

The background is an aerial view of a city skyline, likely Austin, Texas, with various skyscrapers and buildings. The image is overlaid with large, semi-transparent blue geometric shapes: a large triangle on the left and top, and several diagonal lines crossing the bottom and right sides. The text is centered in the upper half of the image.

Future of GI: As Seen From the Lens of a Practicing Gastroenterologist

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Chair, South TX Clinical Governing Board, GI Alliance

Physician Executive Board Member, GI Alliance

ACG Governor for Southern TX

Past-President: TSGE

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Disclosures

- Speakers Bureau:
 - Phathom, Red Hill Pharma, Salix, Sanofi / Regeneron

“The best way to predict the future is to create it” – Abraham Lincoln



“Future is hard to predict” – Harish Gagneja

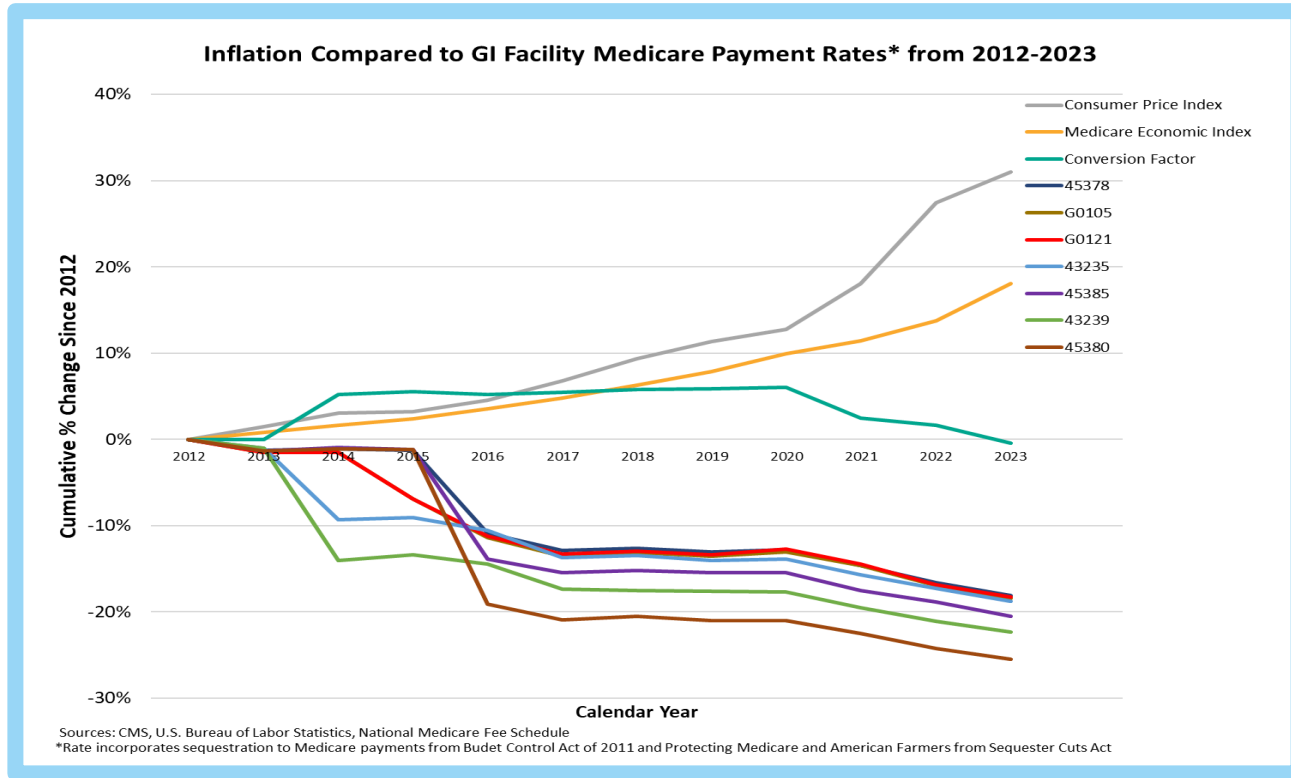
Future of GI: Themes

- Practice related factors
 - Regulations
 - Reimbursement
 - Consolidation
- Technological advances affecting future
 - Advances in the equipment
 - Artificial Intelligence/Machine Learning/Deep Learning
 - Digital health apps/monitoring
 - Cologuard and liquid biopsies
 - Telehealth
- Patient related factors
- Future ancillary services

