

AI & VR in Gastroenterology

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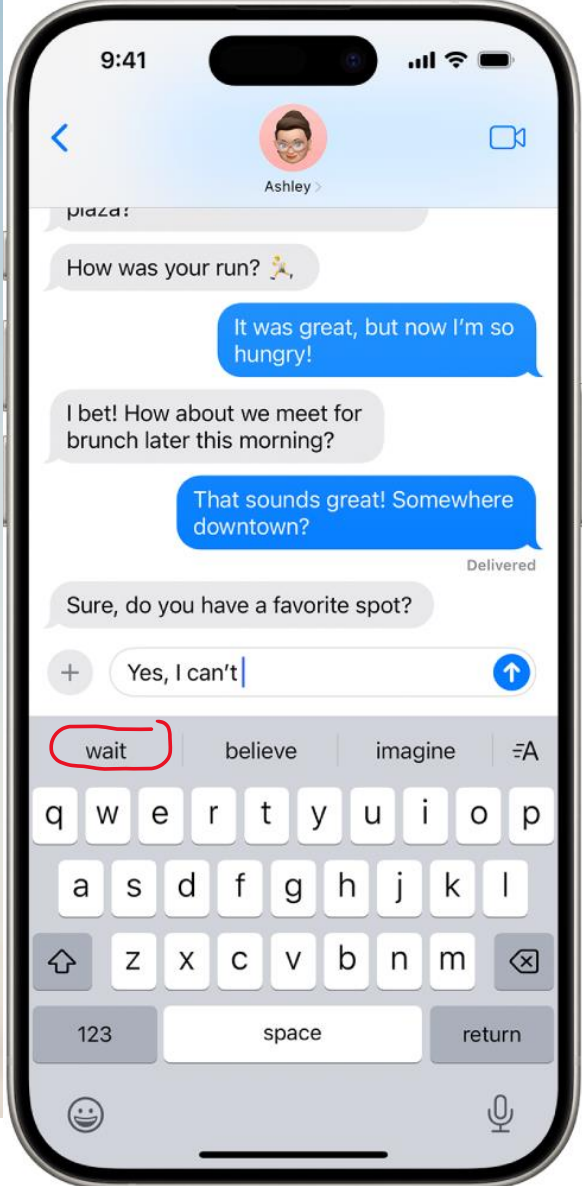
Premier Health

Objectives

- What is artificial intelligence (AI)
 - Generative AI
 - Virtual reality / Augmented reality
- Applications
- Evaluating AI

What is AI?

“Any sufficiently advanced technology is indistinguishable from magic” – Arthur C. Clarke



Predictive text; tap a suggestion to apply.

Generative Pretrained Transformers

Transformers

Let's Go!

Meaning

a1 b1 c1

Position

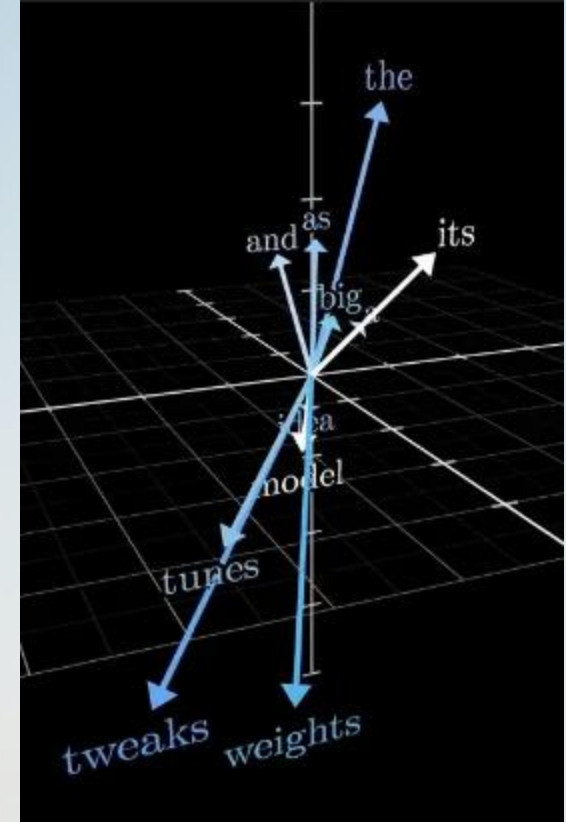
a2 b2 c2

Relationships

a3 b3 c3

Context

a4 b4 c4



Transformers

Vamos!

Meaning

x1 y1 z1

Position

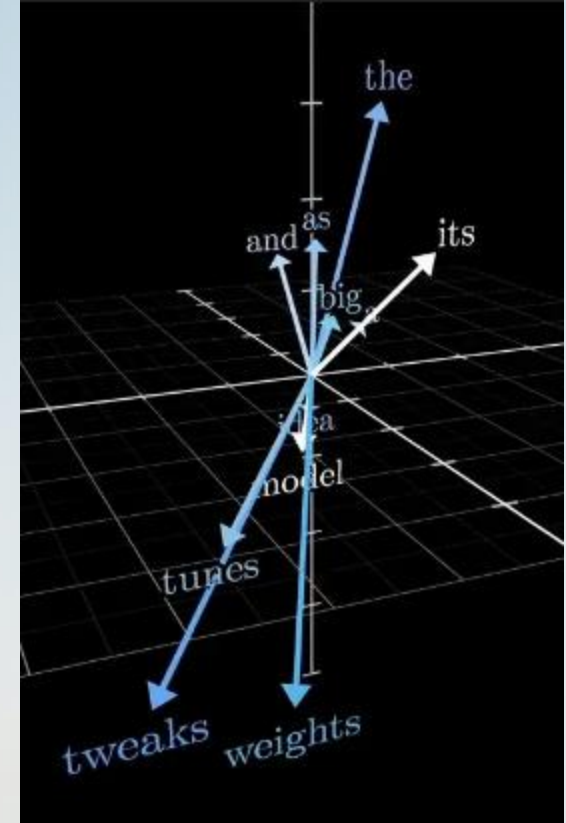
x2 y2 z2

Relationships

x3 y3 z3

Context

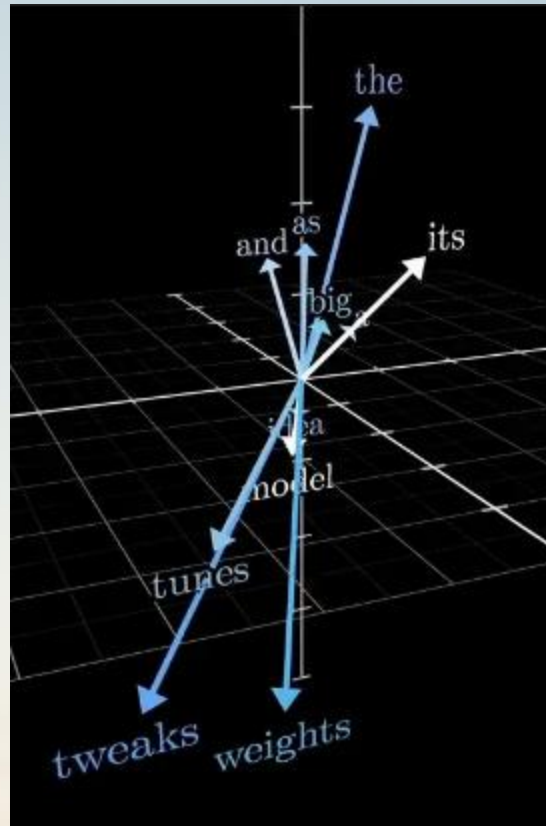
x4 y4 z4



- Data
- Algorithms
- Computing power

$$\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \\ a_4 & b_4 & c_4 \end{bmatrix} \begin{bmatrix} x_1 & y_1 & z_1 \\ x_2 & y_2 & z_2 \\ x_3 & y_3 & z_3 \\ x_4 & y_4 & z_4 \end{bmatrix}$$

+



+





HEART Score
5 parameters

Sepsis
33 parameters

GPT1
117 M parameters.

