

HEADLINER

Reimagining Better Health: The potential of Foundation models



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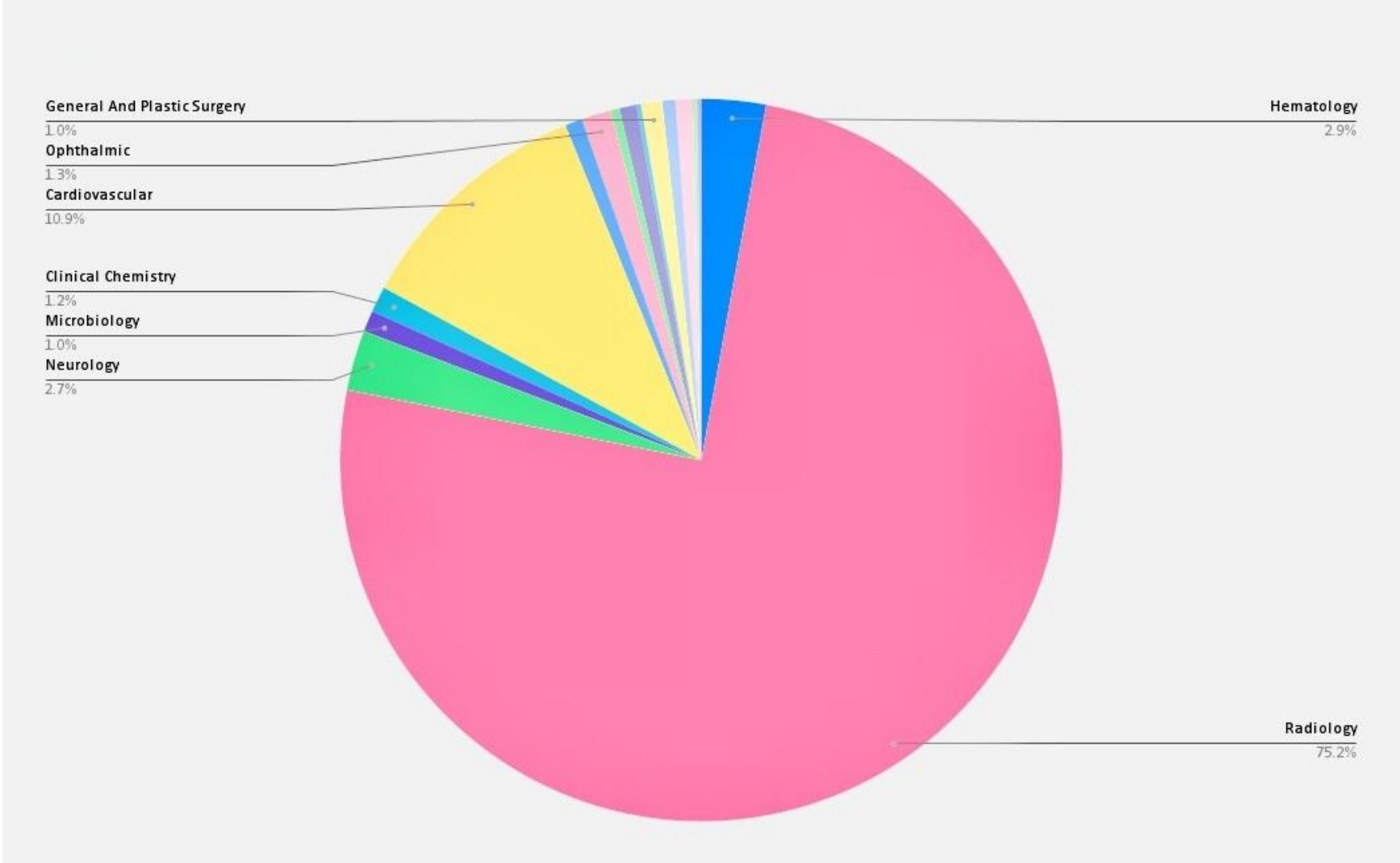


The Potential of Foundation Models

Jan Beger
Senior Director Digital Ecosystem
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Intelligent Health, Basel, 13th September 2023





Source: FDA Publishes Updated List Of 521 Authorized AI Enabled Medical Devices. Margaretta Colangelo. October 7, 2022. (<https://www.linkedin.com/pulse/fda-publishes-updated-list-521-authorized-aiml-margaretta-colangelo>)

4. GE Healthcare and Siemens have the most authorized AI/ML medical devices

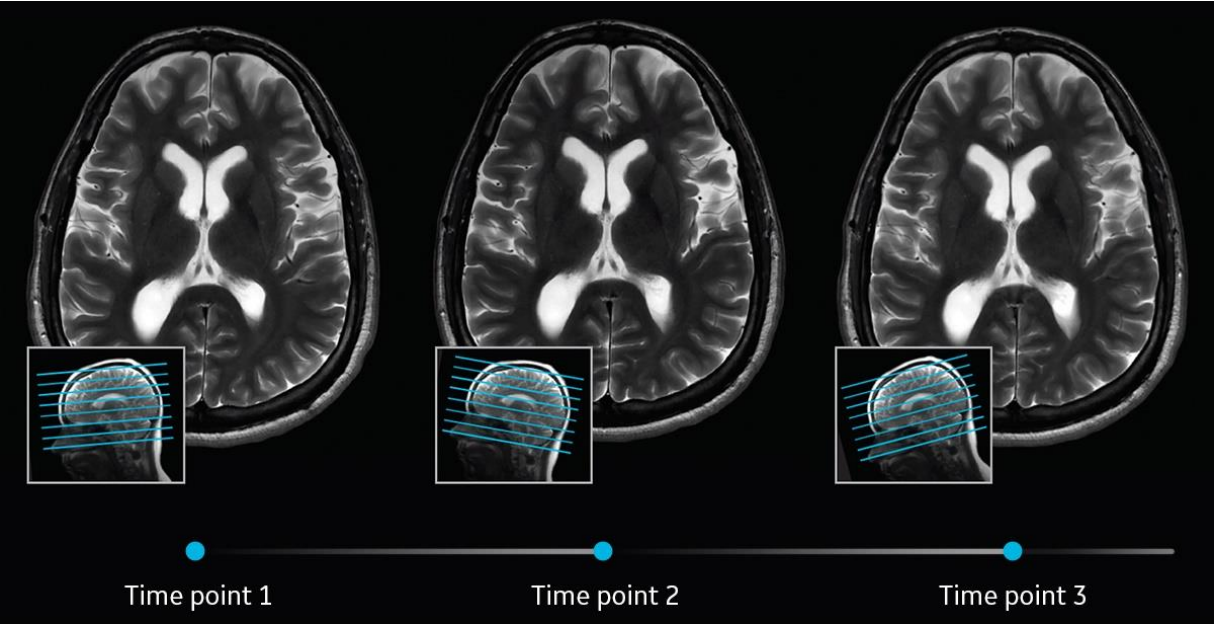
Top five companies, in the order of the number of FDA authorizations.