Future of GI: Practice-Related Issues

- Regulatory environment keeps on getting difficult! Would it change?
- As the health care costs rise, so will the pressure to decrease the reimbursement for our services
 - In 1975, US spent \$800 per patient per year, 8% of the GDP
 - Today, we spend \$11K per patient per year, 19% of the GDP, \$3.5T
- Medicare and Medicaid expansion
- Shift of care to hospital-based care especially for GI, it is predicted that by 2025, hospital-based care will increase from 0.9% to 2.4% of the budget

Future of GI: Reimbursement



Future of GI: Practice-Related Issues

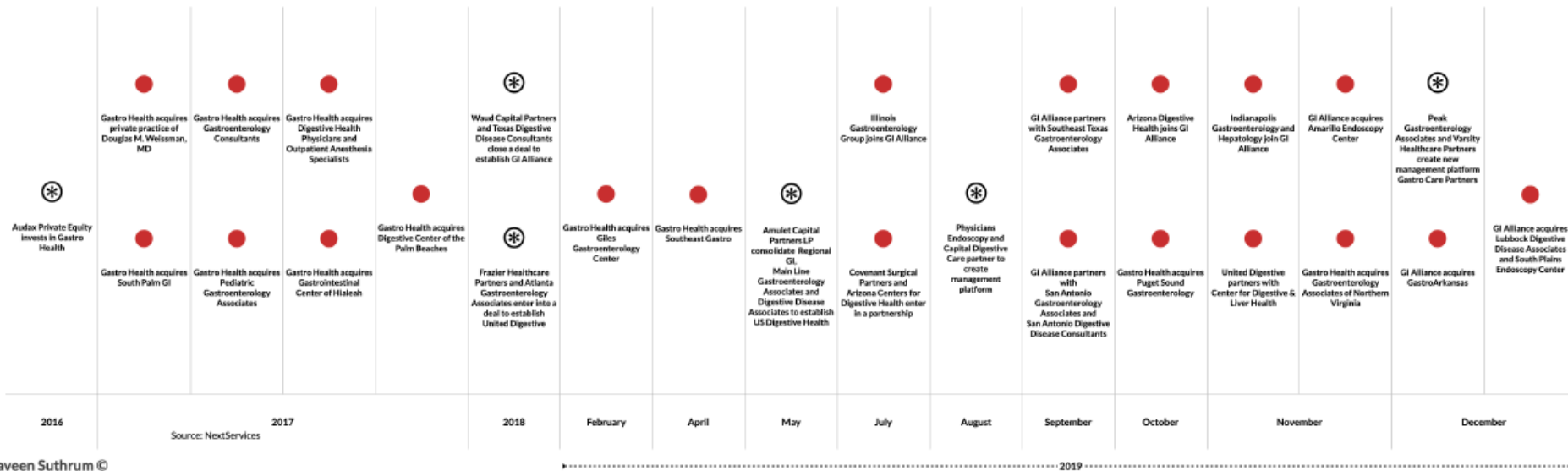
- Demographics are shifting:
 - 46% of all trainees and 50% of all medical students are female per AAMC data
- Demand for GI services will rise due to aging population and there will be shortage of GI physicians
 - 1630 GI physician shortage by 2025 – Physician Thrive's 2022 report
 - GI is the 6th hardest specialty to recruit, 0.67 physicians available for every 1 position – Practicelink.com (Spring 2023)
 - More female colleagues
 - Work-life balance
- Increase demand for therapeutic endoscopy