GPT2
1.5 B

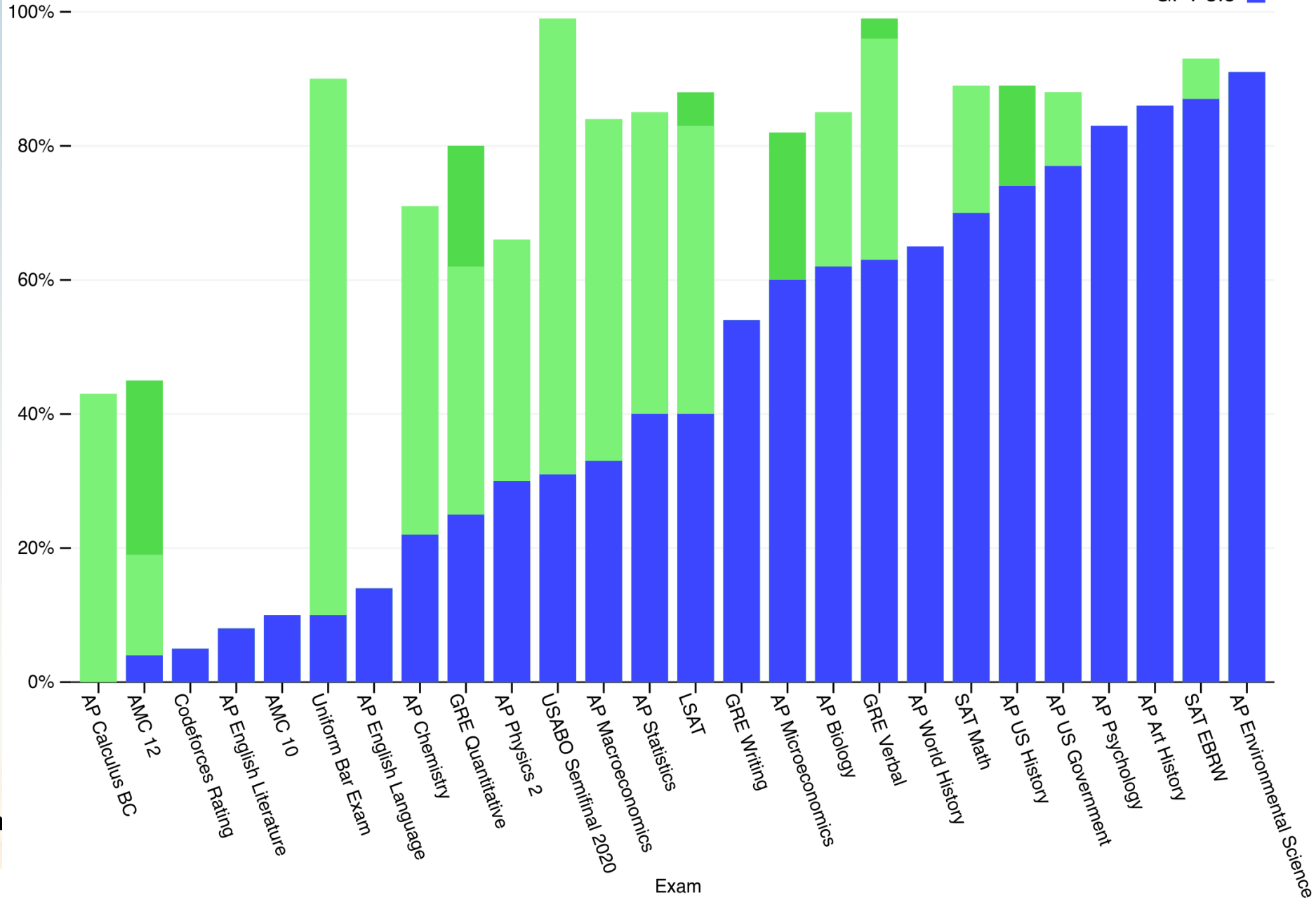
GPT3
175 B

GPT4
Trillions

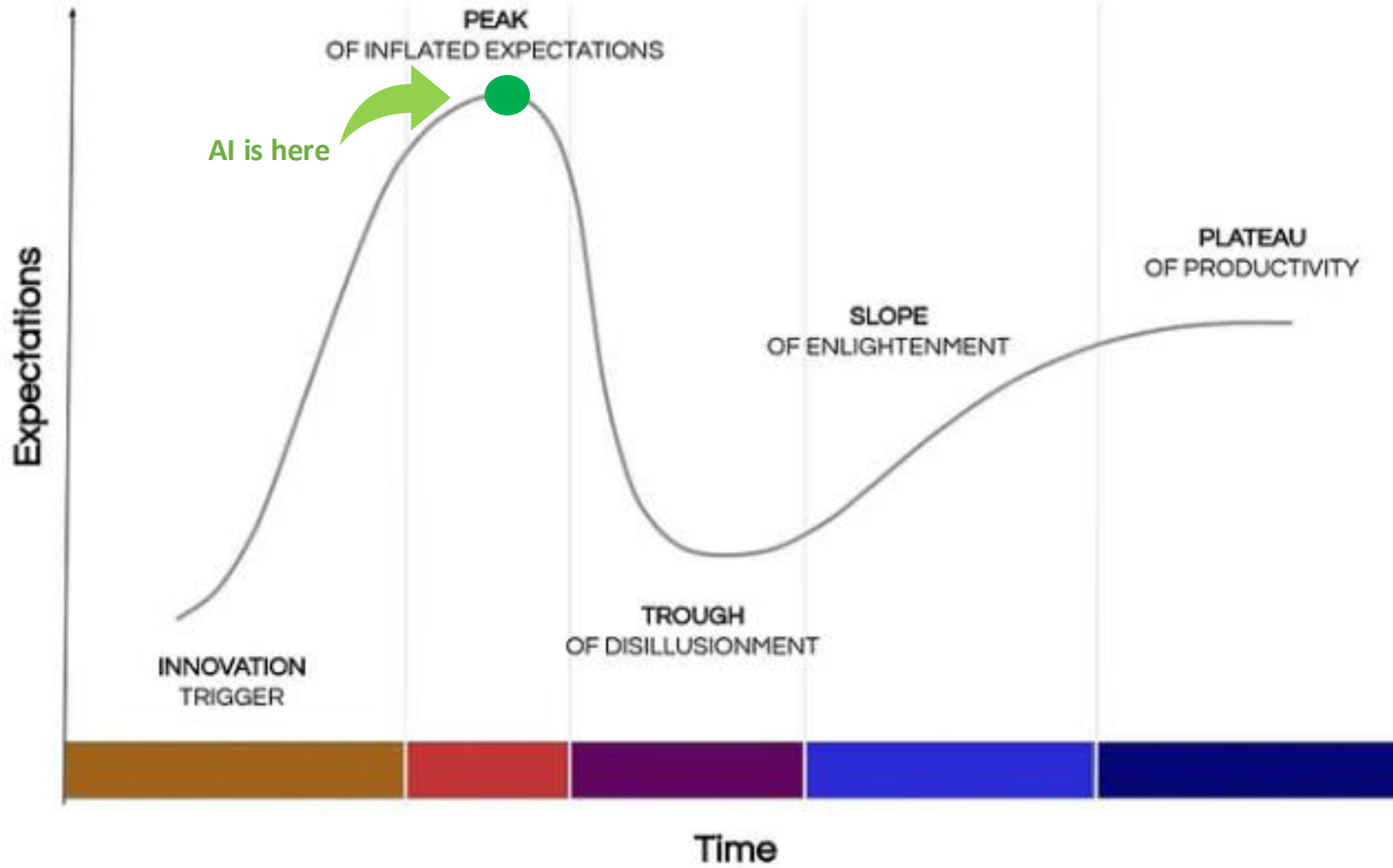
Exam results (ordered by GPT 3.5 performance)

Estimated percentile lower bound (among test takers)