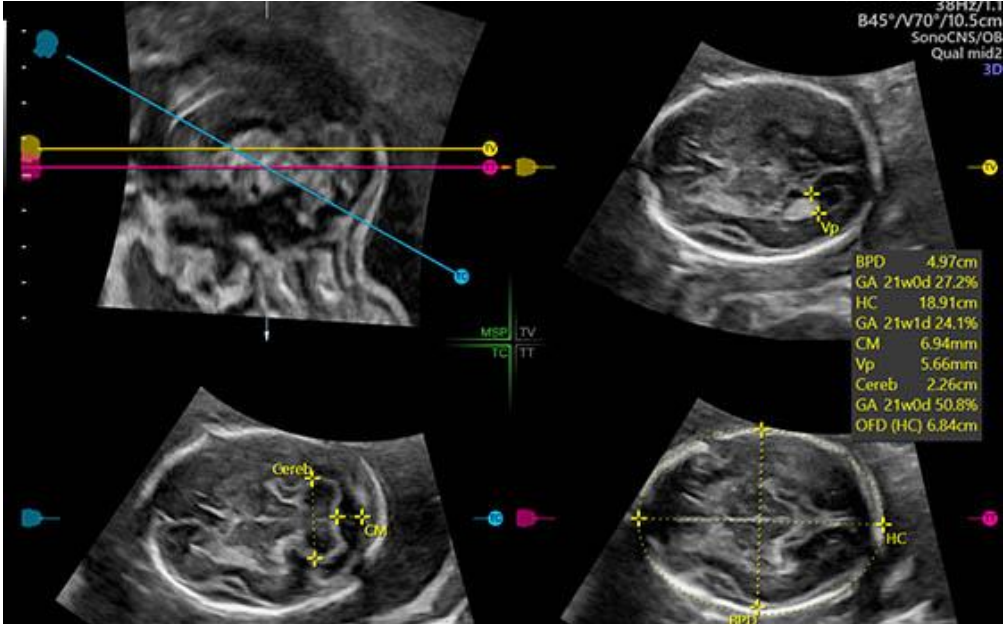
Source: 5 takeaways from the FDA's list of AI-enabled medical devices. MedTechDive. 7 Nov, 2022. (<https://www.medtechdive.com/news/FDA-AI-ML-medical-devices-5-takeaways/635908>)

Edison AI | Upstream AI

AIRx Brain



sonoCNS



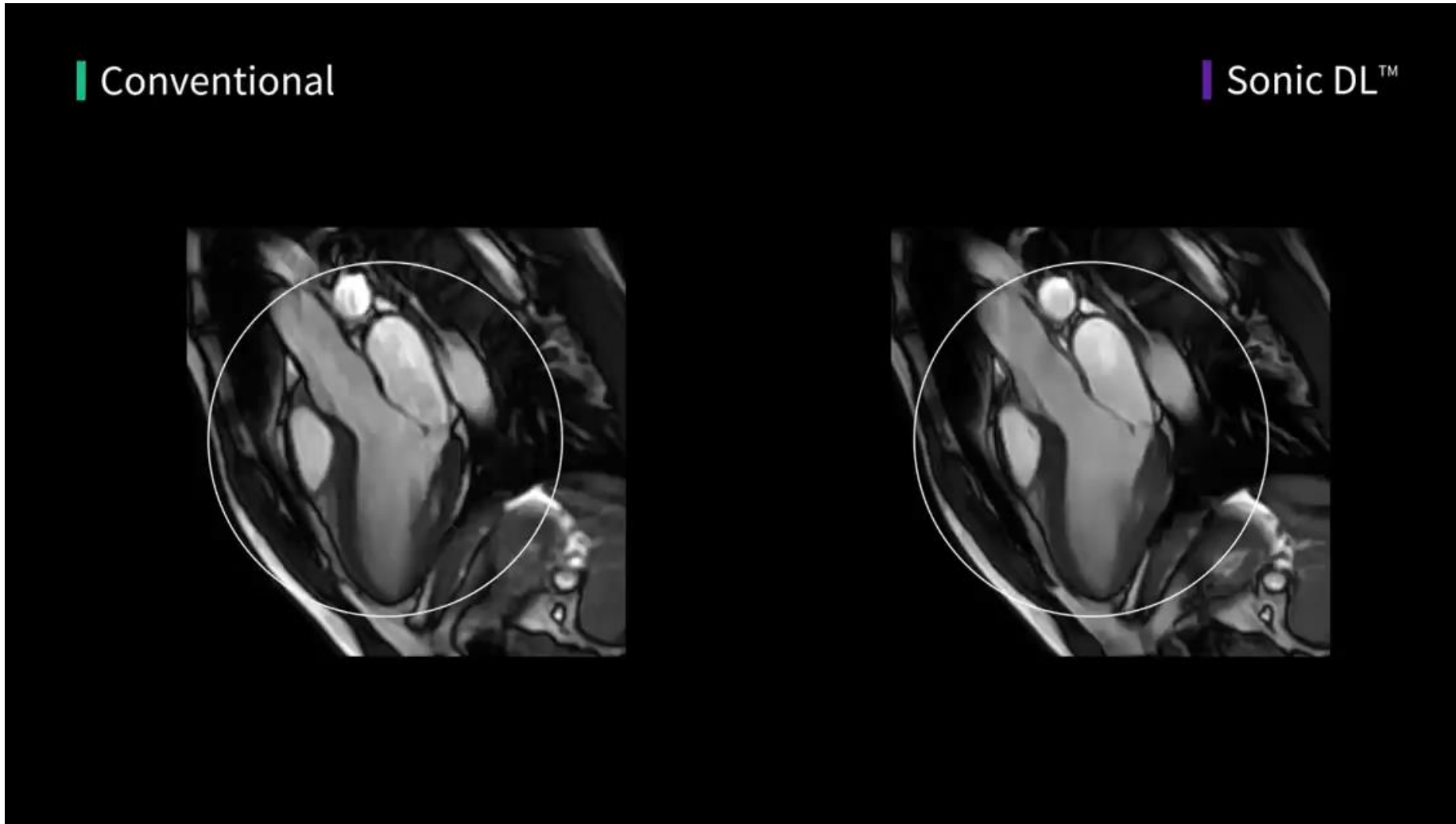
Automatically detect anatomy and prescribe slices