Future of GI: Consolidation of Care

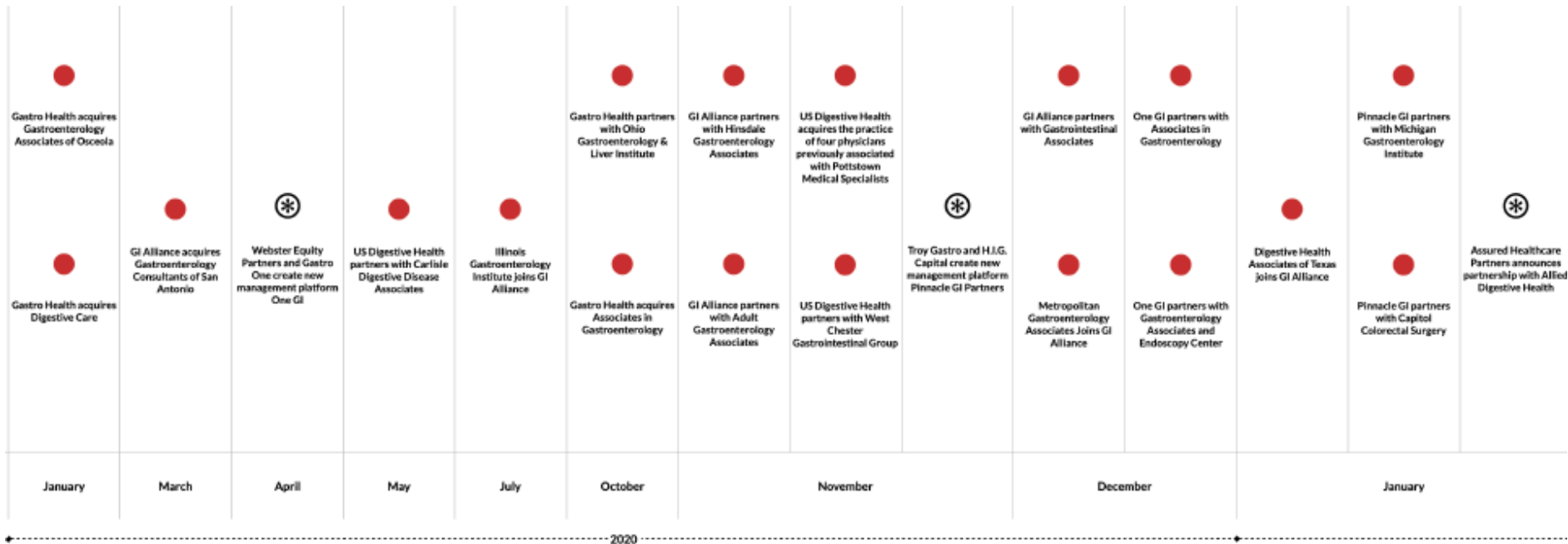
- Prior to 2016, we had solo, small groups or large groups practices in addition to multi-specialty groups
- In 2016, first PE-backed practice emerged in the form of Gastro Health in FL
- In 2022, we have double digit PE-backed practices, and the number is growing
- We will have about 12-15 large PE backed groups in various geographic locations in next 5-10 years

