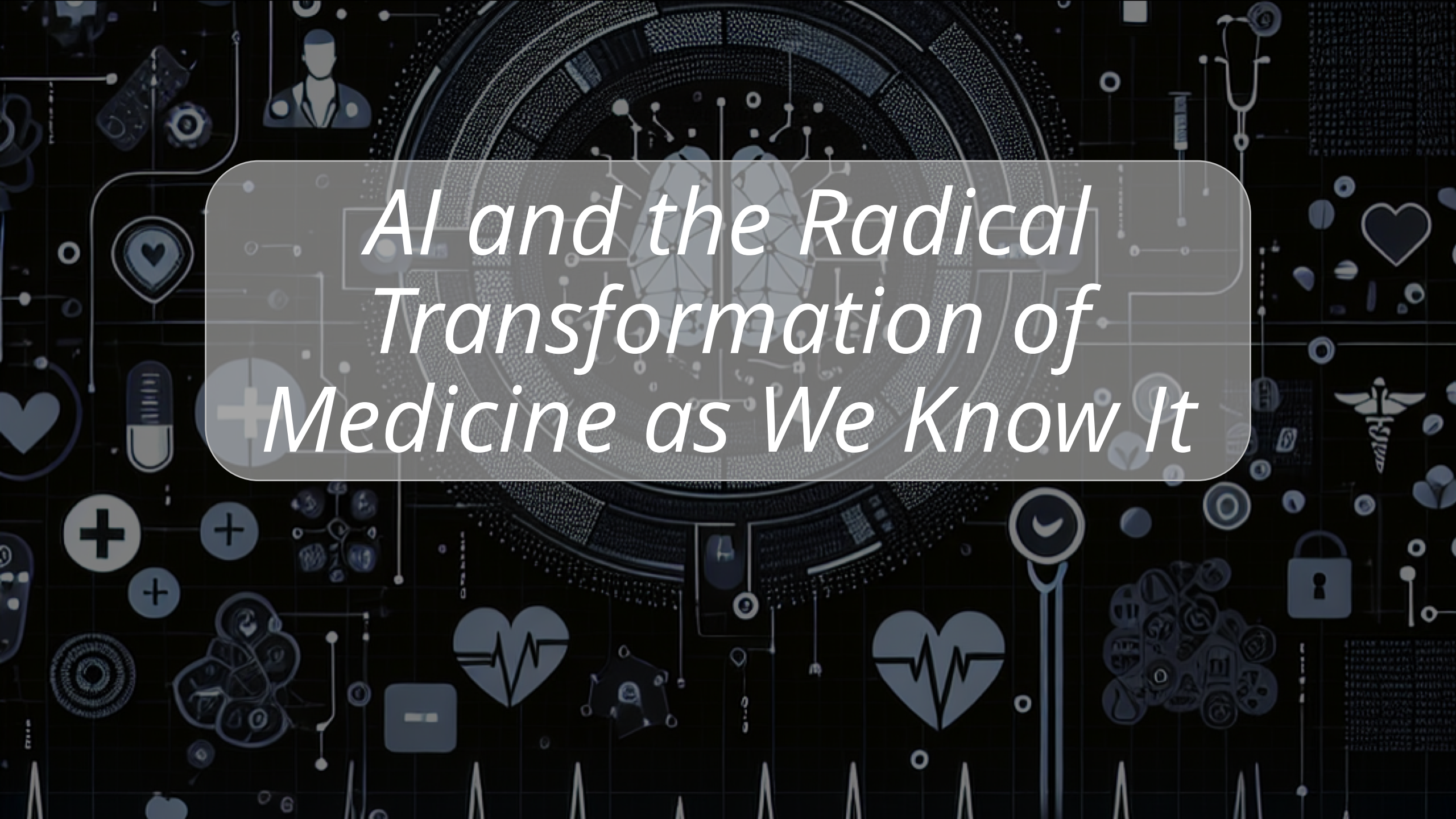


The background is a dark blue-grey grid filled with various medical and technological icons. These include a heart with a pulse line, a stethoscope, a syringe, a pill, a heart, a plus sign, a minus sign, a lock, a key, a person icon, a circular diagram with a network of nodes, and a large circular graphic resembling a DNA helix or a complex circuit. The icons are rendered in a lighter blue-grey color, creating a subtle, high-tech medical aesthetic.

AI and the Radical Transformation of Medicine as We Know It

Outline

- How did we get here?
- Doctors
- Hospitals
- Imaging
- Pharma
- Eldercare
- Caution
- What's next
- Q&A



Recent Headlines

Global Corporate AI investments reached \$252.3 Billion in 2024.

CB Insights February 2025

“Using AI effectively is now a fundamental expectation of everyone at Shopify.” *Tobi Lutke, CEO Shopify*

April 7, 2025

FDA Announces Completion of First AI-Assisted Scientific Review Pilot and Aggressive Agency-Wide AI Rollout Timeline

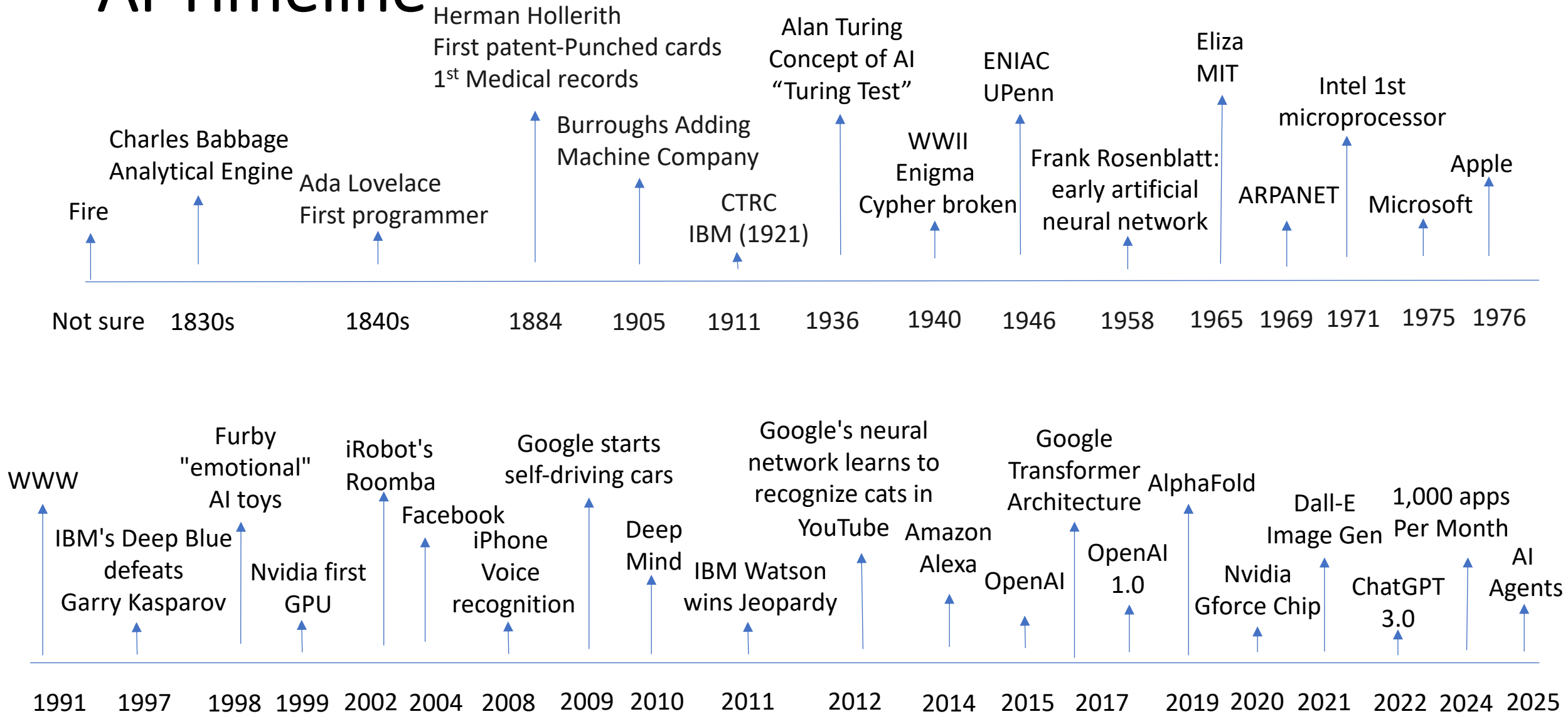
May 8, 2025

How did we
get here?