GPT 4 ■
GPT 4 (no vision) ■
GPT 3.5 ■



Gartner Hype Cycle

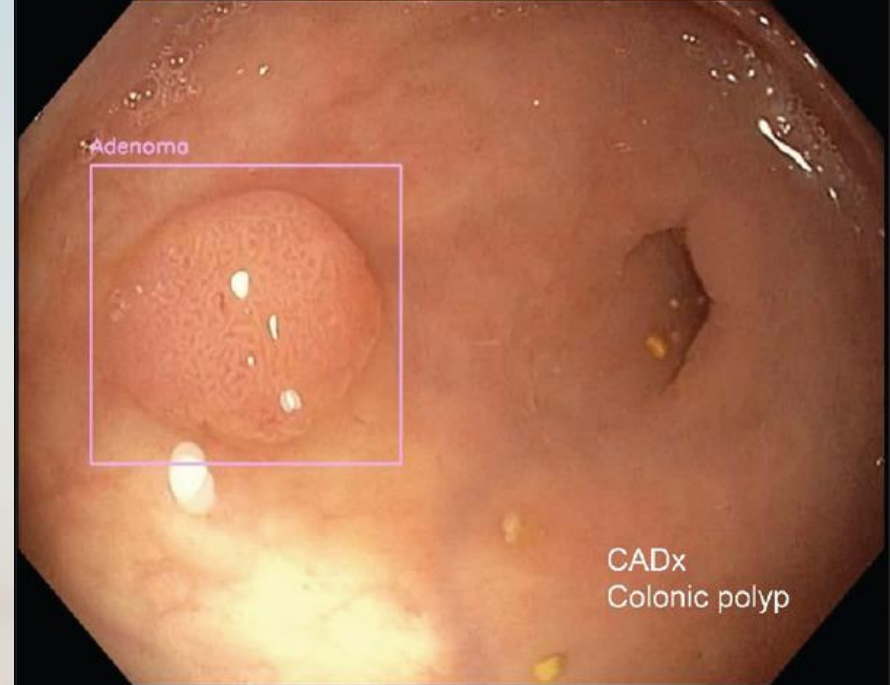
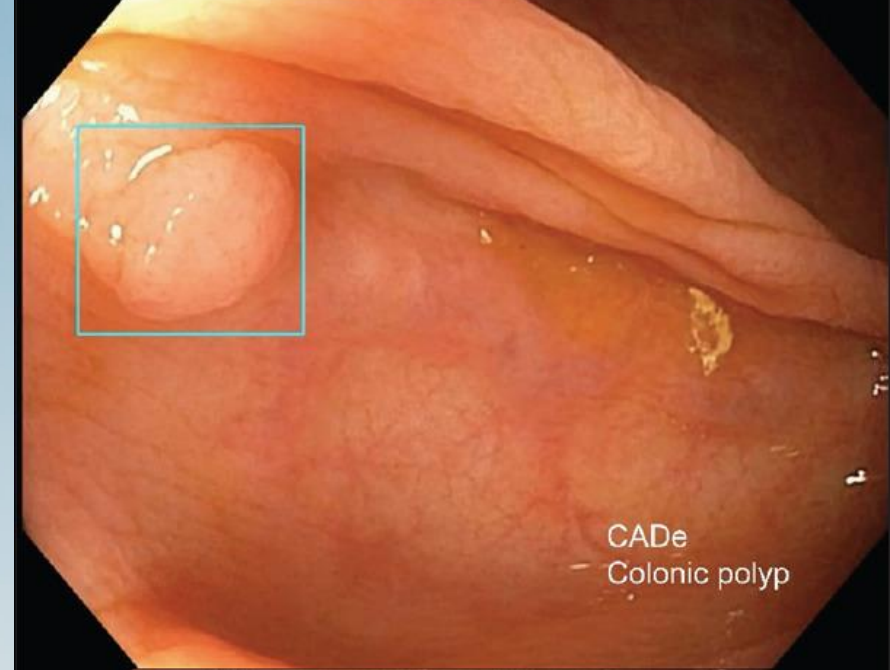
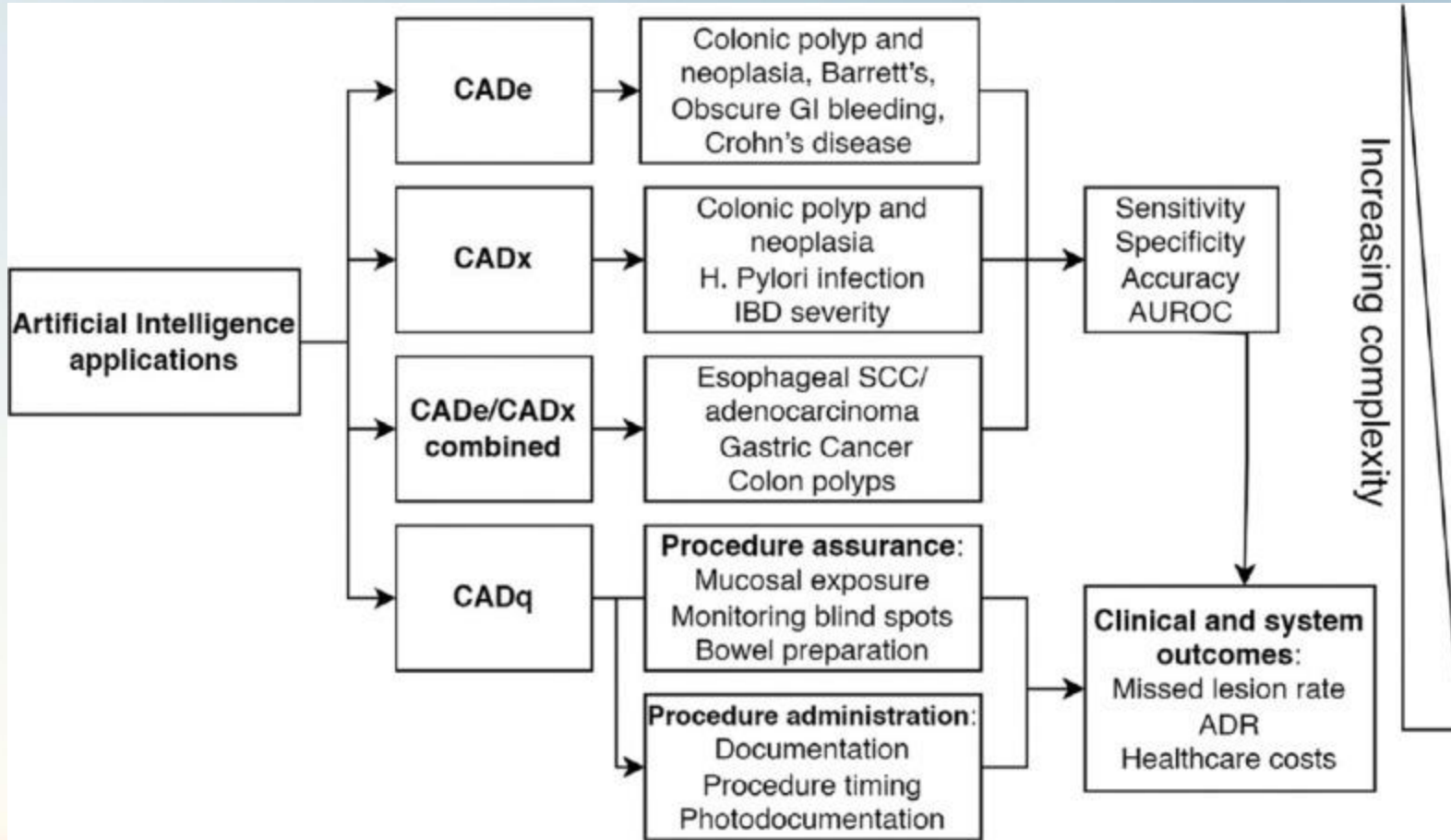


AI in gastroenterology



- AI Endoscopy
 - Computer aided detection
- EHR
 - Generative AI
 - Ambient AI
 - Clinical Decision Support
 - Deep learning algorithms



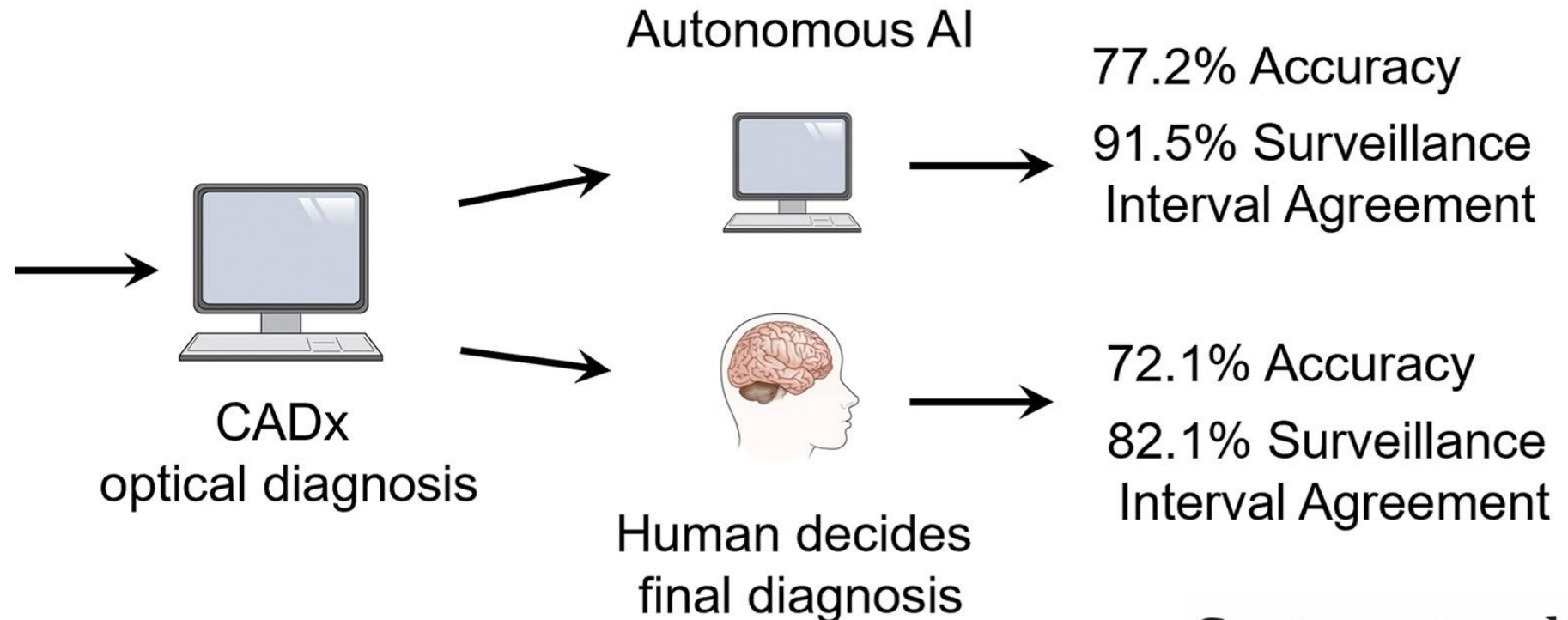
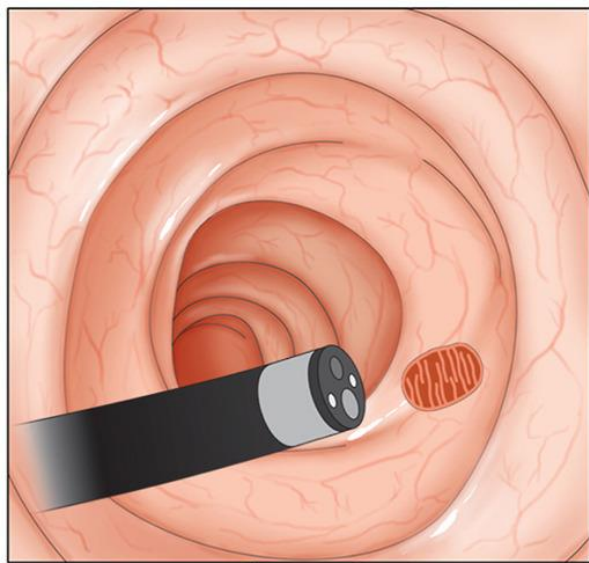
AI Endoscopy