Gastroenterology Consolidation Landscape – 1

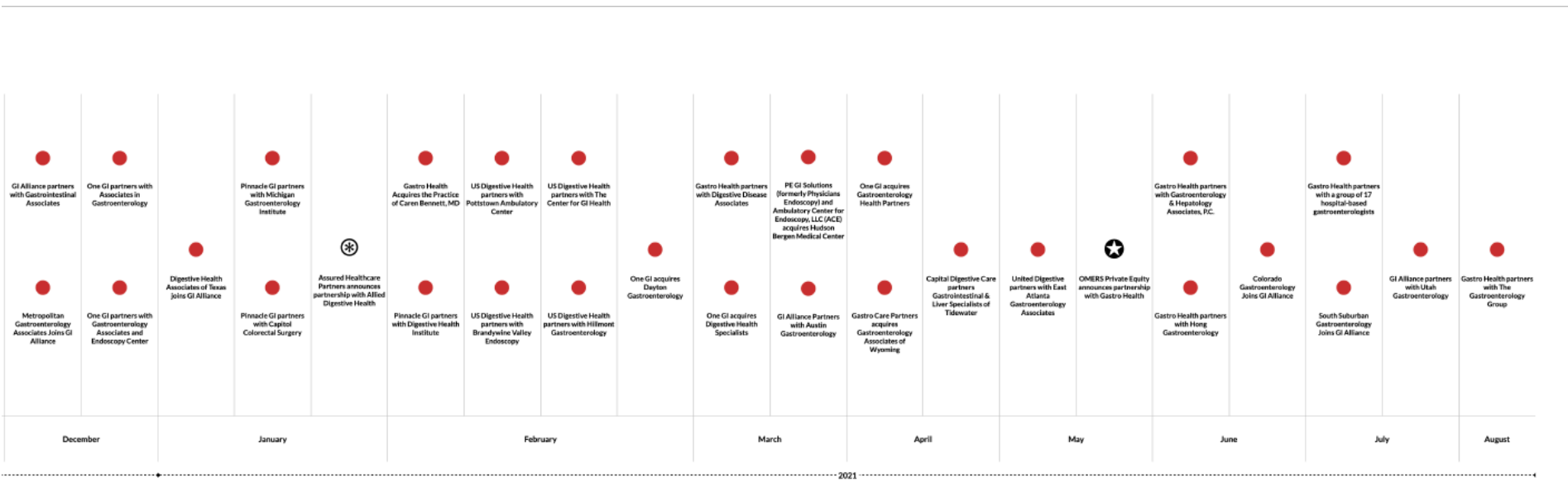
GASTROENTEROLOGY CONSOLIDATION LANDSCAPE



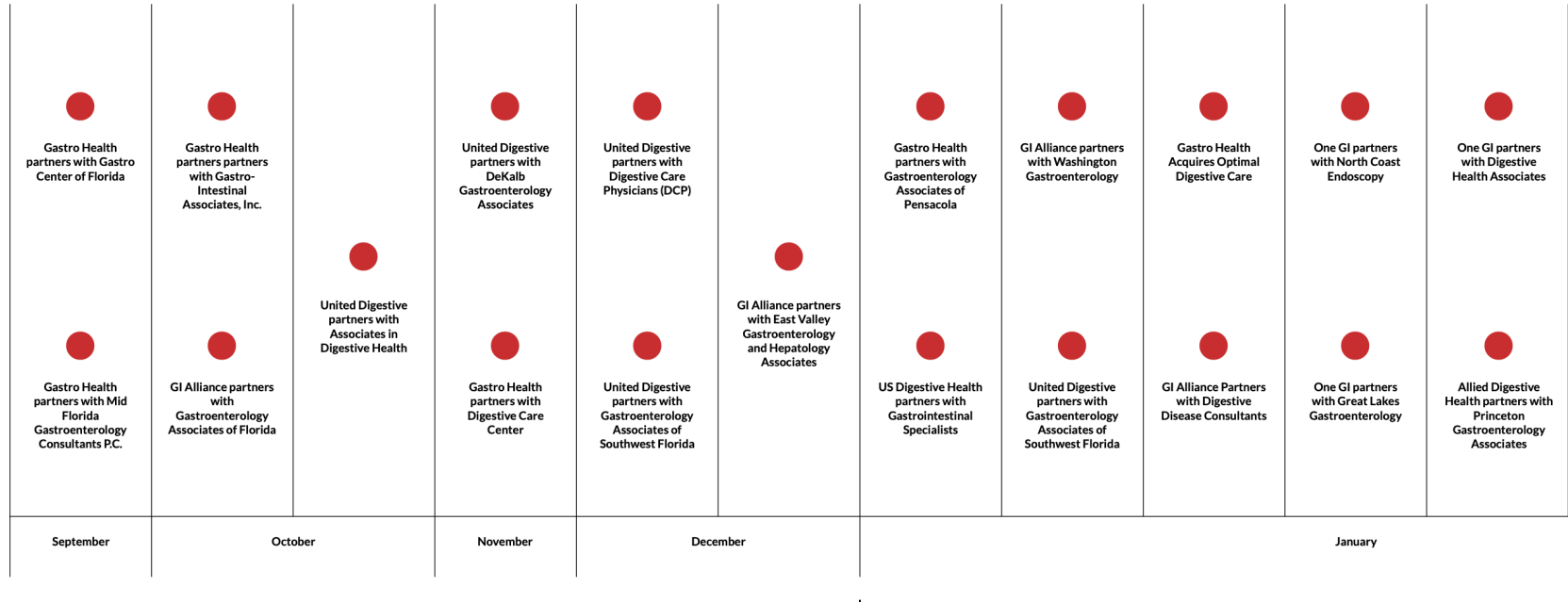
Gastroenterology Consolidation Landscape – 2



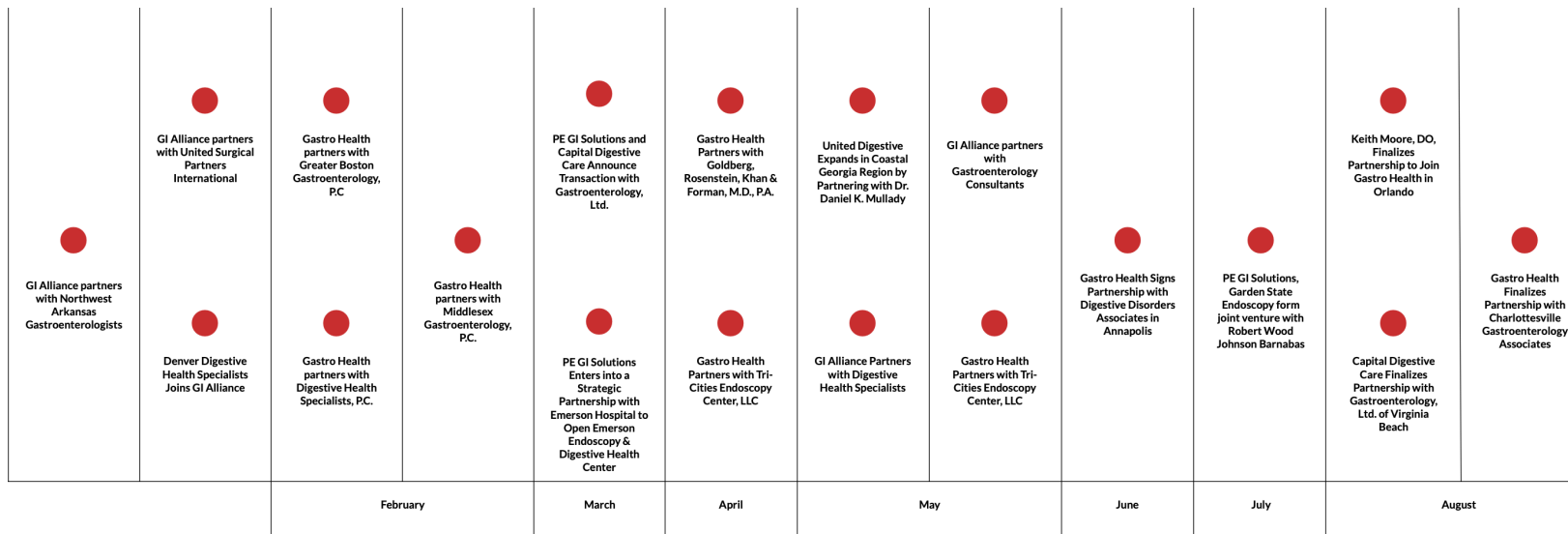
Gastroenterology Consolidation Landscape – 3