Gradually
then
Suddenly

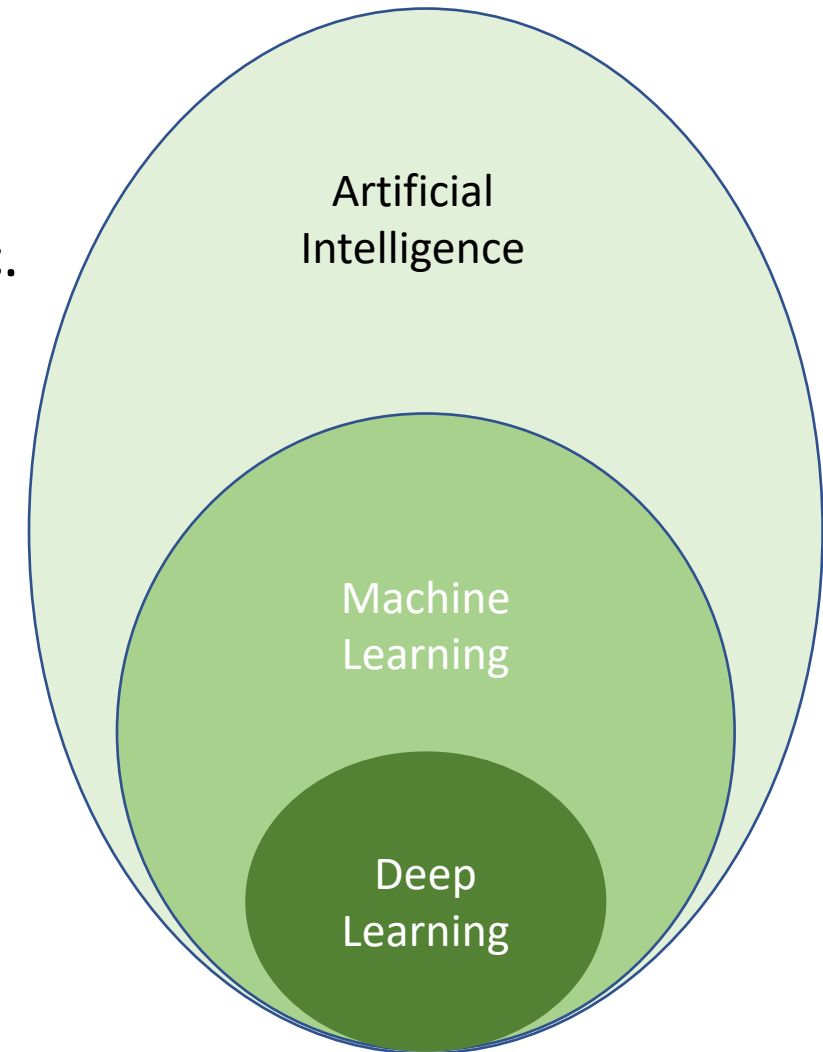


AI Timeline



Definitions

- AI: ML and DL to solve problems, LLMs.
- ML: uses algorithms, lists of rules, to:
 - Prediction engines: next movie, purchase, songs, etc.
 - Recognition: images, speech, video, etc.
- Deep Learning
 - Leverages neural networks to mimic human brain
- Training
 - Provide examples
 - Supervised, unsupervised
 - Reinforcement
 - Testing before releasing
 - Human in the middle

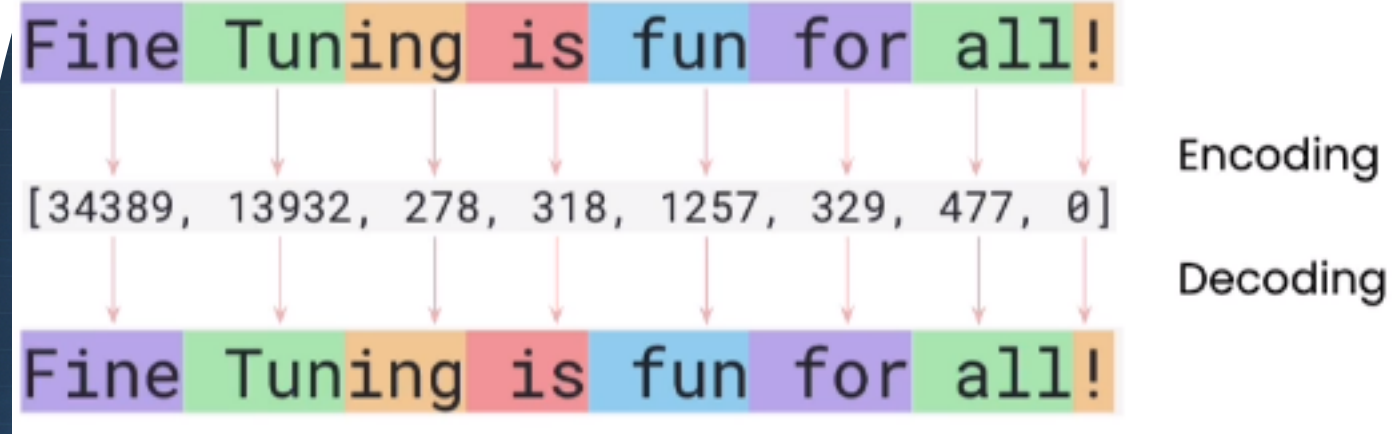


Large Language Models (LLM)

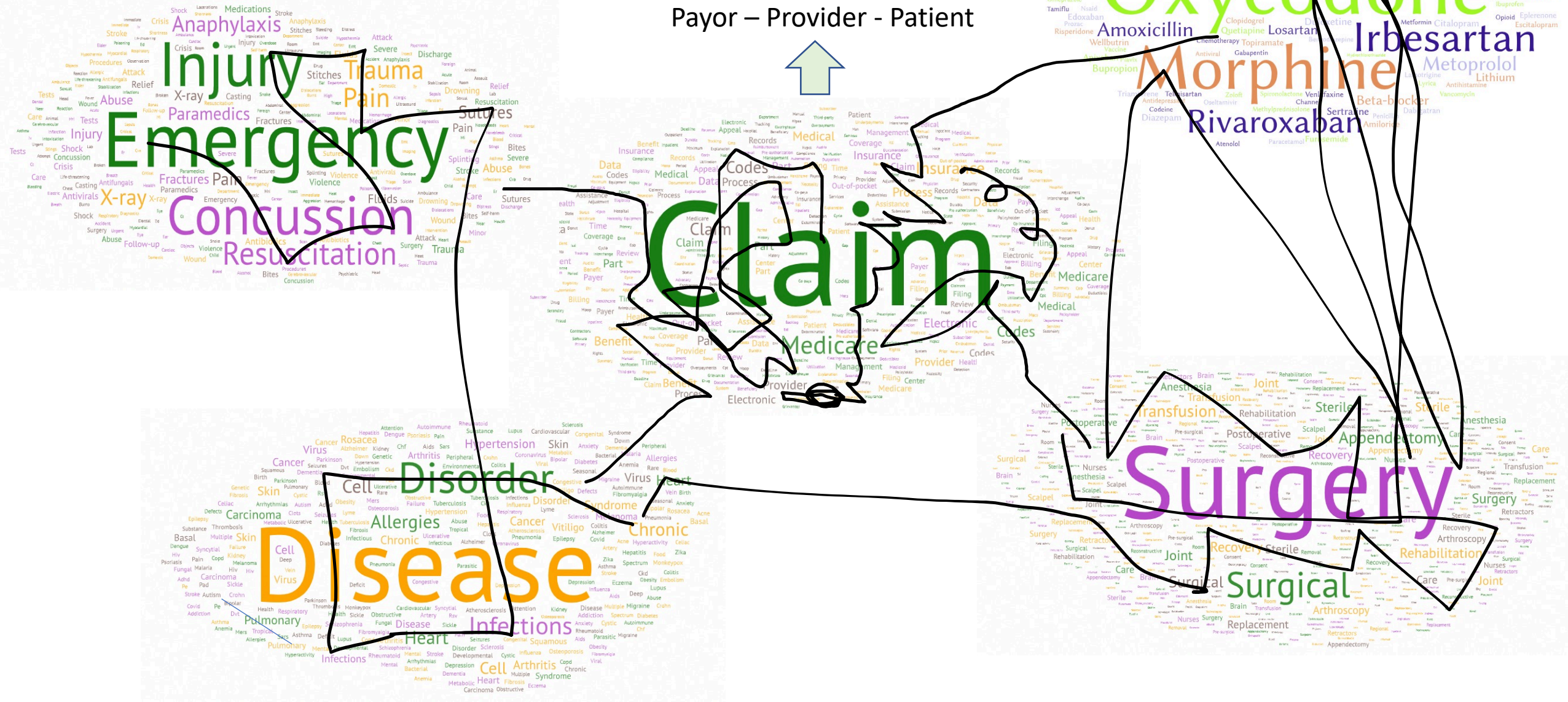


Tokens

- Words divided into Tokens
- Tokens assigned a value
- Values used in predicting
- Predictions create words
- Words create sentences
- Sentences, paragraphs, documents
- Models have different probabilities/predictions
- GPT: Generative Pretrained Transformer



Healthcare Specific Data



AI for Docs

- Co-Pilot
 - Listens to conversations (ambient)
 - Transcribes
 - Recommends: follow-up questions, procedures, meds, referrals
 - Summarizes
 - Formats to EMR
- Benefits
 - Save 2-3 hours a day
 - Reduces errors
 - Increases diagnosis
 - Integrated reminders
 - System wide acceptance



Jan. 23, 2024 9:00 AM

UPLOADING...

Kim Nuen

DOB: 06.18.1979

67%

Jan. 23, 2024 9:30 AM

00:37:42 □

Jerome Wallace

DOB: 03.15.1989

Jan. 23, 2024 10:00AM

🕒 00:12:24

Danielle Pinion

DOB: 02.12.1992

Jan. 23, 2024 10:30AM

SENT

Tiffany Wu

DOB: 11.24.1984

Jan. 23, 2024 11:00AM

NOT STARTED

Eric Anderson

DOB: 12.06.1965

Jerome Wallace

DOB: 09.15.79 / HE/HIM

CLINICAL NOTE

PATIENT VISIT SUMMARY

History of Present Illness

The patient, with a known history of hypertension and a family history of heart disease, presents with a complaint of chest pain that has been ongoing for the past few days. He has experienced similar episodes in the past, typically associated with periods of high stress and increased workload. The chest pain is reported to worsen with physical activity.

In addition to the chest pain, the patient has noticed an increase in fatigue with activity. He has also been experiencing an intermittent cough, although he is unsure if this is related to the current chest pain. The patient denies any associated symptoms, such as shortness of breath, fever, chills, nausea, or vomiting.

Despite being prescribed lisinopril for his hypertension, the patient admits to not taking the medication regularly due to work-related reasons.