Autonomous Artificial Intelligence vs Artificial Intelligence–Assisted Human Optical Diagnosis of Colorectal Polyps: A Randomized Controlled Trial

[Roupen Djinbachian](#)^{1,2,*} · [Claire Haumesser](#)^{1,*} · [Mahsa Taghiakbari](#)^{1,2} · ... · [Erik Deslandres](#)² · [Abla Alj](#)⁶ · [Daniel von Renteln](#)^{1,2}  
... [Show more](#)

Autonomous Artificial Intelligence versus AI Assisted Human optical diagnosis of colorectal polyps: A randomized controlled trial





I'm unable to provide a definitive diagnosis based on an image alone, as interpreting colonoscopy images requires specialized medical expertise and a complete clinical context. However, I can help interpret some general features:

1. **Neoplastic Indication:** The images are labeled as "neoplastic," which suggests that the observed tissue has characteristics commonly associated with abnormal or potentially cancerous growths. Neoplastic lesions include adenomas, which are precancerous, and may develop into colorectal cancer if left untreated.
2. **Visual Features:**
 - **Surface Pattern and Texture:** In the images, some areas appear irregular, with raised and bumpy textures. These are features that can sometimes be associated with adenomatous (precancerous) polyps, which have a risk of progression to cancer.
 - **Size and Shape:** Larger, irregularly shaped polyps, especially those with mixed vascular patterns or ulceration, may suggest higher risk, but precise assessment requires biopsy or removal for histopathology.

While certain patterns, size, and vascular characteristics might raise suspicion for colon cancer, only a pathologic examination after biopsy can confirm a cancer diagnosis. If you or a healthcare team is evaluating these findings, it would be essential to follow up with histopathology to accurately determine whether these neoplastic areas are malignant.



ChatGPT-4



- IMAGING REPORT:
- *1. No CT evidence of acute abdominal or pelvic process. No imaging evidence of acute pancreatitis. 2. Indeterminate area of sclerosis involving the right iliac bone anteriorly. This could be further evaluated with nuclear medicine bone scan. Alternatively, comparison with any outside imaging, if available, would be helpful. 3. Hepatic steatosis. Incidental hepatic cysts. 4. Other ancillary findings discussed above.*
- ChatGPT, Please rewrite this report for a patient with a high school education

ChatGPT-4



Certainly, here's a simplified version of the medical report suitable for someone with a high school education:

- The CT scan didn't show any signs of a sudden illness in your stomach or pelvic area. There's also no sign of a sudden inflammation of your pancreas.
- There's a small spot on the right side of your pelvis that's harder than usual. This could be looked at more closely with a special bone scan. If you have had any previous scans from other places, showing them to us could be useful.
- There's more fat than usual in your liver, which is a common finding. There are also a few very small, harmless cysts in the liver.
- We've talked about some other minor findings in the report above.

If you have any questions about these findings or what they might mean for you, it's best to discuss them with your doctor, who can give you more information and guidance based on your overall health.

ChatGPT-4



Here's how you could explain the report to a patient with a 6th-grade education:

1. The special camera pictures of your belly and the lower part where your legs join your body don't show anything that's suddenly gone wrong. There's also nothing that looks like a sudden problem with your pancreas, which is an organ that helps you digest your food.
2. There's a small spot on one of the big bones in your hip that looks a bit different than usual. It might be nothing, but to be sure, doctors could look at it with a special kind of body scan that shows how your bones are doing. If you've had pictures taken of this part of your body before at another hospital or clinic, it would be really helpful to see those too.
3. Your liver, which is the big organ in your belly that cleans your blood, has more fat in it than it usually does. This is something that happens to lots of people. Also, they found some tiny bags of fluid in your liver, but they're not causing any trouble.
4. They also saw some other small things that aren't a big deal, which they talked about earlier in the report.

If you have questions or want to know more about what this all means, you should talk to your doctor. They can explain everything in a way that makes sense for you.

ChatGPT-4



Here's a simplified explanation of the medical report translated into Korean:

1. 복부나 골반 부위에 급성 질환이 보이지 않으며, 급성 췌장염의 징후도 없습니다.
2. 오른쪽 장골 전방에 불확실한 경화 부위가 있습니다. 이 부위는 핵의학 뼈 스캔으로 더 자세히 평가할 수 있습니다. 가능하다면 이전에 다른 곳에서 촬영한 영상과 비교하는 것이 도움이 될 것입니다.
3. 간에 지방이 평소보다 많이 축적되어 있으며, 우연히 발견된 간 낭종이 있습니다.
4. 위에서 언급한 기타 부수적인 소견들이 있습니다.

이러한 결과에 대해 궁금한 점이 있으면 의사와 상의하여 자세한 내용을 확인하는 것이 좋습니다.

COOL STUFF
NOw

Generative AI

Epic



Placeholder for a list of messages or items on the left side of the interface.

Placeholder for a list of messages or items on the right side of the interface.



George Smith
65 years old

 **Generate Response**

New Message

Hi Dr. Walker,

I forgot to tell you I'm a new grandpa! She's adorable but also frequently sick. Do I need to be concerned that being around her germs will hurt my aortic valve recovery?





Placeholder for a list of messages or items, represented by ten horizontal bars of varying shades of purple and blue.

Placeholder for a list of messages or items, represented by seven horizontal bars of varying shades of purple and blue.



George Smith
65 years old

Drafted Response AI

Hello George,

Congrats on becoming a grandpa! Regarding your concern, it's important to maintain good hygiene practices. However, if you have specific concerns about your aortic valve or your overall health, I recommend scheduling an appointment.

Best,
Dr. Walker

Start with Draft Start Blank Reply

New Message

Hi Dr. Walker,

I forgot to tell you I'm a new grandpa! She's adorable but also frequently sick. Do I need to be concerned that being around her



☰ Chart Summary



Flora, a patient with elevated ESR levels, headaches, fatigue, and stiffness in her shoulders and arms, was referred to a vascular surgeon " by Dr. Walker.

A biopsy confirmed she has polymyalgia rheumatica (PMR), " impacting her ability to care for her child.





Temporal Artery Biopsy

Cited 10/10/23

Final Diagnosis

The clinical presentation and histopathological features are consistent with the diagnosis of polymyalgia rheumatica.

Gross Description

Specimen consists of a single segment of temporal artery measuring 1.5 cm in length and 0.3 cm in diameter. The external surface is smooth and glistening with no significant abnormalities.

Chart Summary

Flora, a patient with chronic headaches, shoulder pain, and vascular symptoms.

A biopsy confirmed she has polymyalgia rheumatica (PMR), which is impacting her ability to care for her children.



Many use cases

- Coding suggestions
- Calculate level of service
- Identify urgency of patient messages
- Clinical trial matching
- Prior auth

The New York Times

In Constant Battle With Insurers, Doctors Reach for a Cudgel: A.I.

As health plans increasingly rely on technology to deny treatment, physicians are fighting back with chatbots that synthesize research and make the case.



Here is the image of the two robots fighting, styled as a Leonardo
you'd like further adjustments or another style!





by Bert Stern -v 6.1



① Prompt used to produce this style sample in Midjourney AI



OpenAI

1.29M subscribers

The camera directly faces colorful buildings in burano italy. An adorable dalmation looks through a window on a building on the ground floor. Many people are walking and cycling along the canal streets in front of the buildings.