Gastroenterology Consolidation Landscape – 4



Gastroenterology Consolidation Landscape – 5



Future of GI: Consolidation of Care

- Large corporations such as Amazon, Walmart, CVS etc. will have their own physician networks
 - Amazon bought One Medical for \$3.9B
 - CVS bought Signify Health for \$8B
- Haven Health - Experiment involving Amazon, Berkshire and JP Morgan Chase with Atul Gawande as the CEO failed, BUT THERE WILL BE MORE, I PROMISE!
- Insurance companies are buying practices:
 - UHC's Optum is one of the largest physician practices in the country
- Expanding hospital networks (I'm sure you have seen this in your respective communities!)

Future of GI: Consolidation of Care

- Future jobs in GI:
 - Large PE-backed groups
 - Hospital systems and academic institutions
 - Large multi-specialty groups
 - Insurance companies
 - Large corporations

Future of GI: Technological Advances

- One of the biggest disruptors in health care has certainly been the COVID-19 pandemic
- One decade's worth of innovation happened in one year

Future of GI: Telemedicine

- Prior to COVID-19 pandemic, only 8-9% of GI practices used telemedicine and post-pandemic, more than 75% of the GI practices used telemedicine
- Telemedicine is here to stay
- Future regulations will determine the intensity of use
- Personally, it is a boon for our practice:
 - Post-procedure follow-ups
 - Frequent-visit IBS patients
 - IBD well check
 - Prescription refills
 - Screening colonoscopies



Gastro Girl™
EMPOWERING OPTIMAL DIGESTIVE HEALTH

Future of GI: Screening Colonoscopy

- Cologuard – exponential growth
- First approved by FDA in August 2014
- Most recent financial data:
 - Revenue \$553M in 4th Qtr 2022
 - Screening only revenue in 4th Qtr 2022 \$410M
 - Gross margins 72.3%
 - Anticipated revenue \$2.3B in 2023 (\$1.7B from Cologuard)

Future of GI: Screening Colonoscopy

- In addition to stool tests, multiple companies are working on liquid biopsies at a frantic pace. More than 100 companies are in the race.
- What does this mean for future of screening colonoscopy? This is a big question to ponder upon!!
- I AM NOT SCARING YOU, JUST WANT YOU TO PLAN YOUR FUTURE BETTER!!

Thrive.
AN ENACT SCIENTIFIC COMPANY

Cancer

Gastroenterology 2022; ■:1-3

Diagnostic Performance of a Noninvasive Breath Test for Colorectal Cancer: COBRA1 Study

FOUNDATION
MEDICINE



Future of GI: Technological Advances

- AI (artificial intelligence): leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind
- ML (machine learning): Ability of the computers (machines) to analyze the vast amount of data and analyze within
- DL (deep learning): It is a sub-set of ML, here algorithms resemble neural network of human brains. It is much more sophisticated

Machines will beat human intelligence by 2045: *Ray Kurzweil, Inventor and Futurist*

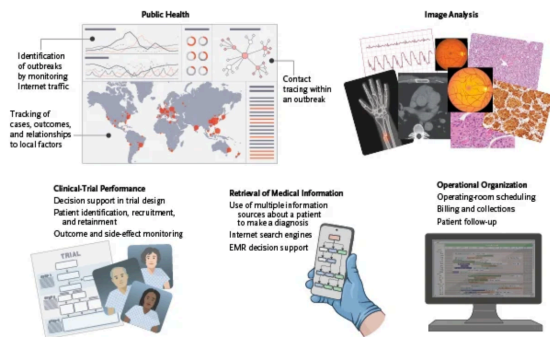
Future of GI: AI Levels of Sophistication

