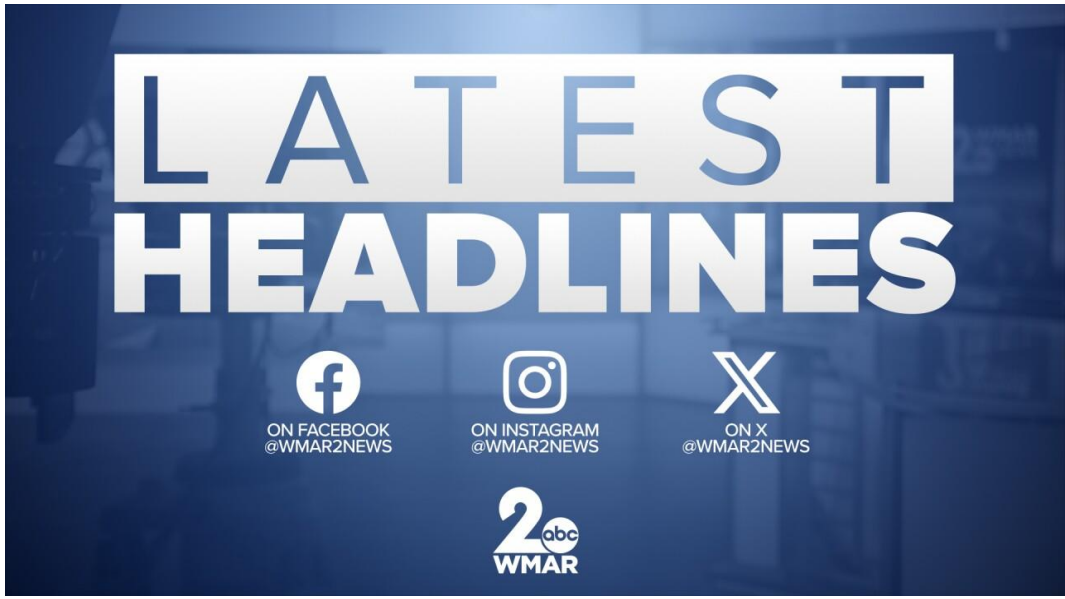
Moving Forward With Responsibility



Cautious Optimism

Beyond The Headlines

- Increased Face-to Face
- Improving workflows
- Earlier Detection
- Expanding Access*
- Clinicians---Care team
- Physician responsibility
- Empower



Knowledge is Power

- Stay informed
- Separate **Headline Hype from Evidence**
- Focus on what Improves Patient Care

Proof-of-concept, INTERNAL VALIDATION

2023

The REDMOD model remains reliable with EXTERNAL VALIDATION

2026

Mukherjee S, et al. Gut 2026

npj Digital Medicine

https://doi.org/10.1038/s41746-026-02960-4

Article in Press

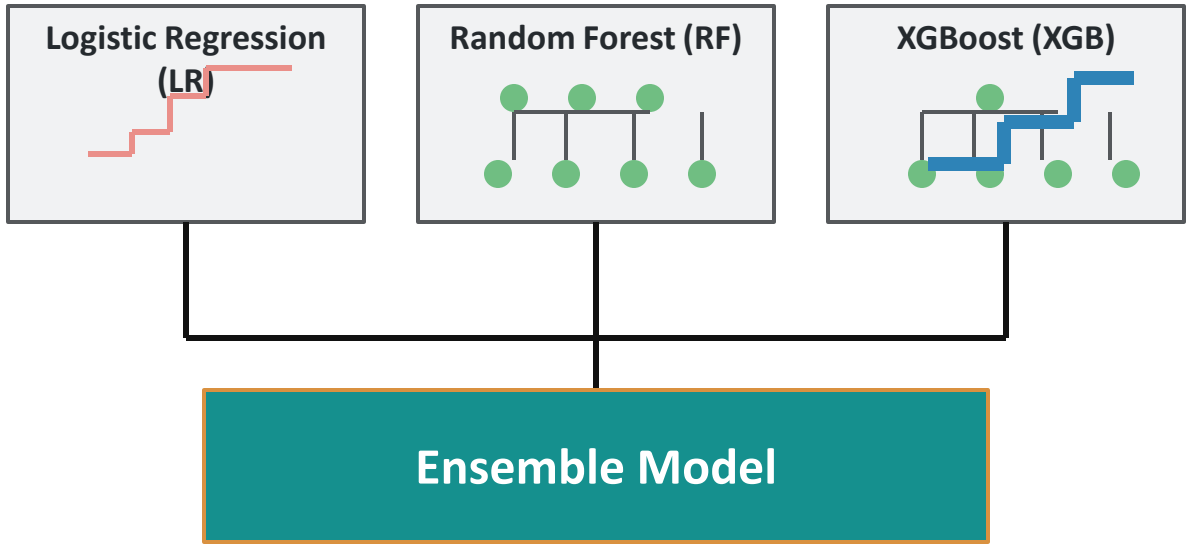
AI agents in clinical practice: an evidence map

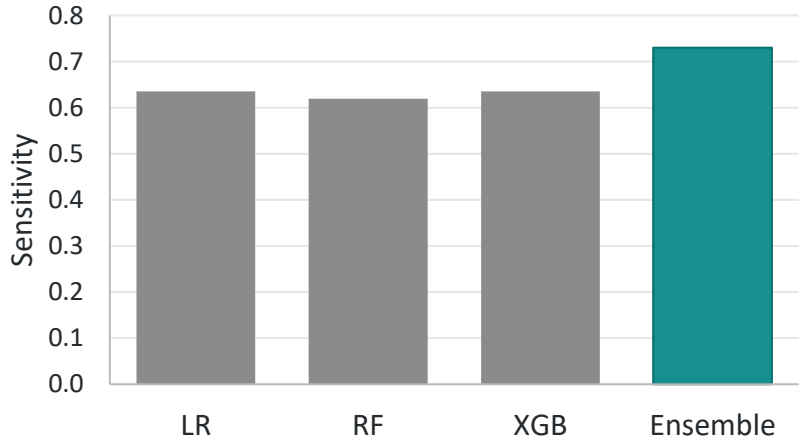
Received: 4 November 2025

Accepted: 25 June 2026

Joy Xu, Justin M. Ko & Joseph C. Kvedar

B. Ensemble outperforms individual models





The ensemble consistently outperformed individual classifiers

Mukherjee S, et al. Gut 2026

Sequence of Trial

Step	Approximate Time
• Enrollment Begins	2021
• Enrollment Completed	2022
• Follow-up for interval cancers	2023-2025
• Statistical analysis	2025
• Peer review & revisions	Late 2025
• Publication in Lancet	January 2026

The Lancet. 2026;407:505-514

ARTICLE IN PRESS

npj Digital Medicine

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Article in Press

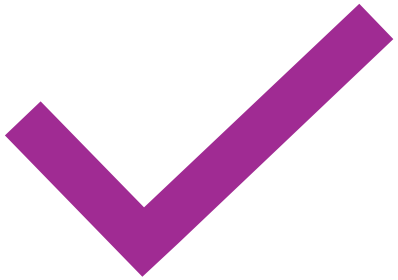
An autonomous AI agent for knowledge and data cooperation in ED clinical decision support

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FUTURE



Need Prospective Workflow Integration



Patient Outcome Evaluations

Morbidity Associated with OSA

- Hypertension
- Heart Failure
- Atrial Fibrillation
- Coronary Artery Disease.
- Type 2 Diabetes

Mood Disorders

Stroke

Chronic Kidney Disease

Pulmonary Hypertension

Dyslipidemia

OSA is a multisystem chronic disease risk amplifier