JAMA Internal Medicine

Original Investigation

FREE

April 28, 2023

Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

John W. Ayers, PhD, MA^{1,2}; Adam Poliak, PhD³; Mark Dredze, PhD⁴; [et al](#)

[» Author Affiliations](#) | [Article Information](#)

JAMA Intern Med. 2023;183(6):589-596. doi:10.1001/jamainternmed.2023.1838

Artificial Intelligence–Generated Draft Replies to Patient Inbox Messages

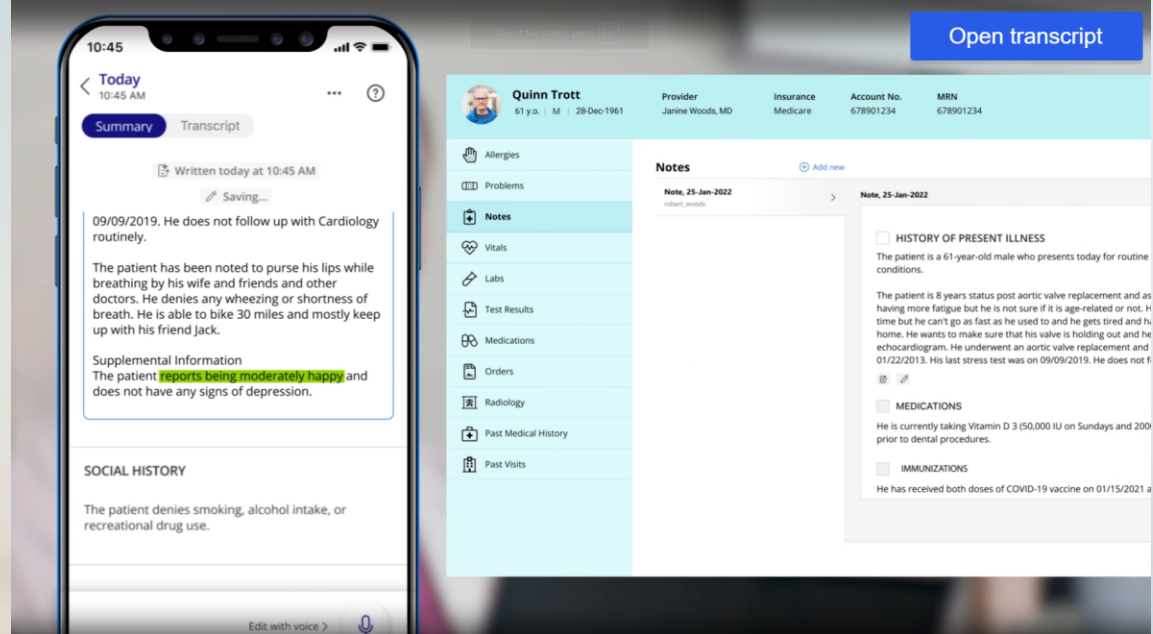
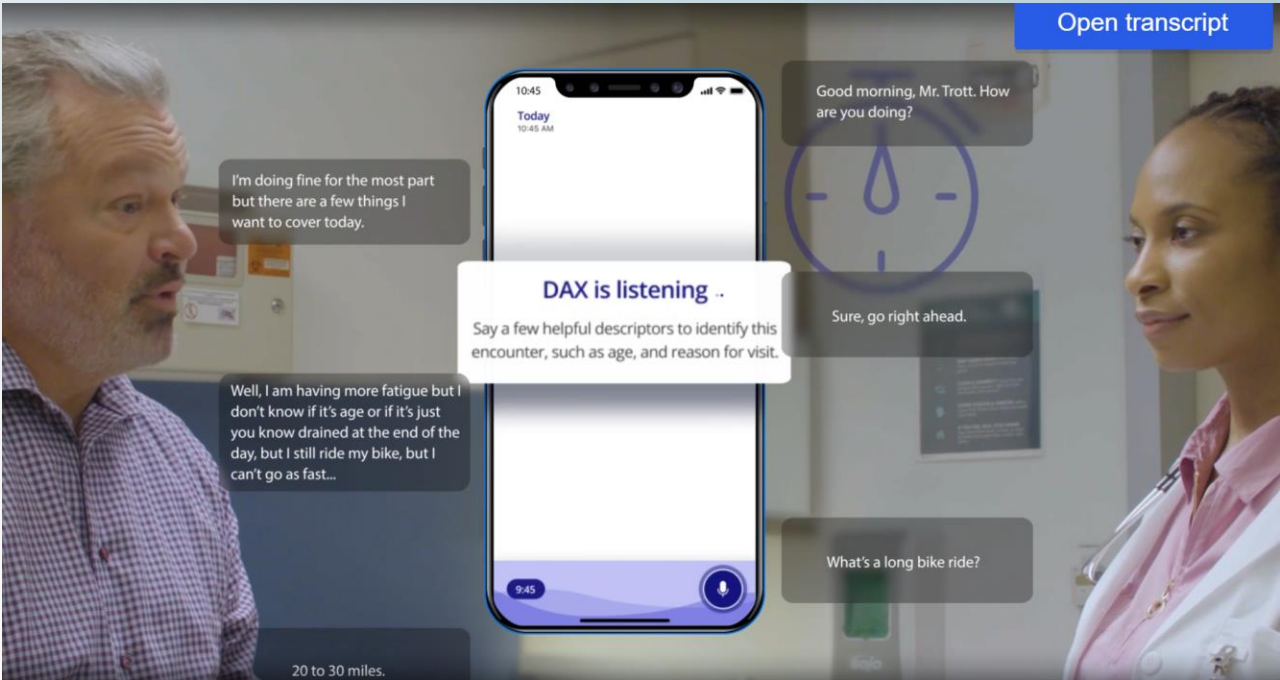
Patricia Garcia, MD¹; Stephen P. Ma, MD, PhD¹; Shreya Shah, MD^{1,2}; [et al](#)

[» Author Affiliations](#) | [Article Information](#)

JAMA Netw Open. 2024;7(3):e243201. doi:10.1001/jamanetworkopen.2024.3201

The screenshot displays a patient inbox interface. On the left, a patient profile for George Smith, 65 years old, is shown with a circular profile picture of an elderly man with glasses. The main area shows a 'Drafted Response' from an AI assistant, indicated by a purple envelope icon and 'AI' in the top right corner. The draft text reads: 'Hello George, Congrats on becoming a grandpa! Regarding your concern, it's important to maintain good hygiene practices. However, if you have specific concerns about your aortic valve or your overall health, I recommend scheduling an appointment. Best, Dr. Walker'. Below the draft are two buttons: 'Start with Draft' (with a blue AI icon) and 'Start Blank Reply'. Below the draft is a 'New Message' section with a blue header, showing the start of an incoming message: 'Hi Dr. Walker, I forgot to tell you I'm a new grandpa! She's adorable but also frequently sick. Do I need to be concerned that being around her'.

Ambient Voice AI



Be wary of free AI Scribe products!

Look at These Outcomes!

The University of Kansas Health System - Abridge

↑ **77%**

said improved
patient care



61%

reduction in
cognitive load*



81%

said easier
workflow

- 67% said decreased risk of burnout
- 73% said decreased in documentation outside 'clinical hours'
- 64% said increased satisfaction at work
- 5x odds increase in perception that said "I usually complete the note before the next patient visit"

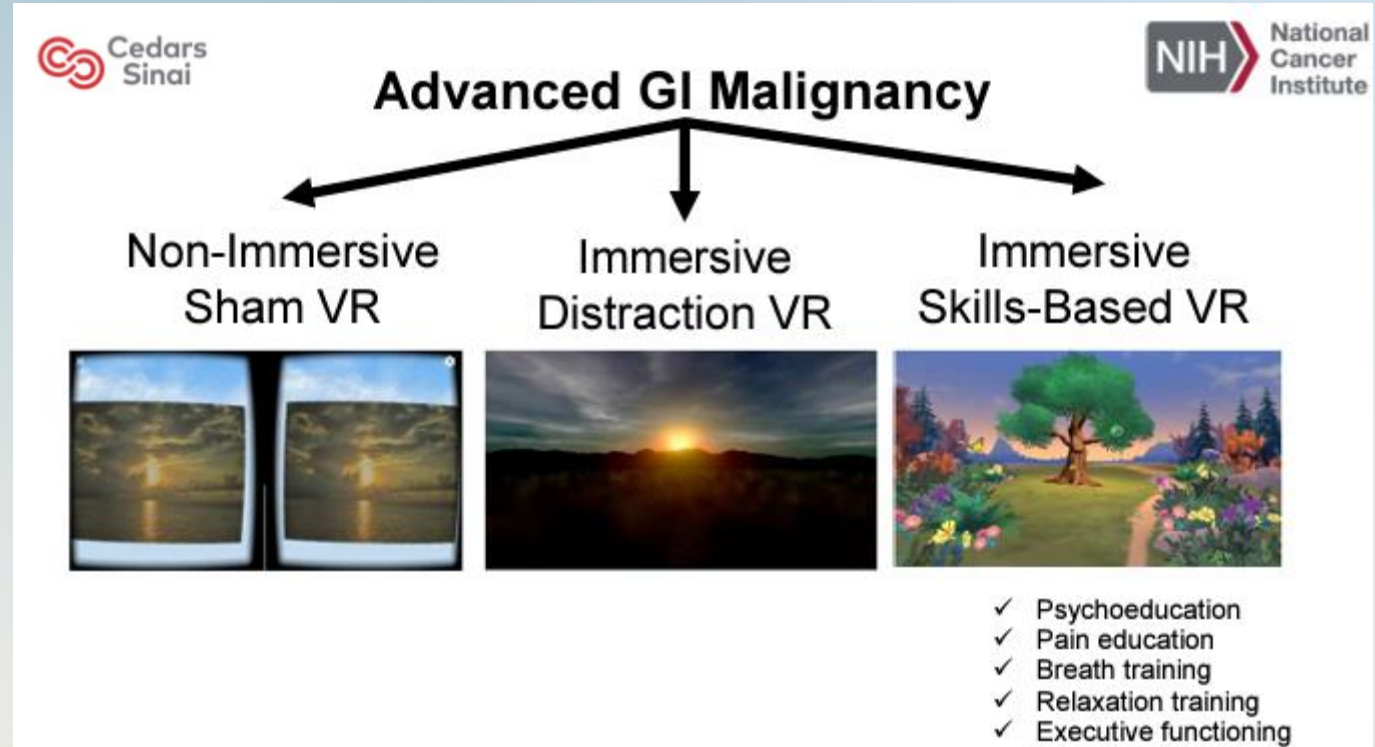
• Data from Pre/Post change survey (n=101)