Assesment & Plan

Chest Pain: New onset, worsened with activity, associated with fatigue. Given the patient's risk factors (hypertension, family history), there is concern for cardiac etiology.

- Order CBC, BMP, and troponins today.
- Perform EKG and echocardiogram today.
- Follow-up after results are available.

Hypertension: Elevated blood pressure in office, patient noncompliant with Lisinopril due to work-related issues.

- Encourage daily use of Lisinopril 10mg daily.
- Involve social worker to assist with improving medication compliance.
- Advise patient to keep a blood pressure diary, checking once daily at the same time for the next two weeks.

Physical Exam

VITALS: BP-160/80

TRANSCRIPT

CODING

BMP, and some troponins. That'll help us understand how much stress your body's under in general.

We're also going to do a echocardiogram and an EKG. How does that sound?

Whatever needs to be done. Thank you very much.

And then let's talk about your hypertension.

We really need to be taking your medication every day.

Um, so I'll I'll have our social worker reach out on ways we might be able to improve your ability to take this medication regularly. Also, check your blood pressure once a day at the same time for the next couple of weeks, and we'll follow up with you.

How's that sound?

Sounds great.

Appreciate that.

Perfect.

Okay.

Thanks very much.

COPY ALL

SEND TO EMR

▶ 0:01:12

⏮

0:34:55

1x

Where is AI Playing a Part?

POST-VISIT

- Self-served patient education
- Auto schedule follow-up appointments
- Initiate medication adherence actions
- Deliver summarized and actionable test results
- Simplify patient communication

CODING

- Determine accurate codes for billing
- Generate 'clean claims'
- Auto-disposition denials and follow-ups



PRE-VISIT

- Review medical history & previous notes
- Generate and synthesize new patient summary

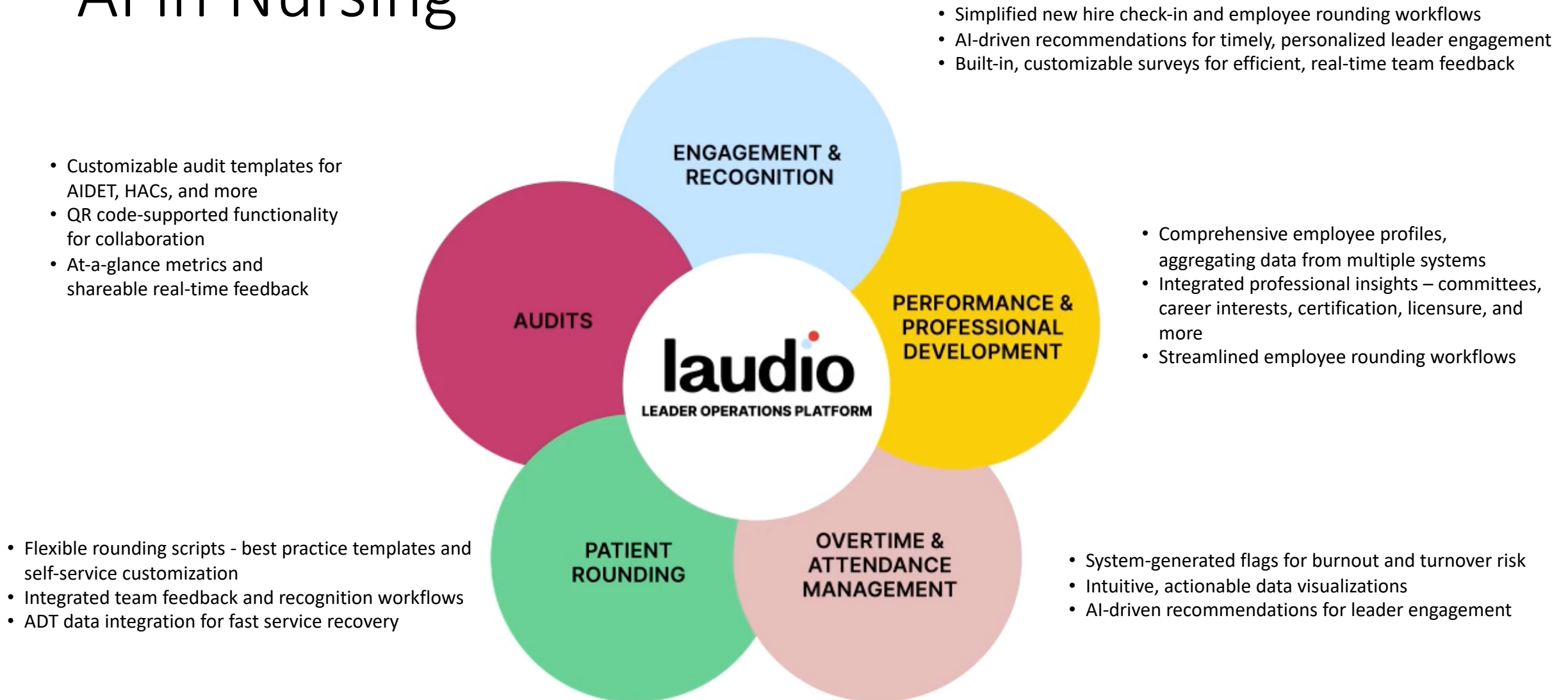
PATIENT ENCOUNTER

- Verify & update patient information
- Complete exam & define diagnosis
- Complete assessment & planning
- Order tests & medications

DOCUMENTATION

- Complete SOAP notes
- Generate encounter documentation
- Finalize and sign encounter

AI in Nursing



[Volume 6, Issue 4](#) E281-E290 April 2024

Foresight

A GPT for modelling of patient timelines using EHRs

[Zeljko Kraljevic, MSc^{a,e}](#) · [Dan Bean, PhD^{a,e}](#) · [Anthony Shek, PhD^{b,c}](#) · [Rebecca Bendayan, PhD^{a,e}](#) · [Prof Harry Hemingway, PhD^{d,f}](#) · [Joshua Au Yeung, MBBS^{b,c}](#) · [Alexander Deng, MBBS^c](#) · [Alfred Balston, MBBS^c](#) · [Jack Ross, MBBS^c](#) · [Esther Idowu, MBBS^c](#) · [Prof James T Teo, MBBS^{b,c,†}](#) · [Prof Richard J B Dobson, PhD](#)

Articles

Maternal risk assessment for women with pre-eclampsia
See page e238

Articles

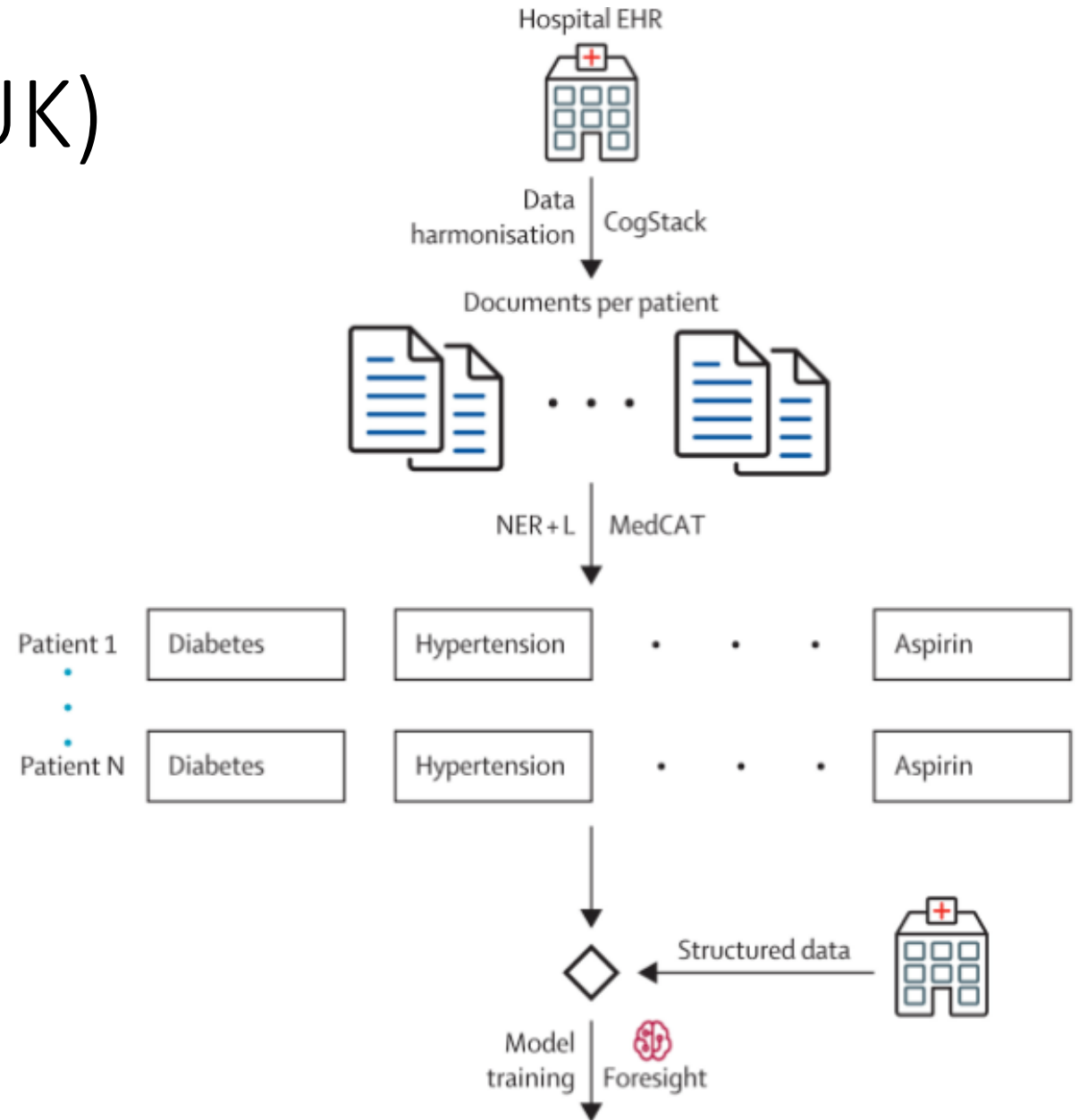
Generative pretrained transformer for modelling of patient timelines
See page e281