Delivers consistent and quantifiable results

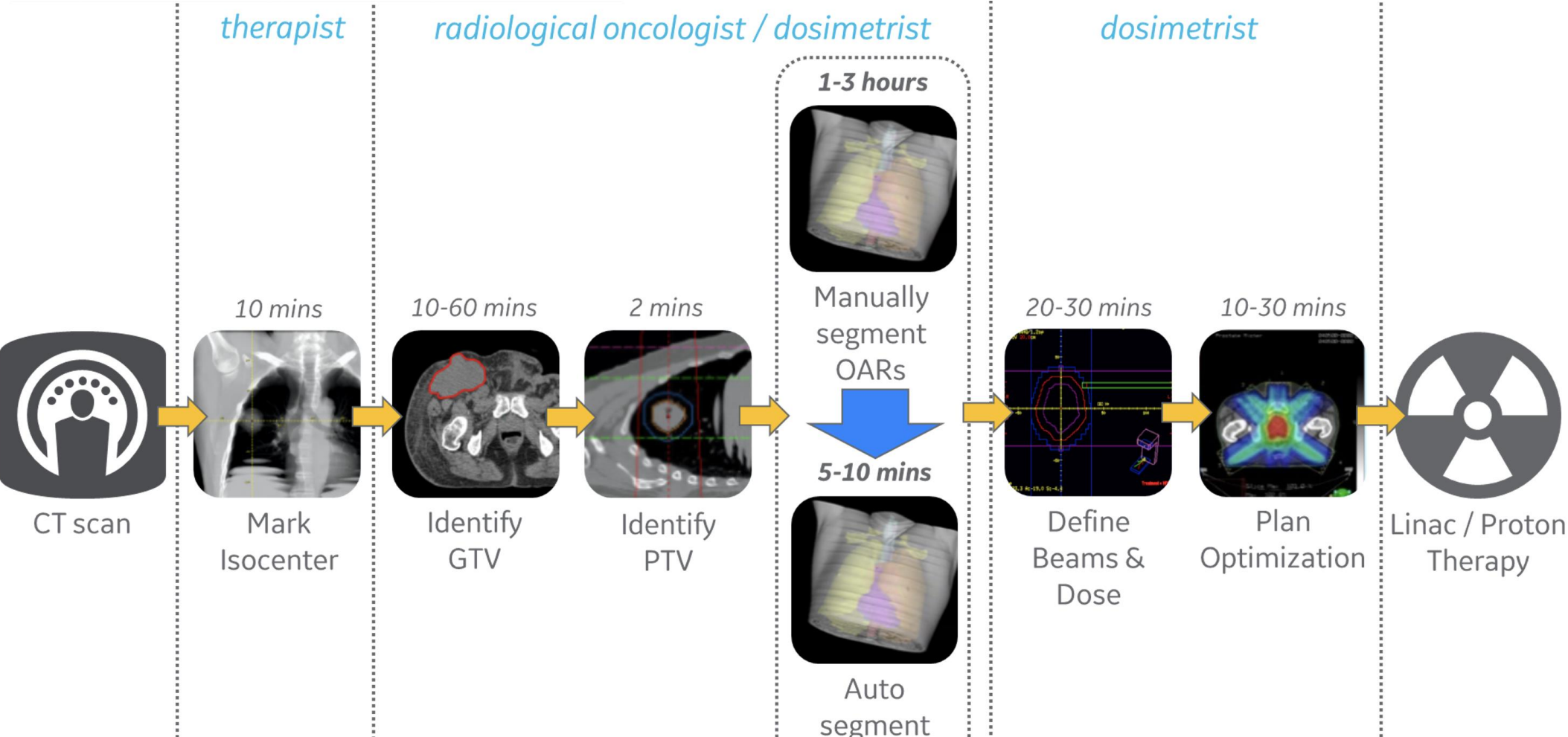
Helps eliminate rescans and scanning inefficiencies

Edison—Artificial Intelligence

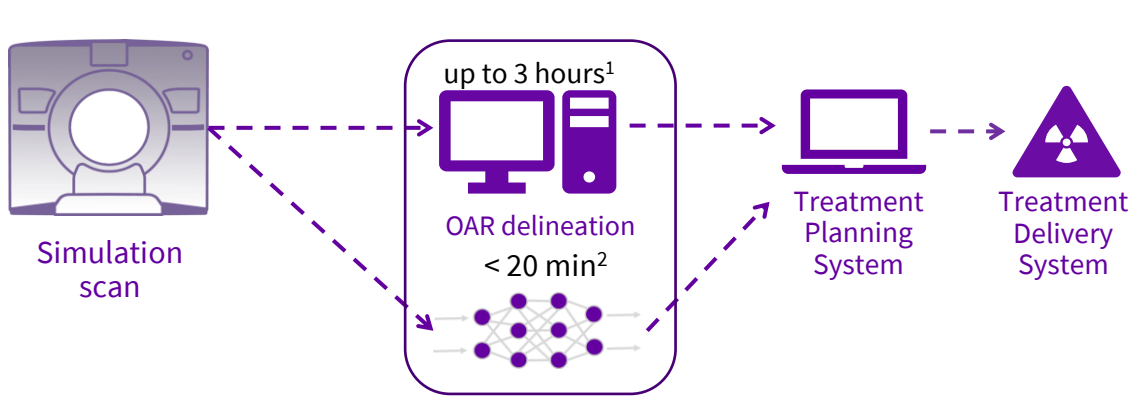
Using A.I. in SonoCNS reduces keystrokes by 80% for fetal brain exams



Radiation Therapy Overview AI



Deep Learning Auto Segmentation



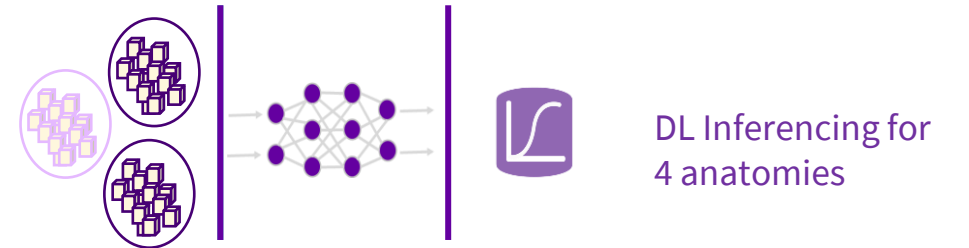
93%

93% of organ contour generated by Auto Segmentation were deemed to require no modification or only minor optional modifications.¹