- Level 0: No automation
- Level 1: Low automation
 - Assist endoscopist with basic work like recording time of scope insertion and withdrawal
- Level 2: Partial automation
 - Identifies and flags polyps
- Level 3: Conditional automation
 - Identifies, classifies and sizes polyps
- Level 4: High automation
 - Identifies ALL polyps, classifies adenomatous polyps with 100% accuracy and hence no need for biopsies. Endoscopist job is to navigate the scope and remove the polyps
- Level 5: Full automation
 - System performs the endoscopy with no assistance from the endoscopist

Future of GI: AI in Medicine

AI in Medicine

Artificial Intelligence (AI) has tremendous potential to advance clinical practice and the delivery of patient care. A new Review article series, “AI in Medicine,” explores the role of AI technology in clinical medicine and digital health, and examines the promise and pitfalls of its application across the health care continuum.



REVIEW ARTICLE

AI and Machine Learning in Clinical Medicine, 2023

C.J. Haug and J.M. Drazen

This first article in a series describes the history of artificial intelligence in medicine; the use of AI in image analysis, identification of disease outbreaks, and diagnosis; and the use of chatbots.

EDITORIAL

Artificial Intelligence in Medicine

A.L. Beam and Others

The editors announce both a series of articles focusing on AI and machine learning in health care and the 2024 launch of a new journal, *NEJM AI*, a forum for evidence, resource sharing, and discussion of the possibilities and limitations of medical AI.

FREE

MAR 30

SPECIAL REPORT

GPT-4, a General AI Chatbot for Medicine

P. Lee, S. Bubeck, and J. Petro

Chatbots are computer programs with which one can have a conversation. In this article, the authors describe how the GPT-4 chatbot, which has been given a general education, could affect the practice of medicine.

COMING SOON
NEJM AI – A NEW JOURNAL

NEJM Group, the publisher of the *New England Journal of Medicine*, is planning a new journal, *NEJM AI*, to identify and evaluate state-of-the-art applications of artificial intelligence to clinical medicine.

[More information.](#)

The NEJM AI Grand Rounds Podcast

Informal conversations with a variety of experts exploring the deep issues at the intersection of artificial intelligence, machine learning, and medicine.

FOLLOW:

NEJM AI Event

The Value Distribution of Clinical AI
April 27, 2023
12:00 PM – 2:00 PM ET
[Register and view more information.](#)



NEJM AI Newsletter

Future of GI: Utilities of AI in GI

- Polyp detection, sizing and classification (optical biopsy)
- Barrett's Esophagus
- Early gastric cancer
- IBD
- Capsule endoscopy

More than 100 AI studies underway

Numerous abstracts submitted for ACG 2023

Future of GI: Utilities of AI in GI

Table 1: AI systems and related functions.

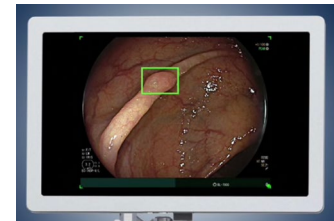
AI system categories	Areas of assistance
Technical	Scope guidance for colonoscope insertion ^[2]
Detection (CADe)	Polyps detection ^[3,4] Bleeding detection ^{*[5,6]}
Diagnostic (CADx)	Early cancer identification ^[7,8] Cancer staging (estimation of invasion depth) ^[9,10] Polyp characterization or classification ^[11,12] Diagnosis of normal <i>vs.</i> inflammatory mucosa in IBD ^[13] GI disease prediction from patient data ^[14]
Therapeutic	Lesion delineation ^[7,15] Assistance in therapeutic decisions (such as complementary surgical resection post-endoscopic resection for malignant lesions) ^[16] Risk stratification, prediction of outcomes, and potential need for therapeutic intervention (in GI bleeding) ^[17]

* Mainly in small bowel exploration for obscure GI bleeding. AI: Artificial intelligence; CADe: Computer-assisted detection; CADx: Computer-assisted diagnosis; IBD: Inflammatory bowel disease; GI: Gastrointestinal.

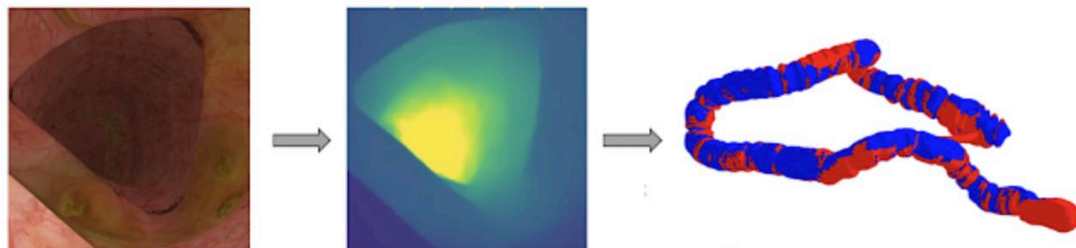
Ahmad El Hajjar, Jean-François Rey. Artificial intelligence in gastrointestinal endoscopy. *Chinese Medical journal*.