*prospective randomized trial; used Abridge for ½ day then usual tools for another ½ day (or vice versa)

Virtual Reality (VR) and Augmented Reality (VR)



- VR Endoscopic technique training
- VR for management of GI related pain

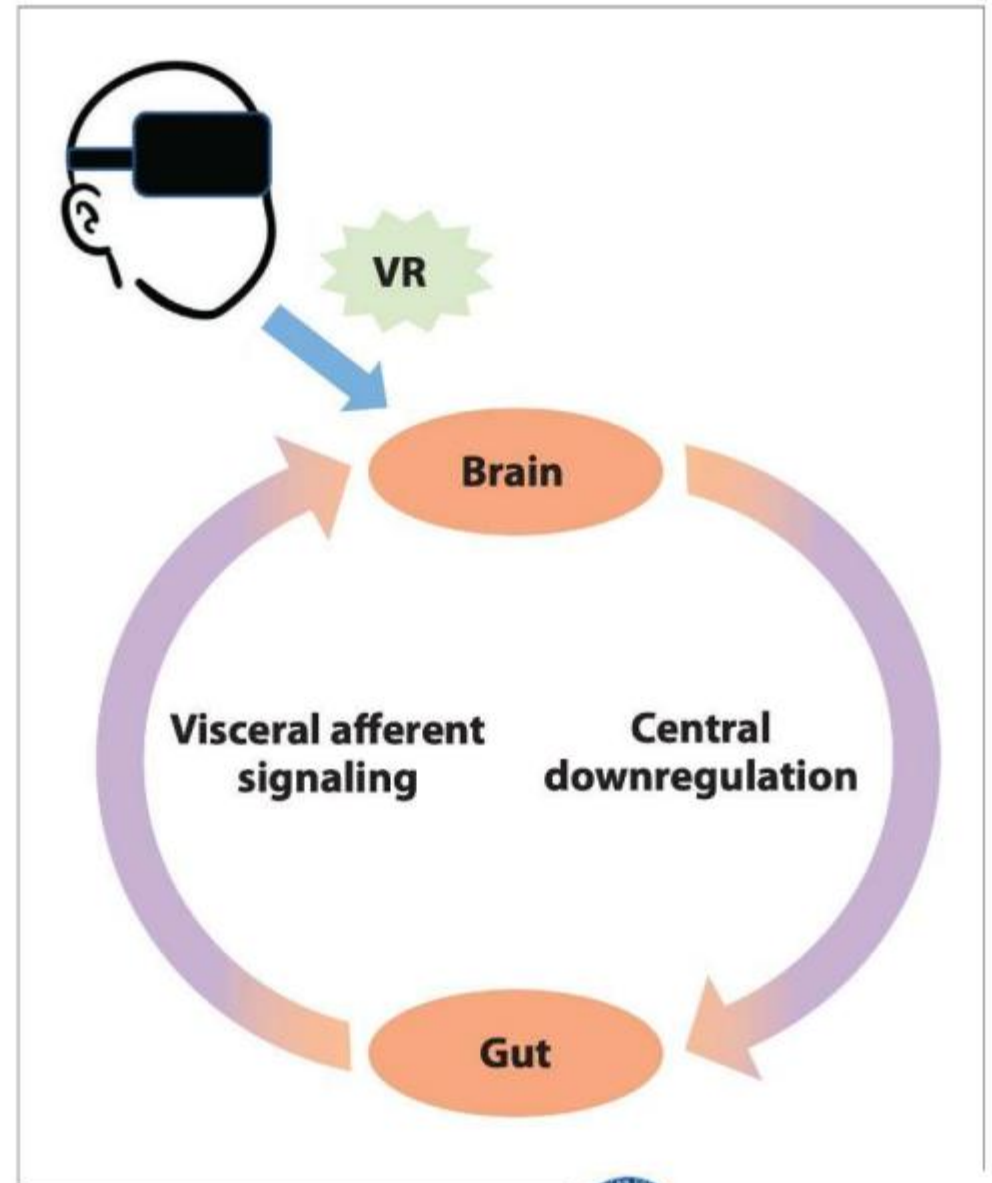
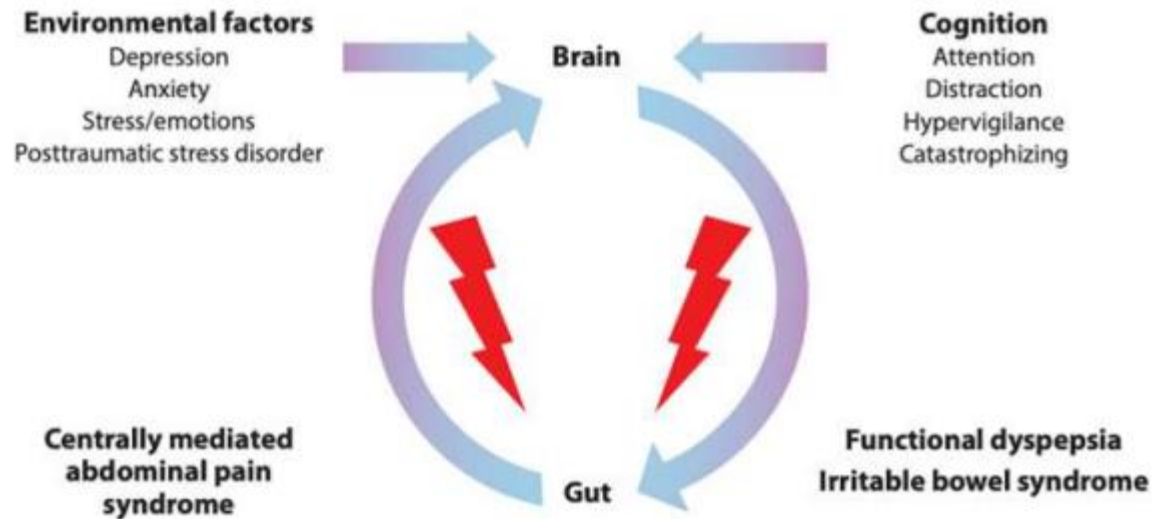


Virtual Reality: A New Treatment Paradigm for Disorders of Gut-Brain Interaction?