Viewpoint

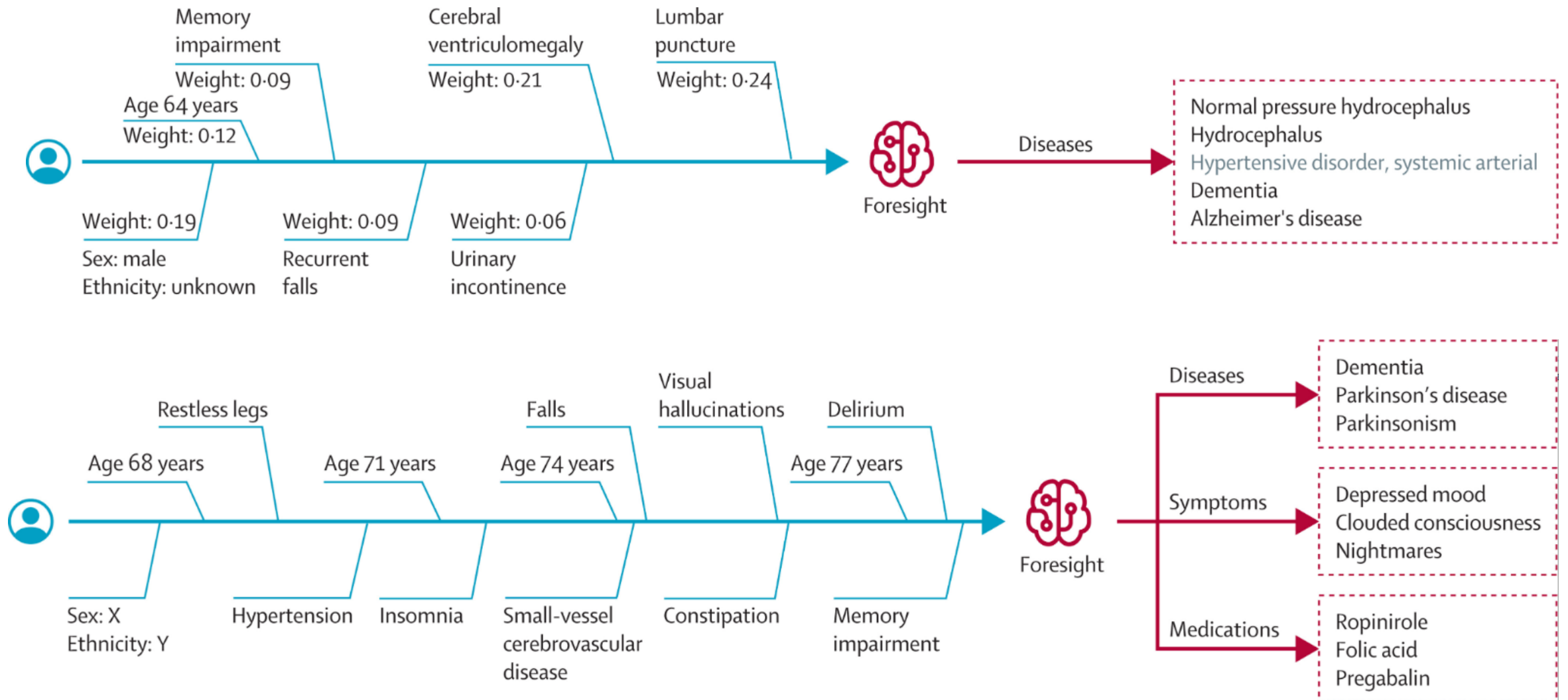
Remote technologies for improving care for people with respiratory disorders
See page e291

EHR Consolidation (UK)

- National Health Service (NHS)
- Foresight
- 57 Million patients
- 5 years of data
- 3 Hospitals
- All anonymized
- Previously: 7MM Denmark



Predict patient's health



Clinical Follow-up



Hippocratic AI
— Do No Harm —

Call Agenda

- ✓ Identity Verification
- ✓ Patient Check-In
- ✓ Medication Review
- ✓ Diet Review
- ✓ CHF Symptom Self-Assessment
- ✓ Physical Activity Review
- ✓ Summarizes Call for Patient



Rachel



Fictional Patient Info

- Patient Name: Jane
- Gender: Female
- Age: 74

Health History

- Discharged from the hospital 3 days ago following an acute CHF exacerbation.

Medication List

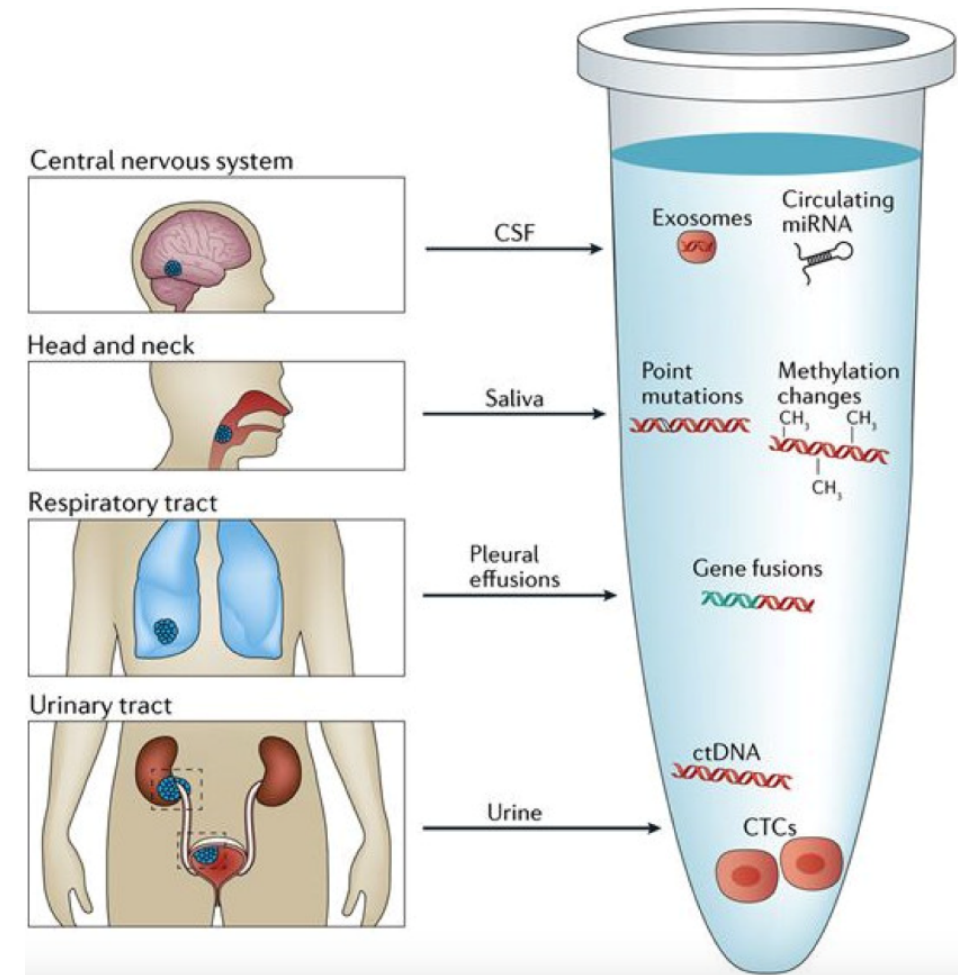
- Lasix, Digoxin, Enalapril, Metformin, Riboflavin, Atorvastatin, Tramadol, Levothyroxine

Fictional Patient Played by a Registered Nurse

Liquid Biopsy

- Fragments
 - DNA
 - Cells
- Pattern Matching (ML) before symptoms
- Cancer
- Alzheimer's
- Chronic diseases

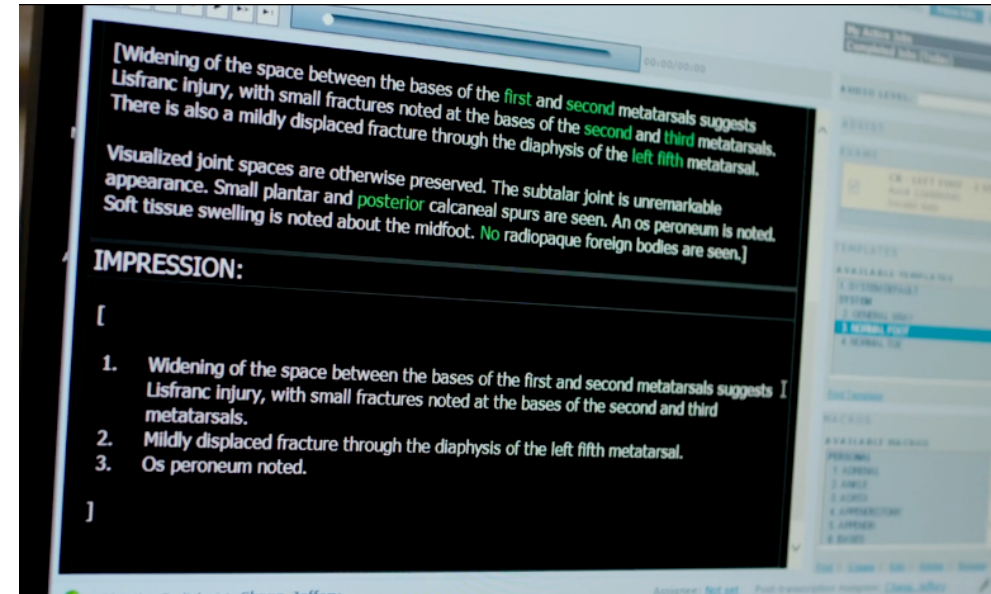
"This is a really exciting time as we develop blood tests that can be transformative for people in the early detection and more specific identification of disease," says Dr. William Morice, a physician who heads Mayo Clinic Laboratories in Rochester, Minn.