Future of GI: AI News in Clinical Practice

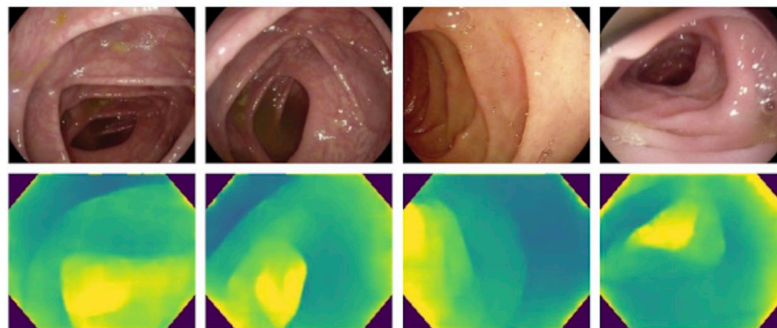
- The FDA granted [de novo clearance](#) for Medtronic's first AI system GI Genius for colonoscopies.
- Pristine Surgical and NexOptic have [agreed](#) to combine their technologies for a single-use endoscopic visualization platform. Pristine Surgical's single-use endoscopes will use NexOptic's AI imaging technology, All Light Intelligent Imaging Solutions
- A team at Washington University in St. Louis [developed](#) an imaging technique for rectal tissues to assess risk management of CRC. Biomedical professor Quing Zhu, PhD, and her team created the imaging technique, acoustic resolution photoacoustic microscopy coregistered with ultrasound, and paired it with AI.
- GI-focused software companies Iterative Scopes and Provation [partnered](#) to link Provation's GI documentation software with Iterative Scopes' inflammatory bowel disease data and AI insights.
- A partnership [reached](#) between Iterative Scopes and Eli Lilly will explore how AI can improve understanding of IBD pathophysiology and target identification. Iterative Scopes closed a \$5.2 million seed round in January 2020.



Future of GI: Google's Detecting Deficient Coverage in Colonoscopies C2D2 Algorithm



C2D2 computes a depth image from a single RGB image. Then, based on the computed depth images for a video sequence, C2D2 calculates local coverage, so it can detect where the coverage has been deficient and a second look is required.



Top row: RGB image, from which the depth is computed. Bottom row: Depth image as computed by C2D2. Yellow is deeper, blue is shallower. Note that the "tunnel" structure is captured, as well as the [Haustral ridges](#).

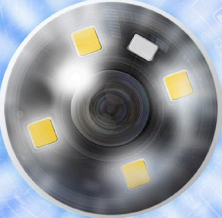
Future of GI: Google's Detecting Deficient Coverage in Colonoscopies C2D2 Algorithm

- System trained on 3600 procedures, 86 million frames
- Tested on 1400 procedures, 33 million frames
- 97% accuracy in detecting polyps
- 4.6 false alarms per procedure
- In 100 procedures performed in a Jerusalem hospital, system detected at least one polyp per procedure which would have been missed and didn't miss any polyps which were detected by the endoscopists

Future of GI: Equipment Advancement


- Monitors and scopes 4K-8K with magnification
- Miniaturization of the sensors – smart pill will become smarter
- Robotic endoscopy : ANXrobotics

Converging Robotics & AI...a new vision of GI diagnostic & therapeutic excellence

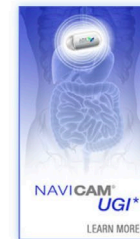
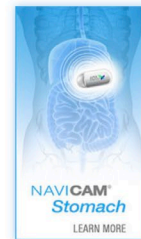


NAVICAM®

Combining magnetically-controlled robotics and innovative intelligent software *for the most advanced capsule endoscopy technology.*



DIAGNOSTIC

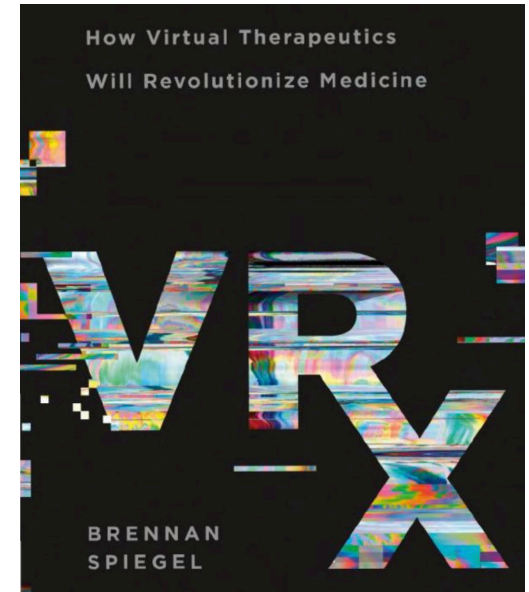


THERAPEUTIC



Future of GI: AR or VR

- **Virtual Reality** – Immersive digital experience
- **Augmented Reality** – Virtual elements in physical world
- **Utilities:**
 - IBS
 - Mind-body interactions
 - Endo training
 - Patient education