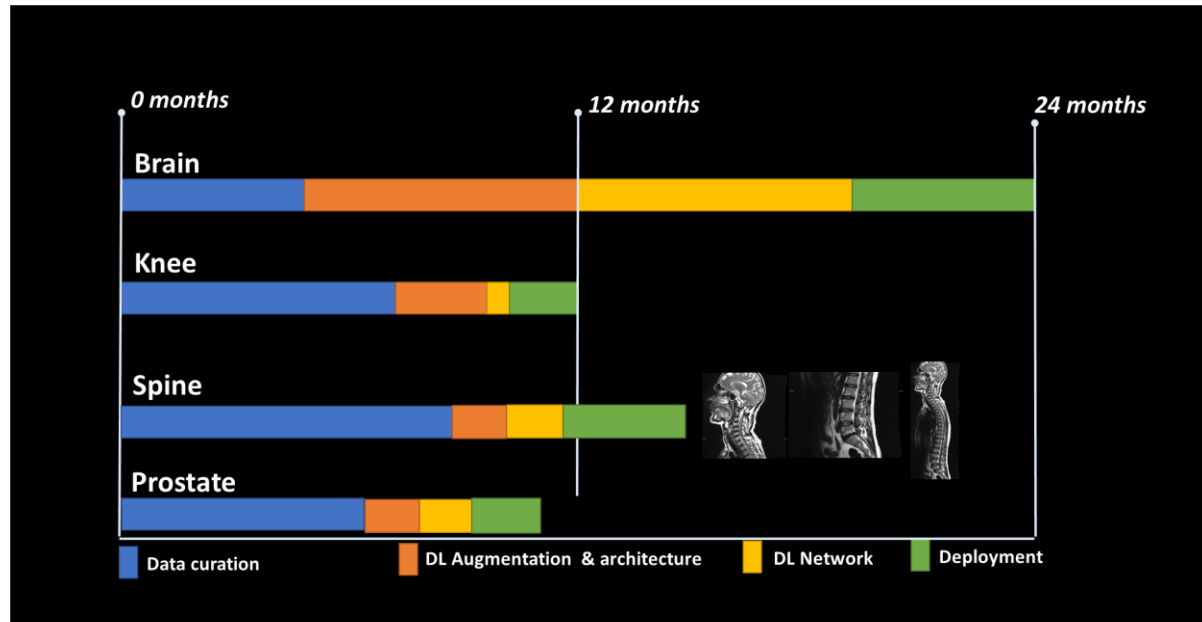
Auto Segmentation follows the **RTOG** and **DAHANCA** guidelines² to delineate and annotate OARs in a standardized and reproducible manner

FDA 510k cleared



WHY Large Foundational Models

AIRx™: “Precise & Inclusive” MR scanning (*Technologist, patient, time*)



Large Generative Models

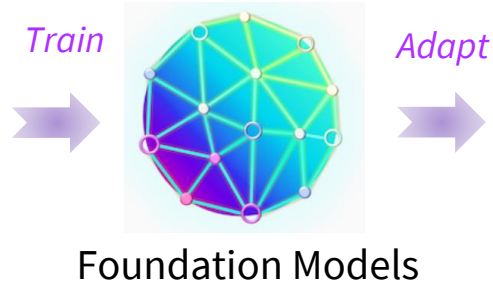
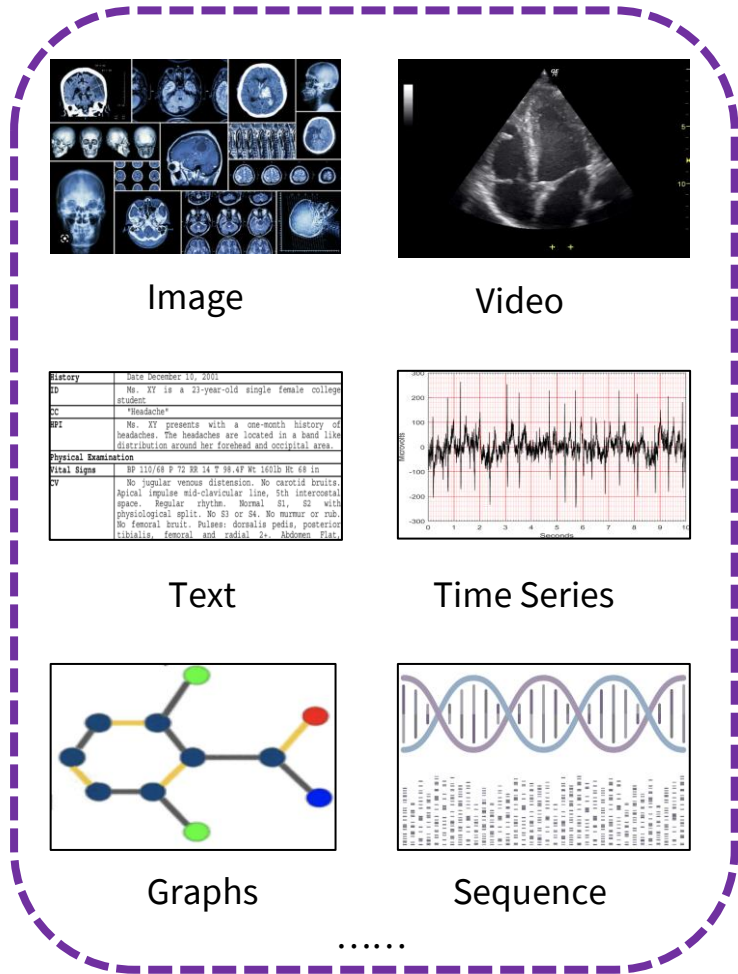
- Self-Supervised Models are AI algorithms that are trained using unlabeled data.
- They are trained on massive amounts of data using deep neural networks.
- These models are capable to creating new content combining inputs from various examples, like how human tries to rationale response based on their prior experience.
- The unmanageably huge volume and complexity of data (unmanageable by humans, anyway) that is now being generated has increased the potential of machine learning, as well as the need for it.