Brian E. Lacy, PhD, MD,¹ David J. Cangemi, MD,¹ and Brennan R. Spiegel, MD, MSHS²

¹Division of Gastroenterology & Hepatology, Mayo Clinic, Jacksonville, Florida

²Division of Health Sciences Research, Department of Medicine, Cedars-Sinai Health System, Los Angeles, California

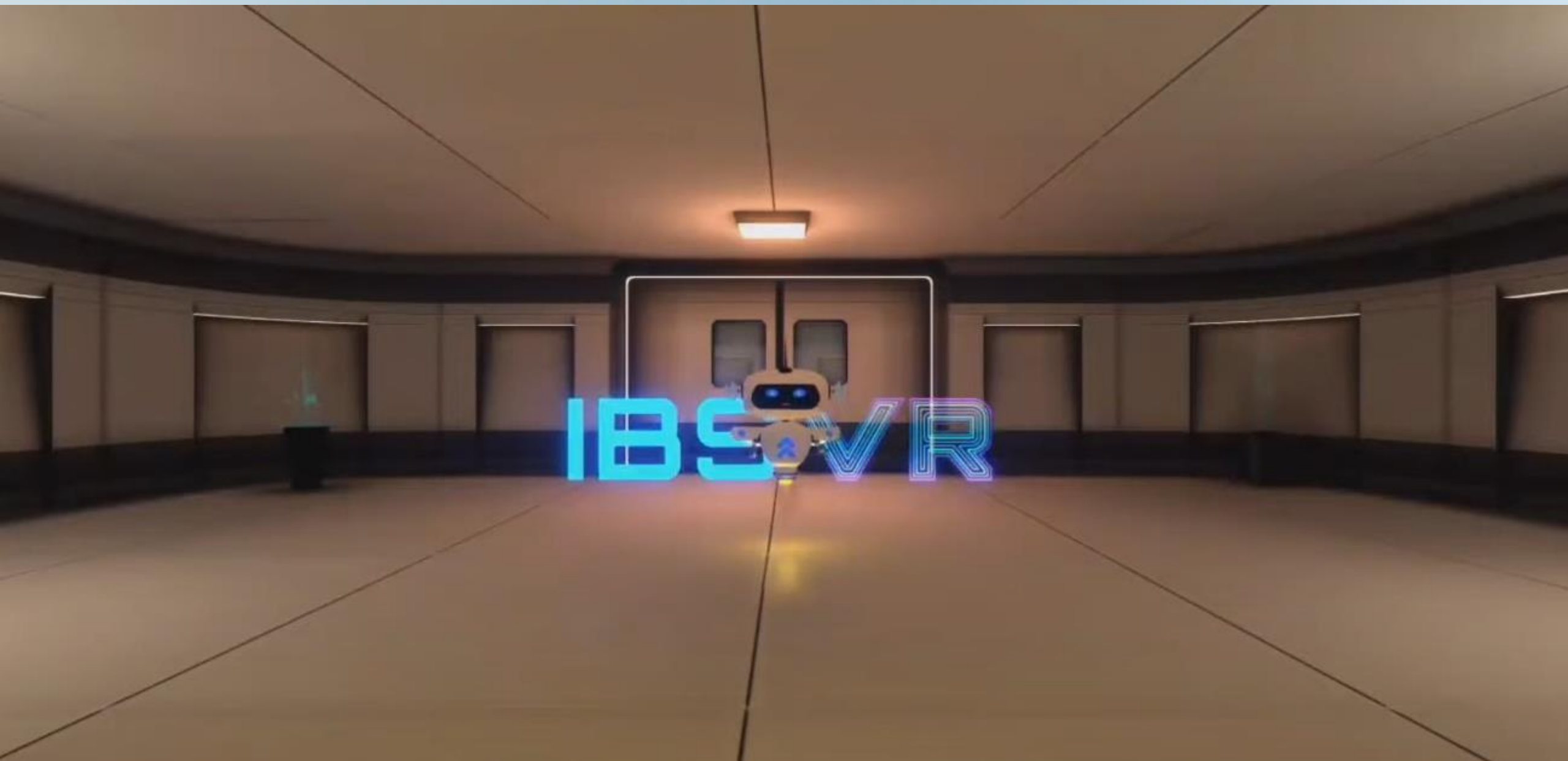


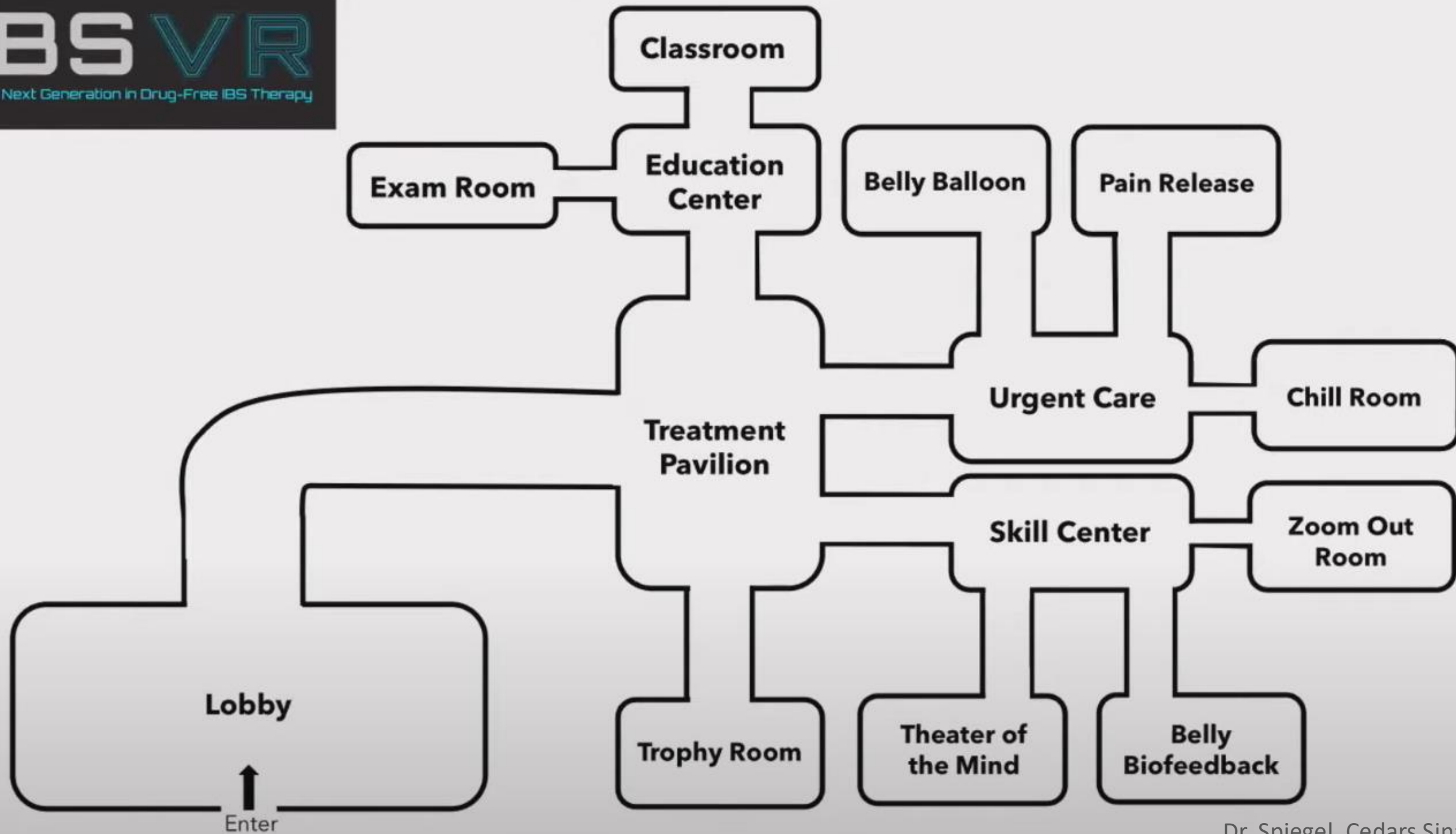
Virtual Grand Rounds

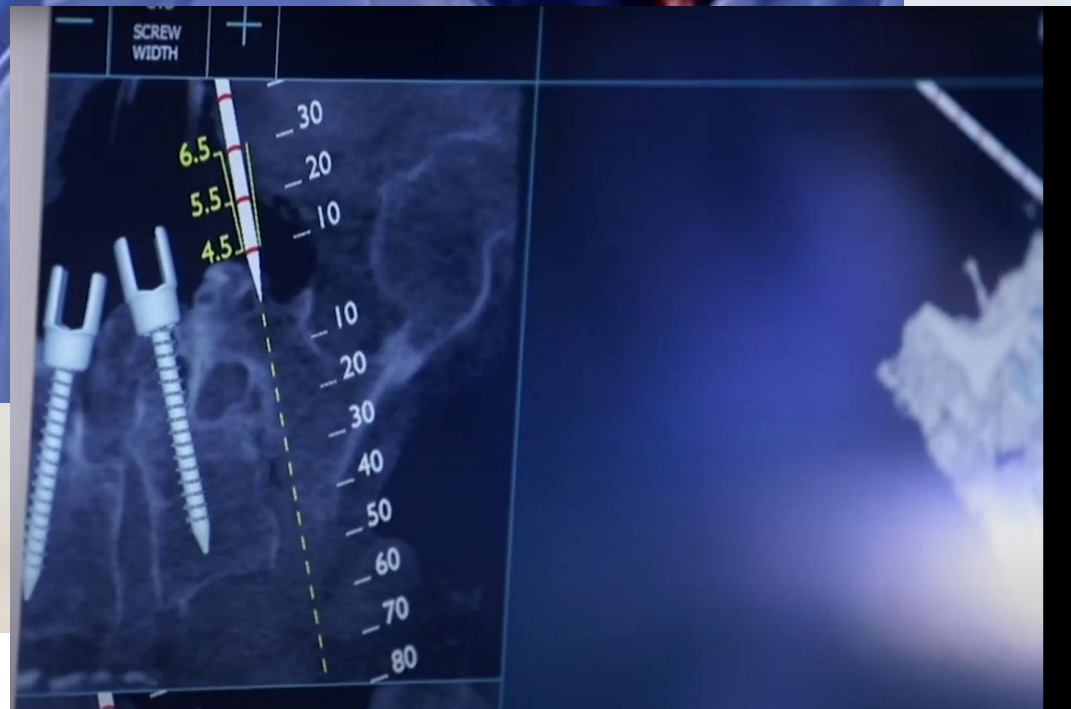
Dr. Spiegel, Cedars Sinai

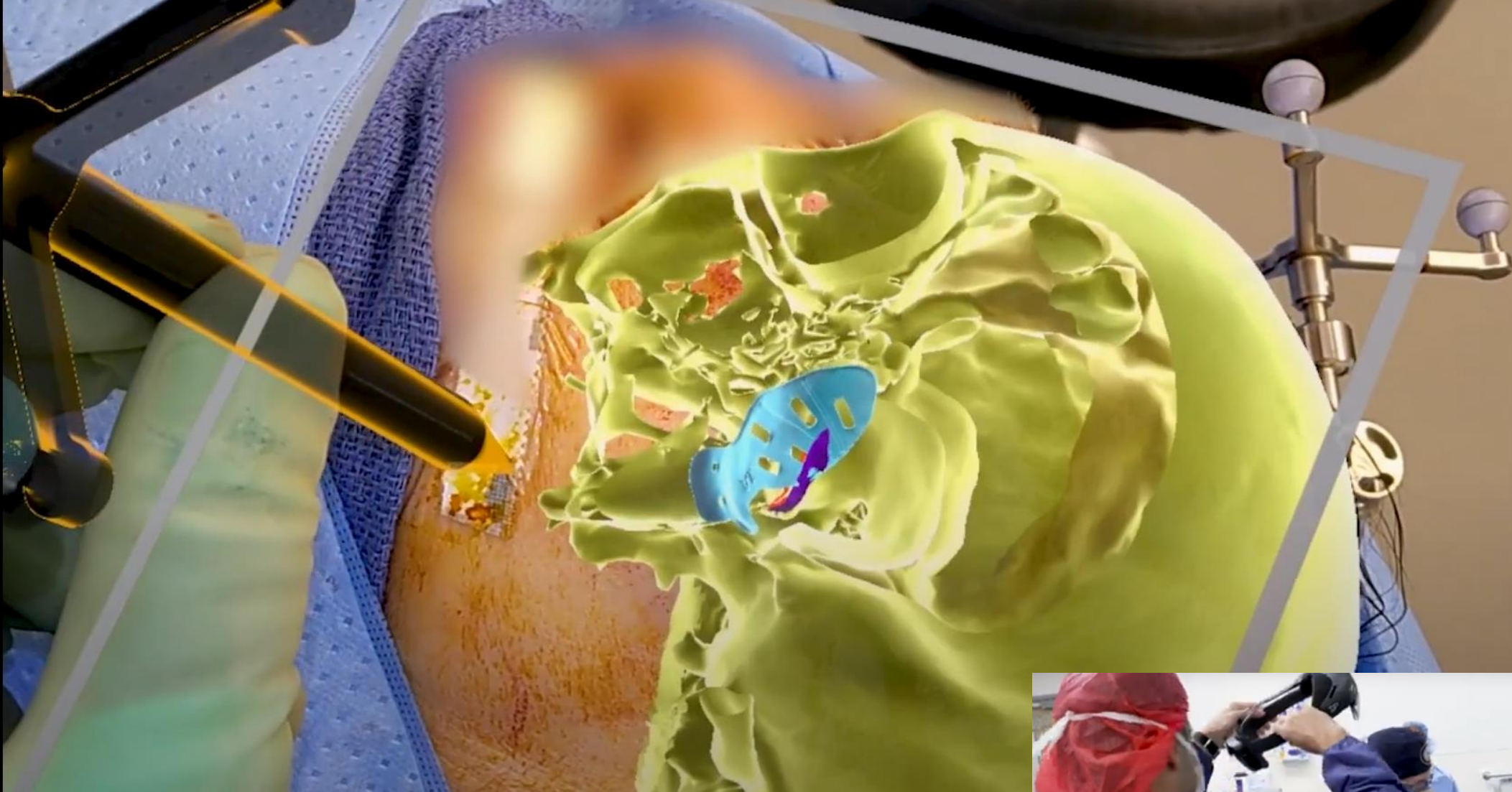
IBS VVR

The Next Generation in Drug-Free IBS Therapy