Future of GI: Digital Therapeutics



NEWS | JAN 28, 2021

Oshi Health Virtual
Gastrointestinal Care Is
Now Available In
Pennsylvania And
Florida



December 8, 2020

Mahana Therapeutics Obtains FDA Marketing Authorization for the First Prescription Digital Therapeutic to Treat Irritable Bowel Syndrome

March 9, 2021

Mahana Therapeutics Obtains CE Mark for Parallel™ in the UK

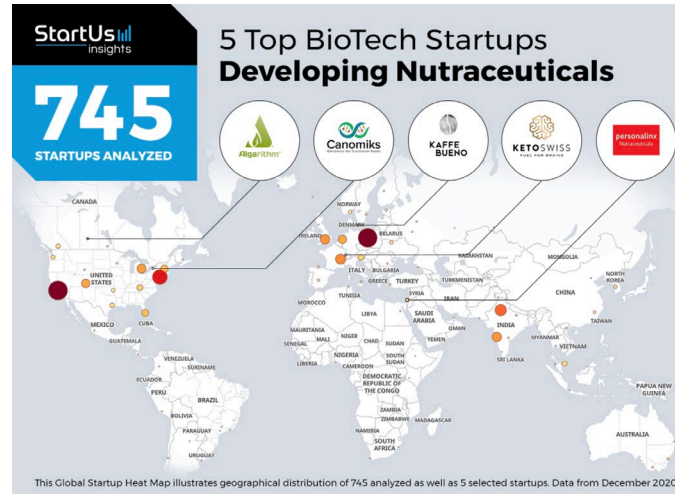
August 11, 2021

Mahana Therapeutics Secures \$61 Million Series B Financing to Support Commercialization and Further Development of Digital Therapeutics

Future of GI: Food as a Medicine

- Patients are demanding and we need to be prepared to respond

NUTRIGENOMI[®]



Future of GI: Microbiome

- How is this related to future of GI?
- Well....90% of our DNA is bacterial. Microbiome is one of the biggest organ in the body.
- Research suggests that changes in one's microbiome is directly related to aging, obesity, heart disease and so on...
- Hundreds of millions of dollars are being spent on research in this field, Industry will be worth \$3.2B by 2024...

WE NEED TO BE PREPARED!!



Future of GI: Wearables

- How can we improve our documentation using technology?
- How about use of technology to document procedure notes and office encounters?
- Google glass (nixed for now) or similar technologies forthcoming!

Nuance DAX in action

Better patient-physician experience, all around.

Join a live demo of the Dragon Ambient eXperience to see how to improve care delivery, boost efficiency, and reduce physician burnout.

Take care of your patients

Our AI-based scribe technology will take care of your documentation.

[See DeepScribe in Action](#)

nature

FASTCOMPANY

SILICON VALLEY
BUSINESS JOURNAL

BECKER'S
HEALTH IT

The New York Times

Future of GI: Patient Expectations

- Patients are connected all the time and demand more from healthcare providers:
 - Want to feel good
 - Want to look good
 - Want to live forever
 - Patients now and in future, are more likely to shop around for higher quality at a lower cost.
- Desirous of much more from the health care providers
- We need to have a strategy in place to deal with level of expectations!

Future of GI: Potential Ancillary Service Lines

- Data is the king – How do we monetize it?
- Chronic care management:
 - IBD
 - NASH
 - Cirrhosis
- Bariatric care
- Integrative care
 - Digital Health

Future of GI: Summary

- Regulatory and reimbursement environment will be demanding in future
- Artificial Intelligence will be embedded in our future, and we should embrace it rather than fighting it
- Disruptive technologies such as Cologuard are here to stay, and liquid biopsies are going to be a reality and we need to have a game plan!
- Digital therapeutics will be a part of what we do and sooner we embrace it better we will be prepared for the future

An aerial view of a city skyline, likely Austin, Texas, featuring several prominent skyscrapers. The image is overlaid with blue geometric shapes: a large triangle on the left and bottom-left, and a diagonal line across the middle. The text is centered in the upper half of the image.

Thank You

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