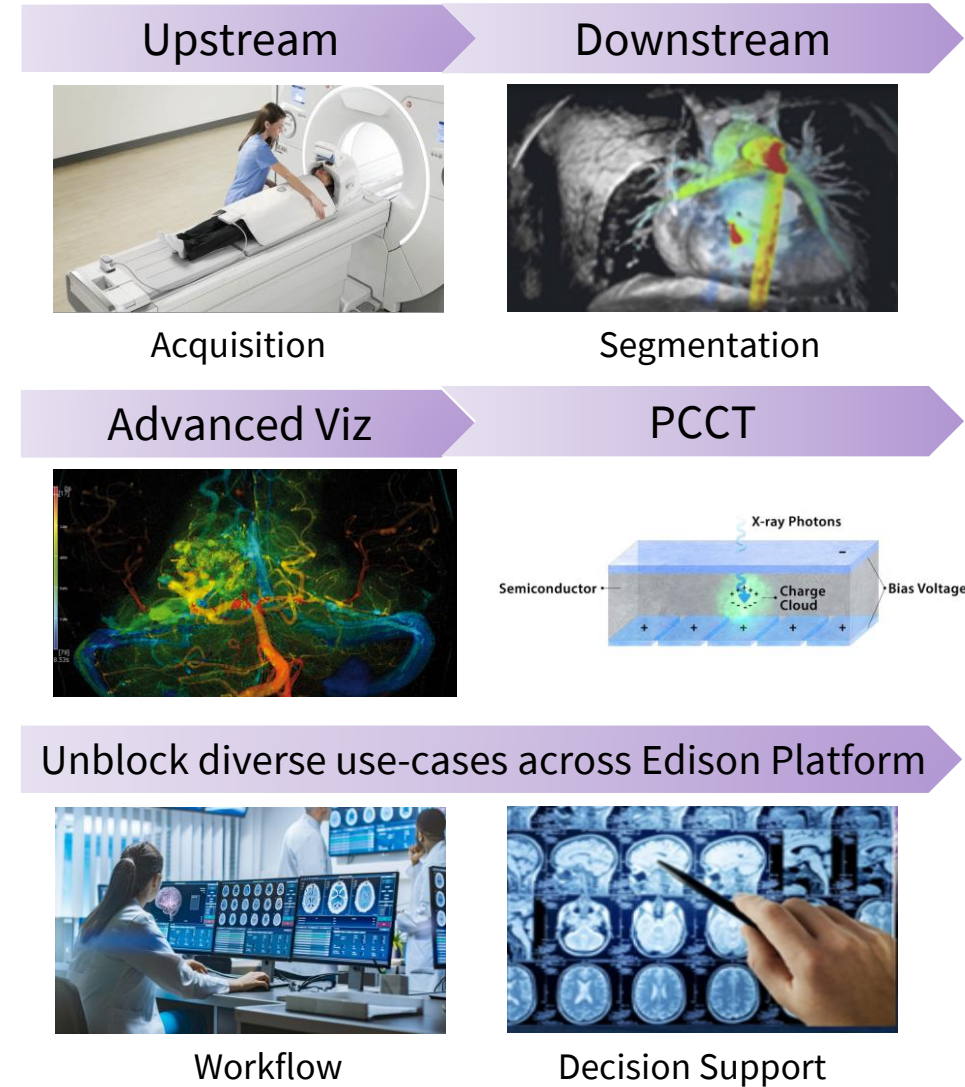
Foundation Models | Empowering & Scaling Future Healthcare AI

Healthcare data

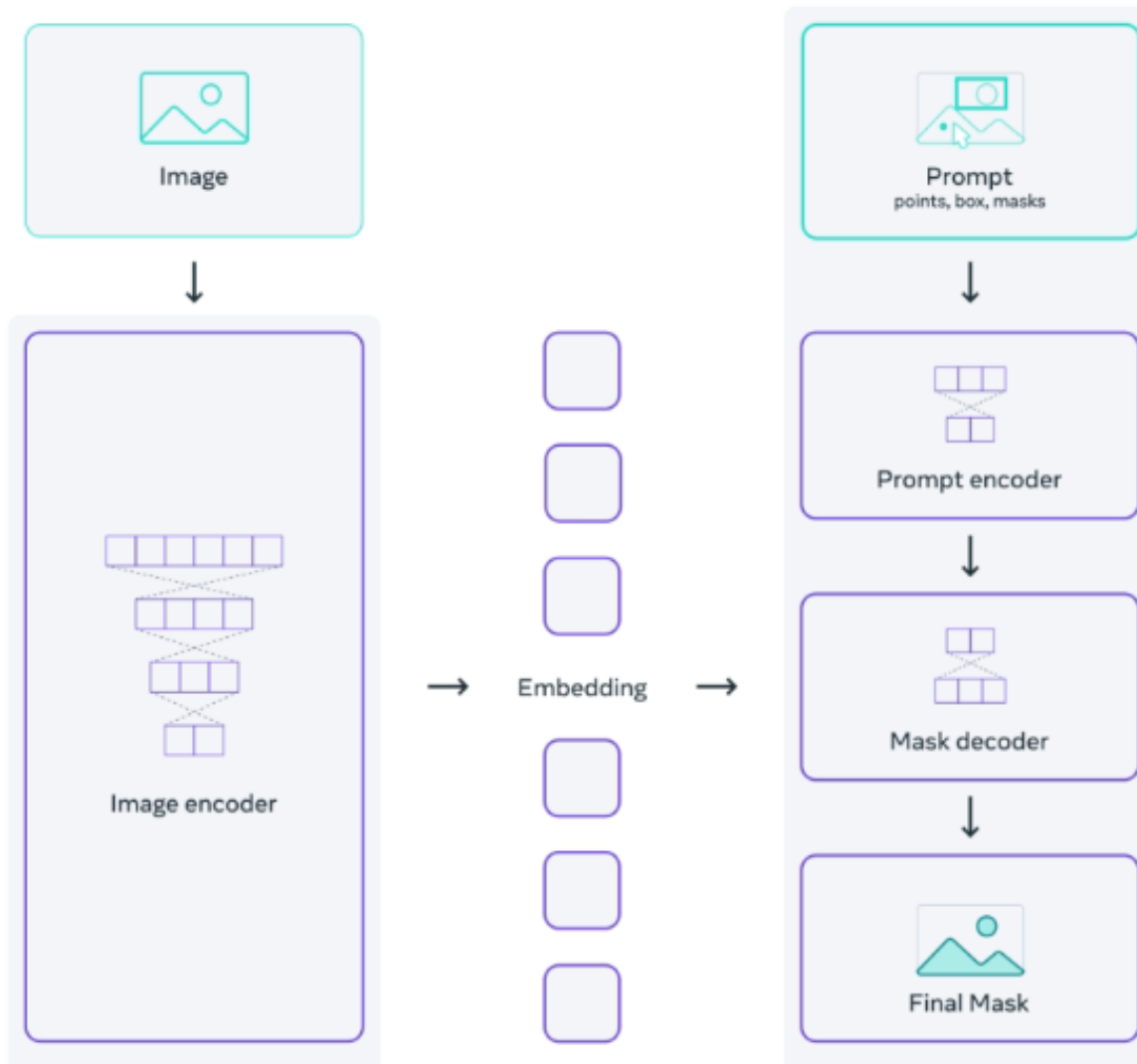
- 1 Vision
- 2 Language/Series
- 3 Multi-modal