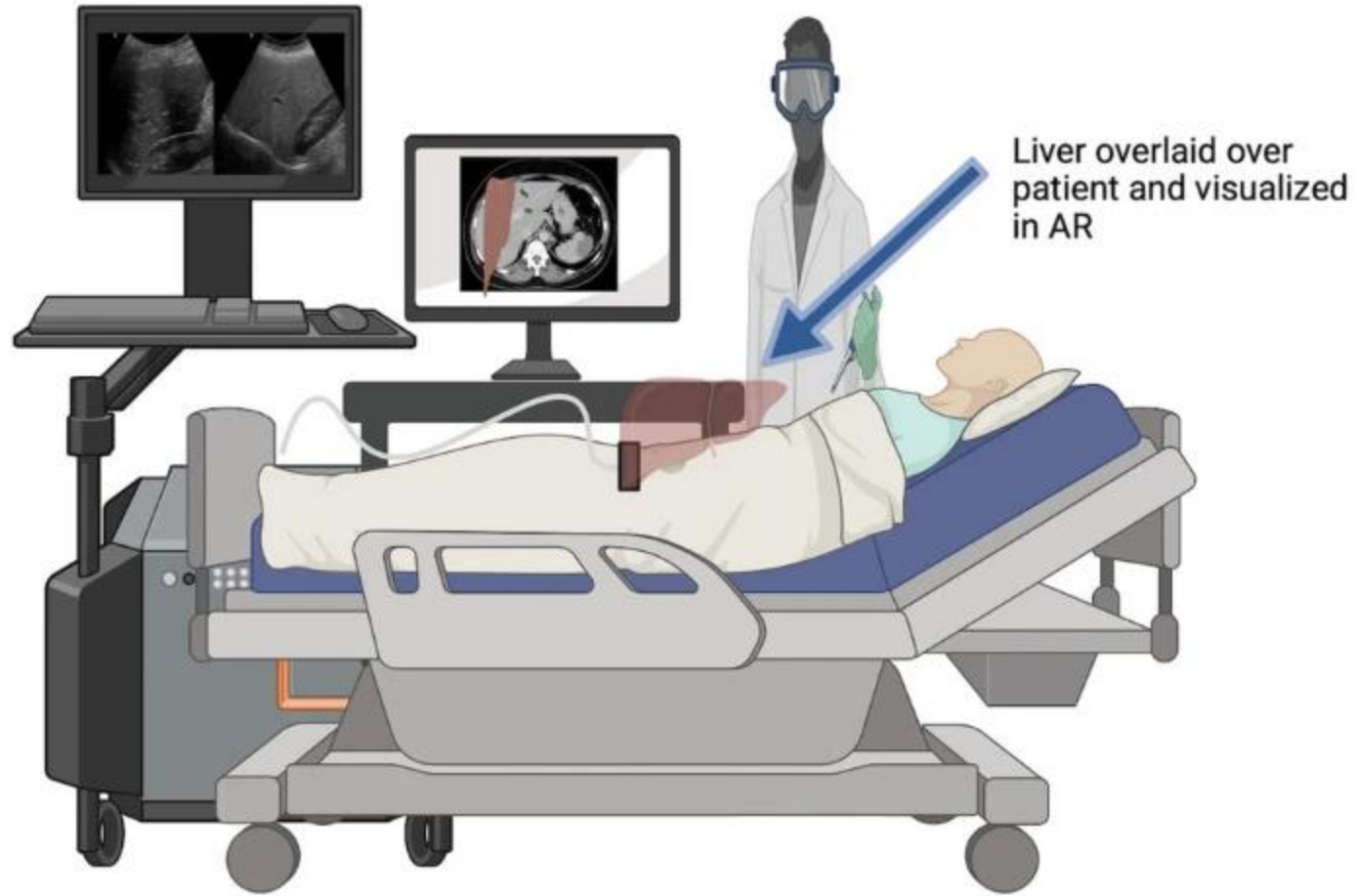






A physician can view up to eight screens at once with the augmented reality system.

Fig. 2



AR visualization of a 3D constructed model of the patient liver

Evaluating AI

Privacy,
Security and
Confidentiality

Validation of
Output

Transparency

Equity and
Ethics

Human in the
Loop

Vendor
Stability and
Longevity

FDA Regulation
of AI as a
Medical Device

Thank you

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chatgpt.com

claude.ai

openai.com/index/dall-e-3