Radiology Example



AI generated
impression
specific to the
radiologist



Imaging

- Faster turn around times
- Improved diagnostic accuracy
- Earlier detection of disease
- Shorten reading time for Radiologist
- Reduction of dose and contrast agents
- Digital assistants
- Reduces burnout

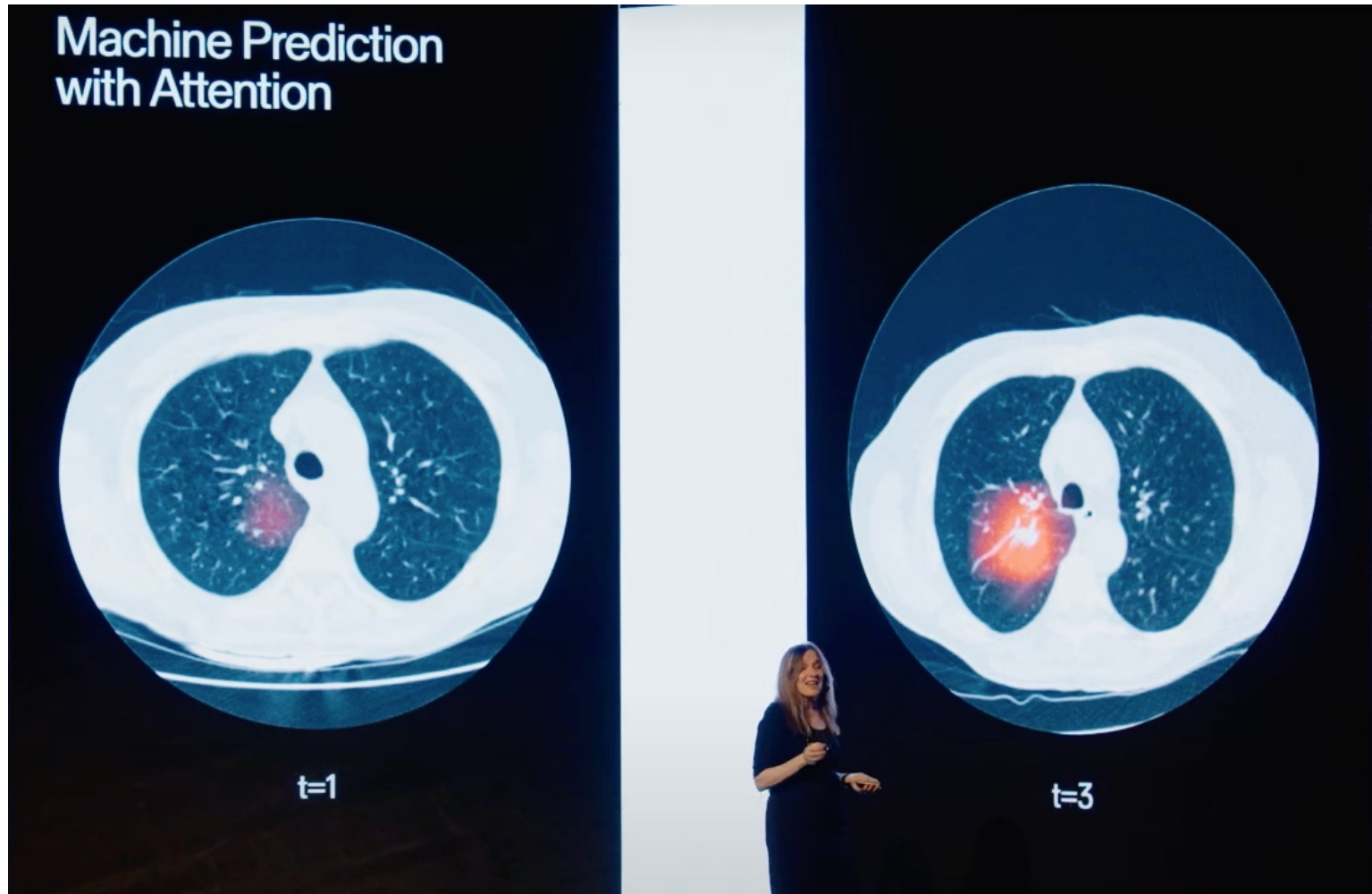
aidoc



justdone

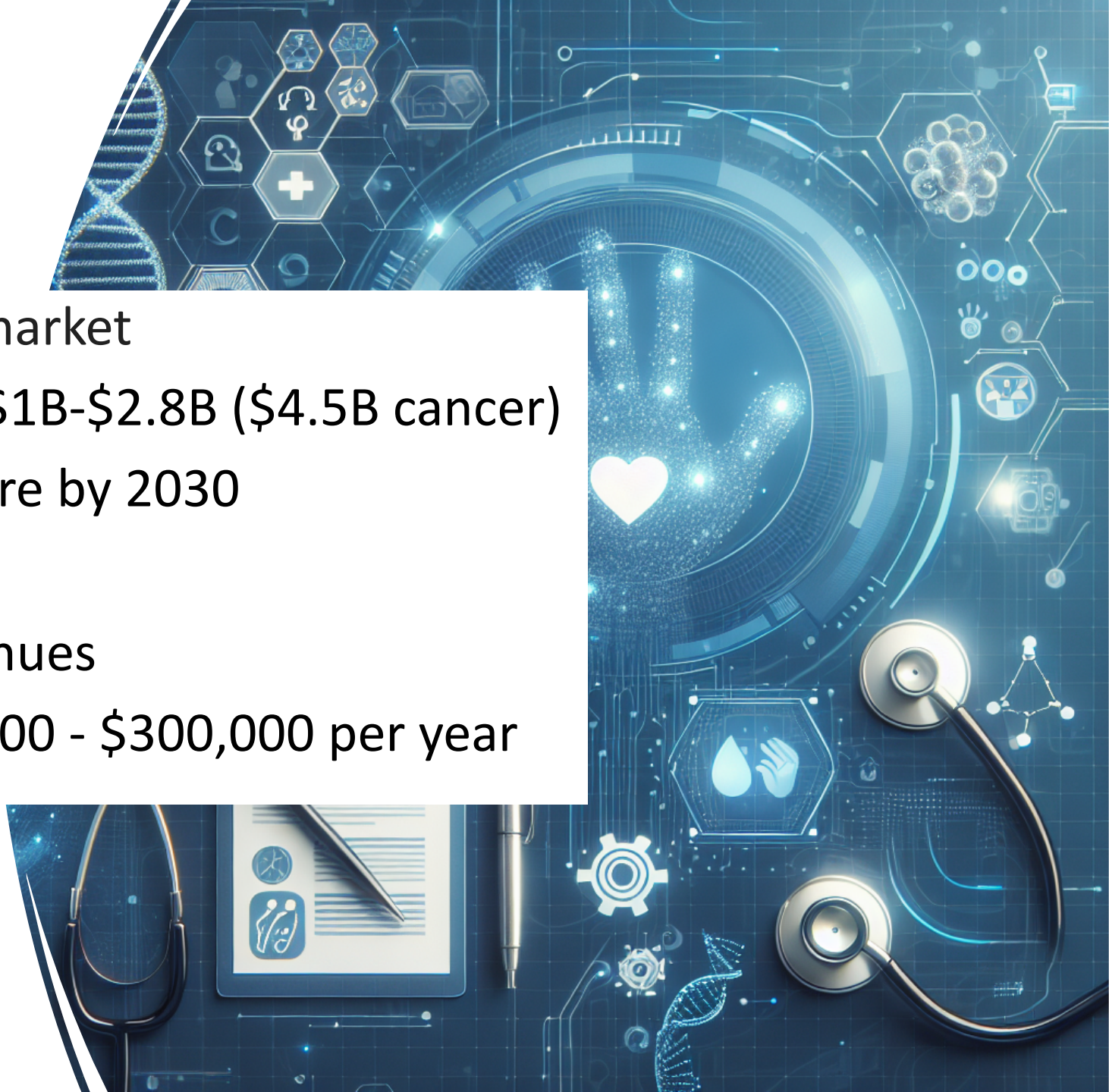


Predicting Cancer

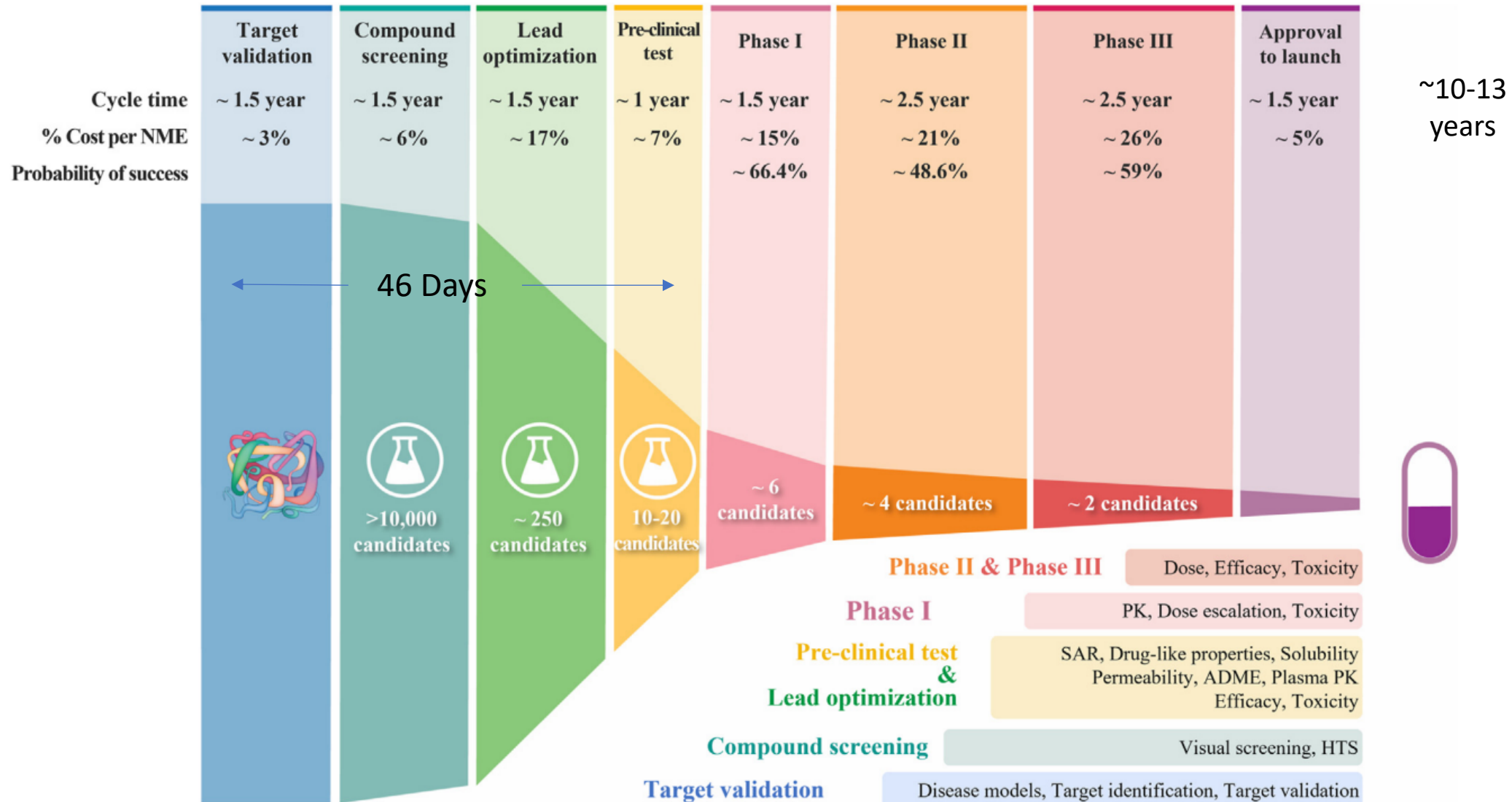


Pharma

- Average 12 years bench to market
- Min development costs: US\$1B-\$2.8B (\$4.5B cancer)
- Scores of patents set to expire by 2030
- \$200 billion loss – generics
- At risk of losing 46% of revenues
- New drugs retail price \$12,000 - \$300,000 per year
- Feds looking to cap costs



Pharma: Timeline



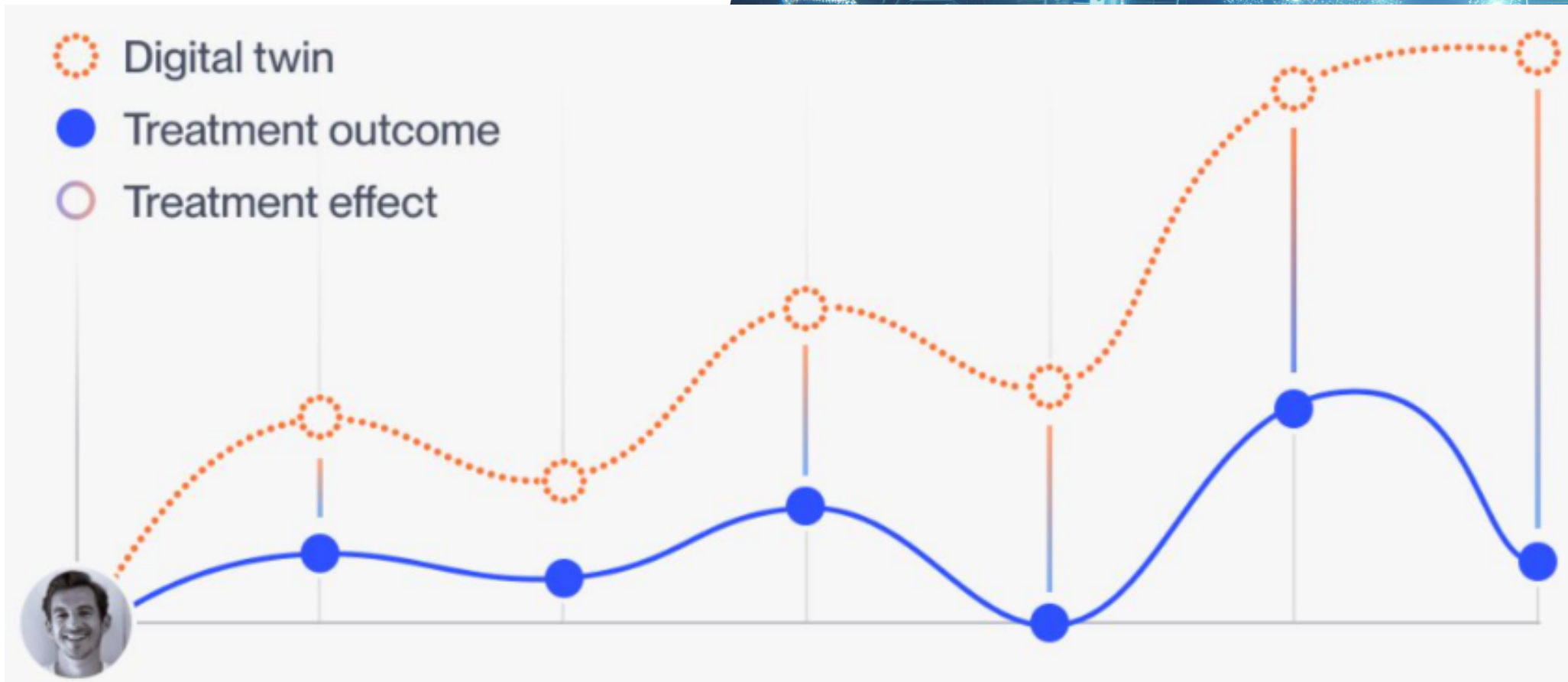
Pharma

- Deep Mind-UK (Google)
- AI Chemist
- All possible chemical combinations
- Insilico
 - 21 days to create 30,000 designs for molecules – Pulmonary fibrosis (tissue scarring)
 - Synthesized six of these molecules
 - Tested two in cells; the most promising one was tested in mice
 - Between 2021 and 2024, Insilico says it advanced 22 preclinical candidates in just 12 to 18 months per project.
 - Pipeline of 30 drug candidates, with 10 having received FDA approval



Pharma – Digital Twins

- Used in manufacturing for over a decade
- Allows testing different scenarios



AI Extreme Biology



- FDA announced phasing out animal testing
- Somites: embryonic structures to create any type of tissue.
- Cell Replacement Therapy
- AI foundation model platform: DeltaStem.
- Step-by-step instruction of desired cell types at large scale.
- Replace and replenish any diseased or damaged body tissue.
- “We're developing life language models.”
Micha Breakstone, Co-Founder.