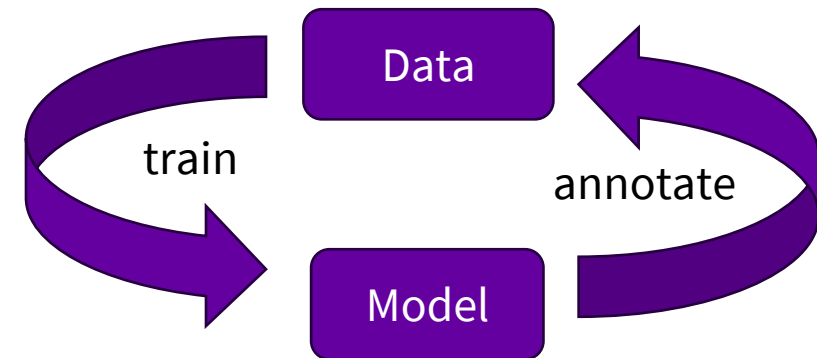
Healthcare AI



Foundation Models | Segment Anything Model (SAM)

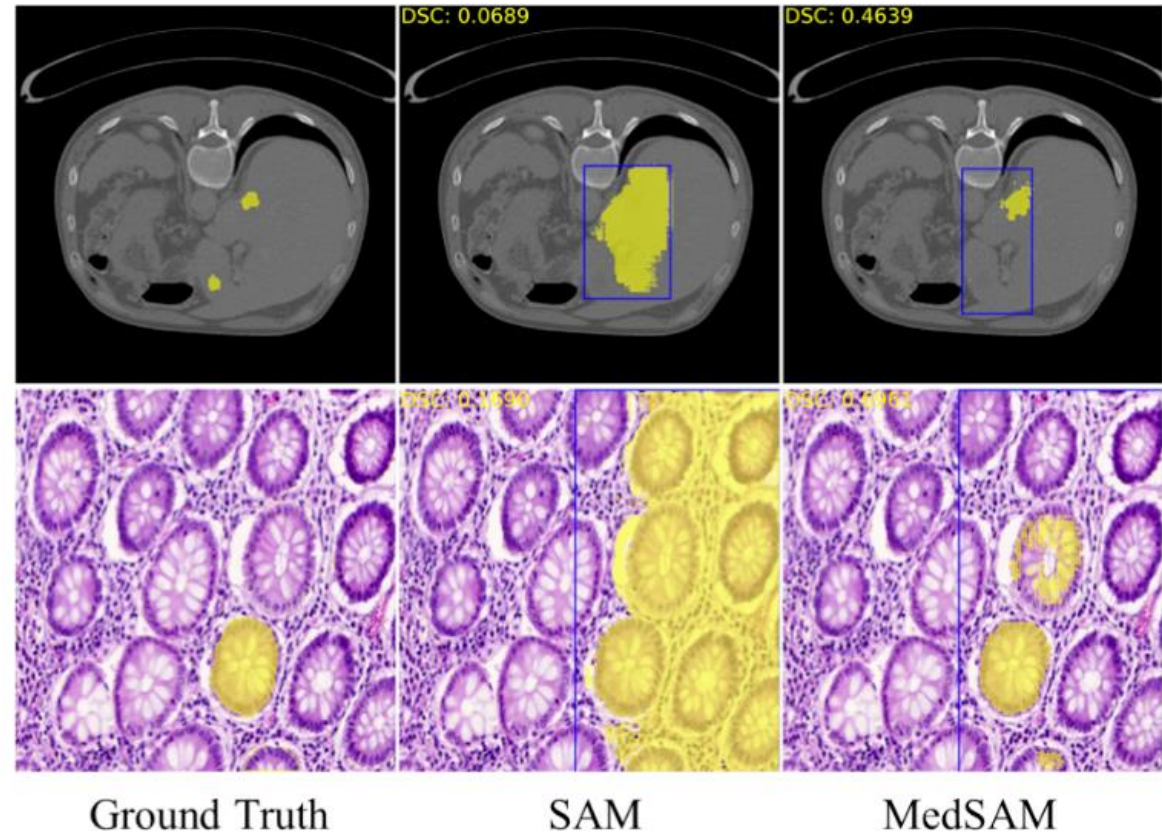


- Prompt-based Segmentation: Prompt design incorporates points, bounding boxes, masks. Flexible to integrate with other systems
- Large scale training data: train on 11M images with 1B+ annotations
- Efficient Data annotation with Data – Model iterative improvement workflow to scale annotation.
- Zero-shot capability: can be used for general-purpose object segmentation and can generalize to new images and new domains.