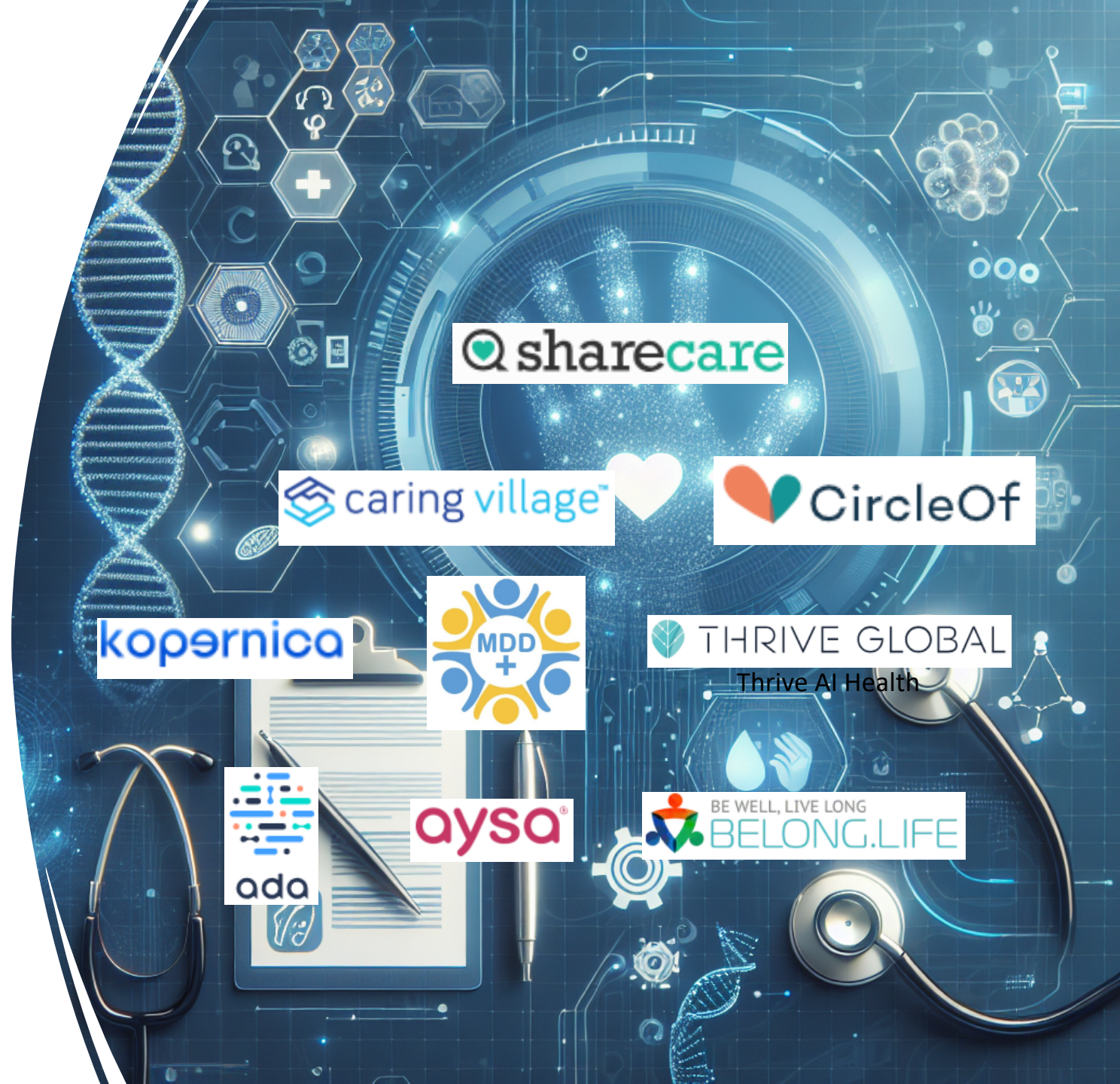
Eldercare

- Watches: Apple, Fitbit, Garmin, etc.
 - Heart/ECG: Rates, Rhythms, Abnormal, Hypertension
 - Infection: Abnormal levels over time
 - Falls: Automatic notifications
 - GPS: Geo fencing
 - Environment: Temp, DB Levels
 - Oxygen Levels
- 2009: LTC facility predicted poor health 9 days in advance
- Data sent to Doctor/EMR



Family

- Apps
 - Family, Caregivers, Doctors, Nurses
 - Coordinate care
 - Monitor events
- Bots
 - Conversational
 - Mental health
 - (some) EMR integration
- Features
 - Real-time access
 - Collaboration
 - Division of Care
 - Health literacy



Discovery engines

AI-derived small molecule drugs

METAPHORE

Superluminal
MEDICINES

healx

ENSEM
THERAPEUTICS

Ilorion
THERAPEUTICS

enveda*

Iambic

TERRAY

VERGE
genomics

Insilico
Medicine

Unnatural Products

Vesalius

congruence^{TX}

ATAVISTIK

Athos

RELATION

FRONTIER
MEDICINES

AQEMIA

Genesis
Therapeutics

Arctic Therapeutics

AI-powered drug repurposing platforms

SOM
BIOTECH

purposeful

AI-derived biological drugs

INSAMO

LabGenius

xaira

Inceptive

Shape^{TX}

BigHat
BIOSCIENCES

ANKYRA

VILYA

ArsenalBio

ABIOLIGICS

ENVISAGENICS

fable
THERAPEUTICS

Atomic AI

Generate:Biomedicines

alltrna

leman

NOETIK

SEISMIC
THERAPEUTIC

PRELLIS

ManifoldBio

Software platforms

AI drug target identification platforms



AI protein engineering platforms



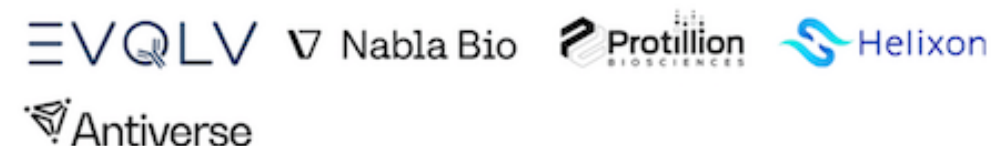
AI molecular design platforms



Cell & tissue analysis for drug discovery



AI antibody design platforms

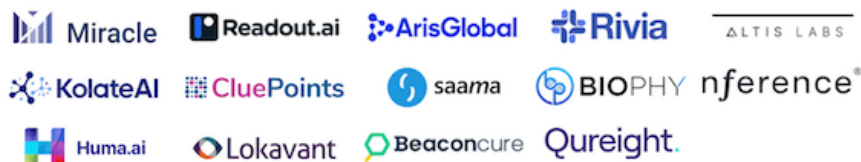


Quantum computing for drug discovery



Clinical development

Clinical trial data analytics platforms



Protocol design & optimization tools



Decentralized clinical trial platforms



Clinical trial management systems



AI in pharmaceutical manufacturing



EHR-based patient recruitment platforms



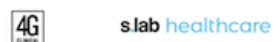
Clinical trial regulatory solutions



Trial recruitment optimization tools



Clinical trial supply management



Patient-facing trial discovery platforms



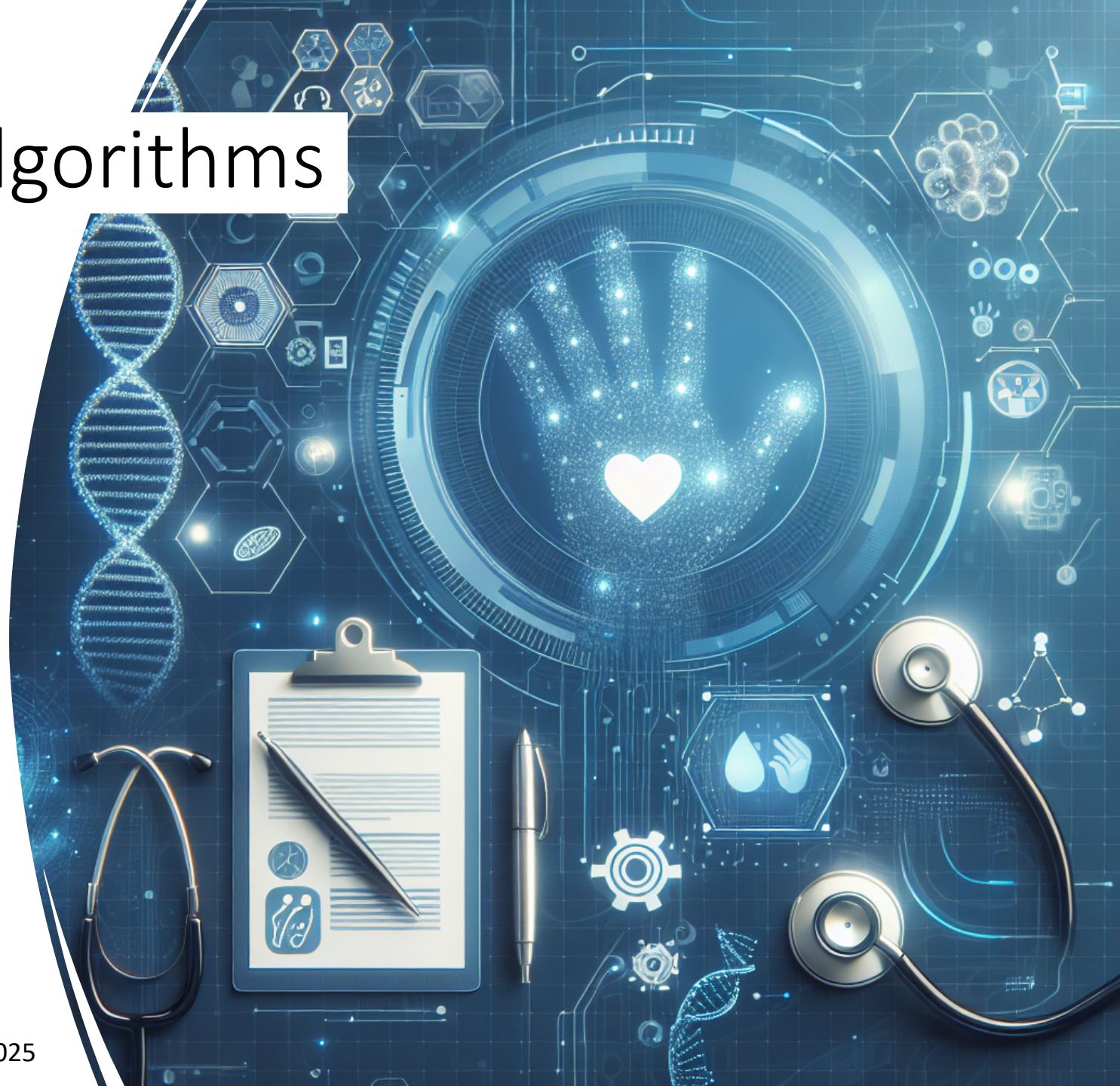
AI-enabled pharmacovigilance



FDA approved AI algorithms

Area	
Anesthesiology	17
Cardiovascular	104
Clinical Chemistry	9
Clinical Txicology	5
Dental	4
Gastroenterology-Urology	14
General and Plastic Surgery	2
General Hospital	4
Hematology	17
Immunology	1
Microbiology	5
Neurology	42
Obstetrics and Gynecology	1
Ophthalmic	9
Orthopedic	2
Pathology	3
Radiology	777
Grand Total	1016