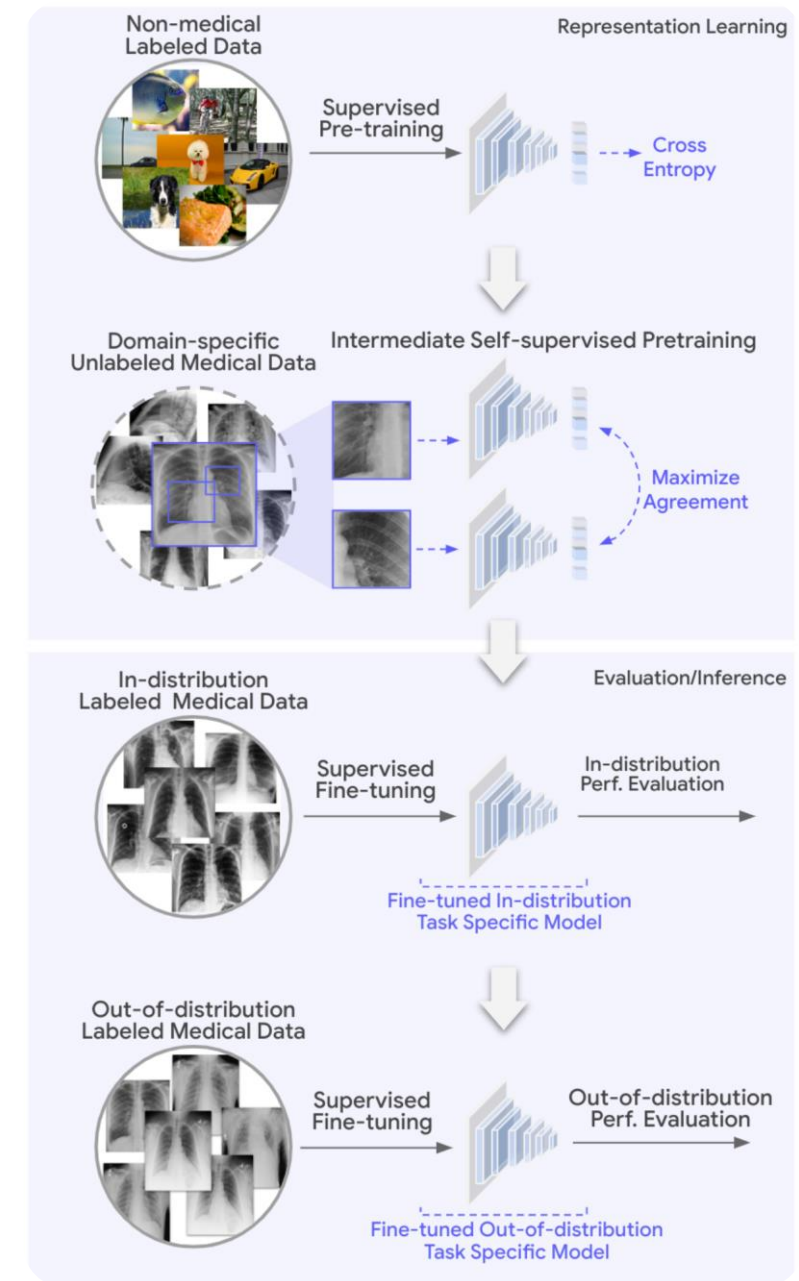
Foundation Models | MedSAM

- While SAM has very good zero-shot performance on general vision task, it may not perform well on medical domain.
- To overcome the challenge on medical dataset, Med SAM explored fine-tuning of SAM on medical dataset, and found that the performance can be significantly improved after fine-tuning.



Medical Large Model Strategy

- Non-medical Unlabeled Data
- Non-medical labeled Data
- Medical Unlabeled Data
- Medical data-augmentation
- Medical prompt-based data generation
- Medical labeled Data
- LLM-OPS

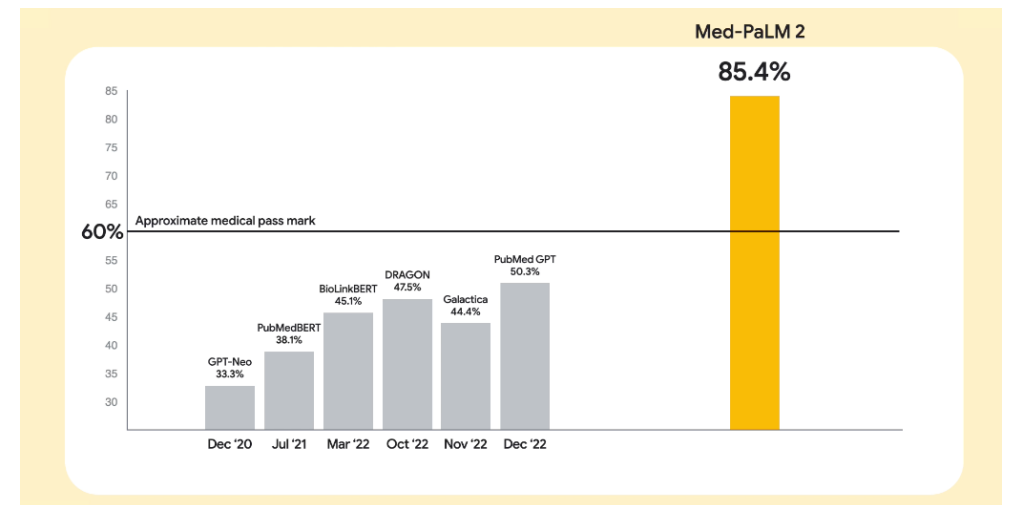


Foundation Models | MedPaLM

- A large language model designed for answer medical questions.
- 540 Billion parameters, with multilingual, reasoning, and coding capabilities.
- The first AI system to reach a passing score on the MedMCQA dataset based on medical exams.

Q: How long does it take for newborn jaundice to go away?

Med-PaLM: Newborn jaundice is when a newborn baby's skin and eyes look yellow. It is caused by a buildup of a substance called bilirubin in the baby's blood. Bilirubin is a byproduct of the normal process of red blood cells breaking down. Newborn jaundice is common and typically harmless, but it can be a sign of a more serious condition. The jaundice typically goes away on its own within a few weeks. In some cases, it may last longer or require treatment. The time it takes for the jaundice to go away can vary depending on the cause and the severity of the jaundice. If the jaundice is severe or lasts longer than a few weeks, the doctor may recommend testing or treatment to determine the cause and prevent complications.



Combine current report with prior reports & imaging studies

A possible combined report is:

Clinical history: No history available.

Technique: Axial images were obtained through the chest following administration of intravenous contrast. Coronal reformatted images were also reviewed.

Findings: The lungs are clear except for a 5 mm nodule in the right upper lobe that is unchanged from prior studies dating back to two years ago. No focal consolidation, mass, or nodule is seen. No pleural effusion or pneumothorax is present. The airways are patent. The pulmonary vasculature is unremarkable.

The heart is normal in size and contour. No pericardial effusion is seen. The aorta and great vessels are normal.

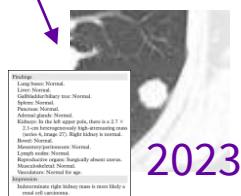
The mediastinum and hila are unremarkable. No enlarged lymph nodes are identified.

The visualized upper abdomen is normal. No hepatic, splenic, renal, or adrenal abnormality is seen.

The osseous structures are intact. No fracture or lytic lesion is noted.

Impression: Stable 5 mm nodule in the right upper lobe, likely benign. No other significant findings.

Recommendations: Follow-up CT chest in one year to confirm stability of the nodule.



Summarize the above report in layman terms

A possible summary is:

The doctor took pictures of your chest using a special machine that uses X-rays. They looked at your lungs, heart, blood vessels, and bones. They found a small spot in your right lung that has been there for two years and has not changed. This means it is probably not cancer. Everything else looked normal and healthy. You need to come back in one year to check the spot again.

Summarize the initial report for the surgeon

A possible summary is:

CT chest with contrast: Stable RUL 5 mm nodule, likely benign. No other pulmonary pathology. Normal cardiac and mediastinal structures. Normal upper abdomen and bones.