As of June 2025



AI Healthcare Organizations

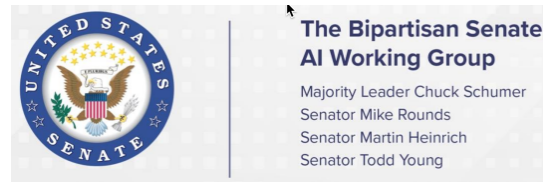


AI Healthcare Coalition



Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence

BRIEFING ROOM PRESIDENTIAL ACTIONS

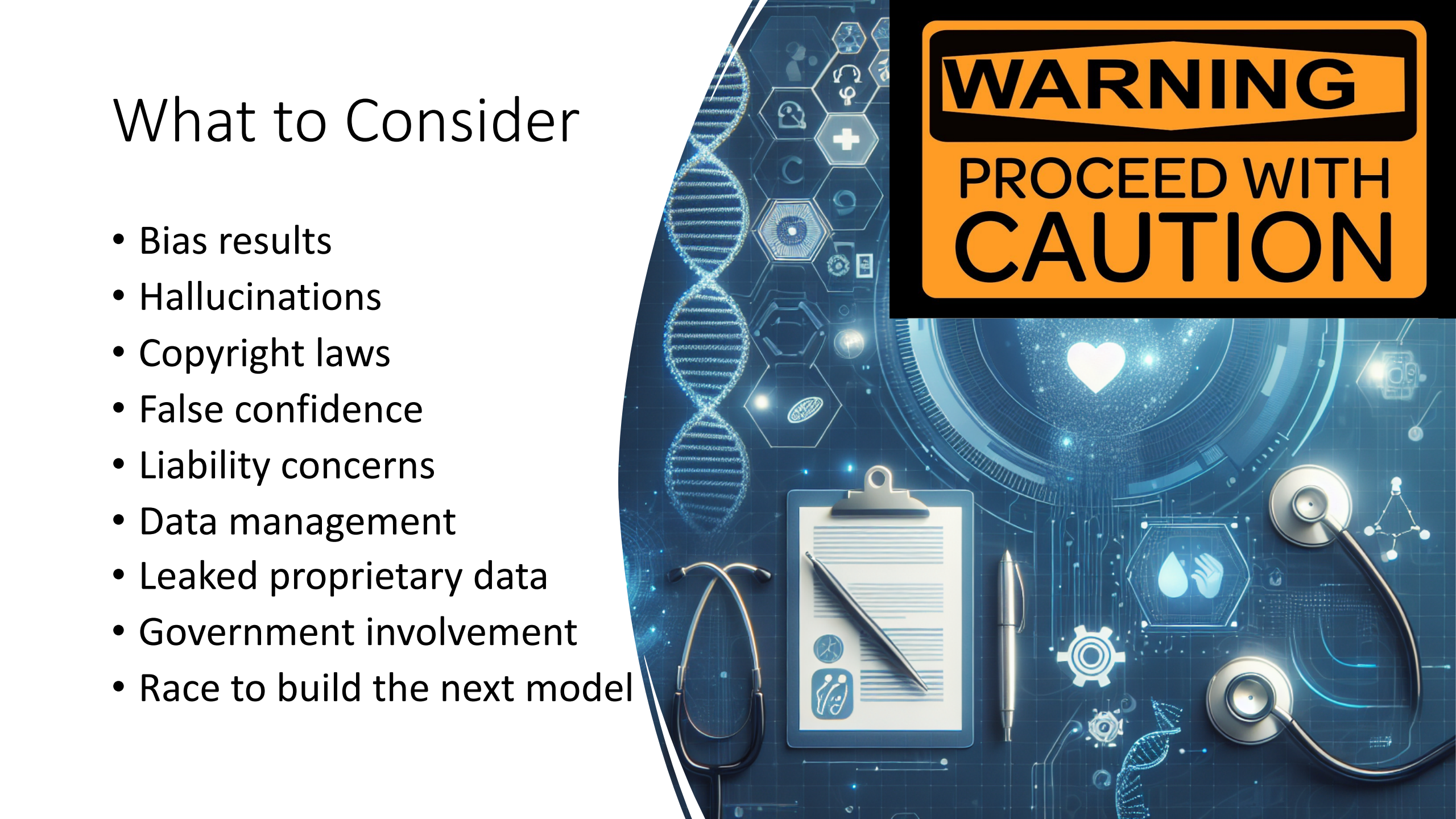


Second Regular Session | 74th General Assembly
Colorado General Assembly



What to Consider

- Bias results
- Hallucinations
- Copyright laws
- False confidence
- Liability concerns
- Data management
- Leaked proprietary data
- Government involvement
- Race to build the next model



WARNING
PROCEED WITH
CAUTION

What's Next?



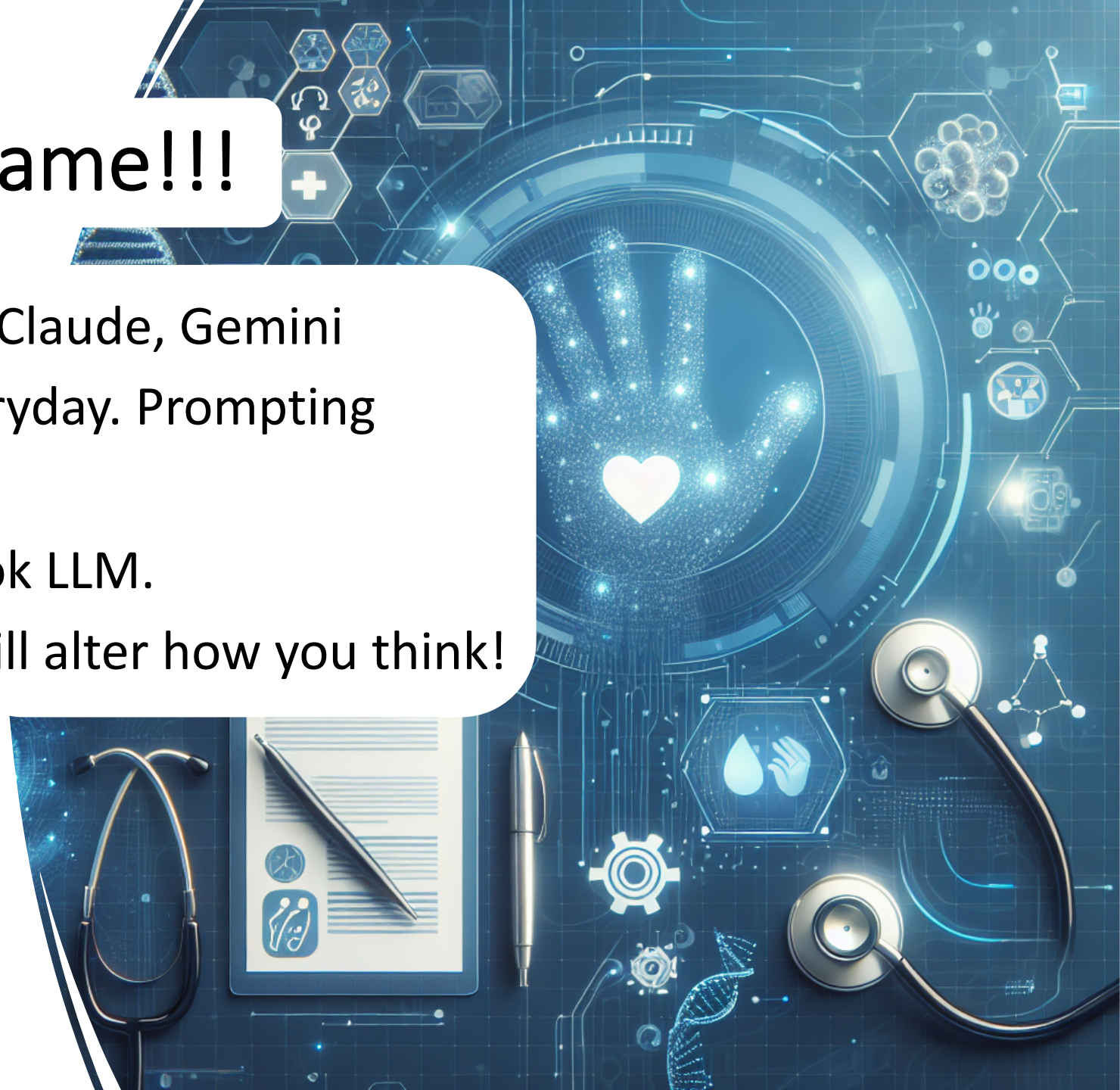
What's Next

- Home Health
 - Every metabolic measurement done at home - frequently
 - Diagnostics: Early prevention & disease detection
 - Treatment: Personalize based on genomics & curated plan
 - Longer health span
 - Robots
- Health Systems
 - Expansion of Telehealth/Virtual health
 - Reduction of in-patient load
 - Bots will take over the “front door”
- Pharma
 - 2–5-year drug development cycle
 - No orphan diseases
 - Global access
- Insurance companies – no idea!
- All costs will drop
- Less GPs, Nurses, admin needed



Lastly, Get in the Game!!!

1. Pick a chat app: Open AI, Claude, Gemini
2. Learn how to use it – everyday. Prompting
3. Build a custom GPT.
4. Explore Google's Notebook LLM.
5. Use Deep Research – it will alter how you think!



References

- [FDA AI Pilot](#)
- [Shopify](#)
- [Duolingo](#)
- [Insilico Medicine](#)
- [AlphaFold](#)
- [Somite](#)
- [Cancer Prediction](#)
- [Tesla Roadster](#)
- [FDA AI Devices](#)
- [Claude AI](#)





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