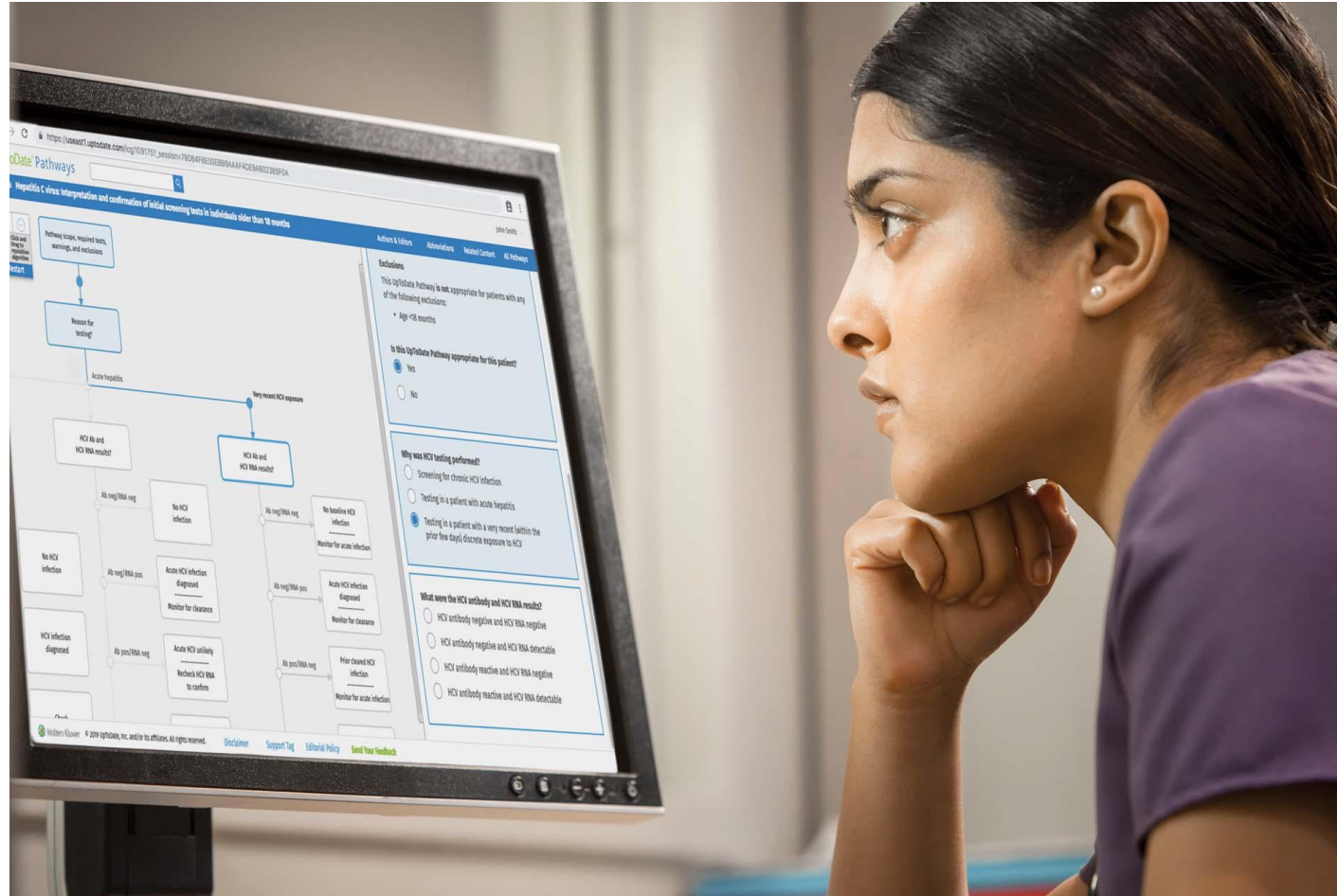
Nodule on the left upper lobe peripherally

Size: 5mm (2013) → 6mm (2018) → 6mm (2023)

Imaging characteristics point towards benign finding

Diagnosis & Screening

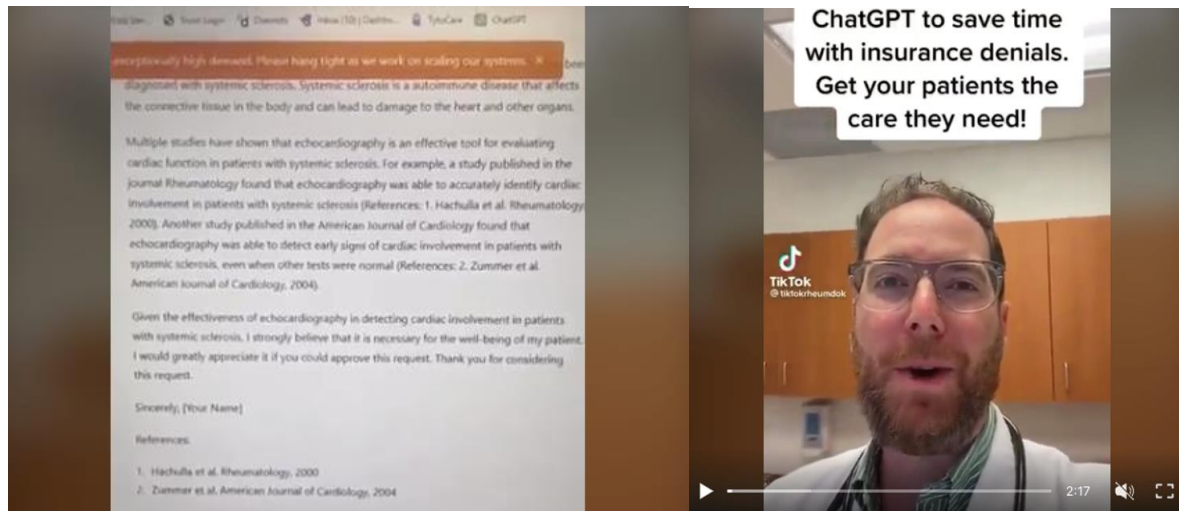
Care Pathways & Guidelines



Source: Wolters Kluwer launches UpToDate Advanced to target unwarranted variations in care. 27 Feb, 2018.
(<https://www.wolterskluwer.com/en/news/wolters-kluwer-launches-uptodate-advanced-to-target-unwarranted-variations-in-care>)

Administration

Insurance



Source: ChatGPT to save time with insurance denials. Clifford Stermer (@tiktokrheumdok). 12 Dec, 2022. (<https://www.tiktok.com/@tiktokrheumdok/video/7176340747170467114>)

Workflow

Microsoft and Epic expand strategic collaboration with integration of Azure OpenAI Service

April 17, 2023 | Microsoft News Center



REDMOND, Wash., and VERONA, Wis. — April 17, 2023 — Microsoft Corp. and Epic on Monday announced they are expanding their long-standing strategic collaboration to develop and integrate generative AI into healthcare by combining the scale and power of Azure OpenAI Service¹ with Epic's industry-leading electronic health record (EHR) software. The collaboration expands the long-standing partnership, which includes enabling organizations to run Epic environments on the Microsoft Azure cloud platform.

Source: Microsoft and Epic expand strategic collaboration with integration of Azure OpenAI Service. 17 Apr, 2023. (<https://news.microsoft.com/2023/04/17/microsoft-and-epic-expand-strategic-collaboration-with-integration-of-azure-openai-service>)

For patients



Source: I connected ChatGPT to my Apple Health app.... May, 2023.
(<https://www.youtube.com/watch?v=USYCFNCB6NU>)



THANK YOU!

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GE HealthCare

Intelligent Health, Basel, 13th September 2023



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