

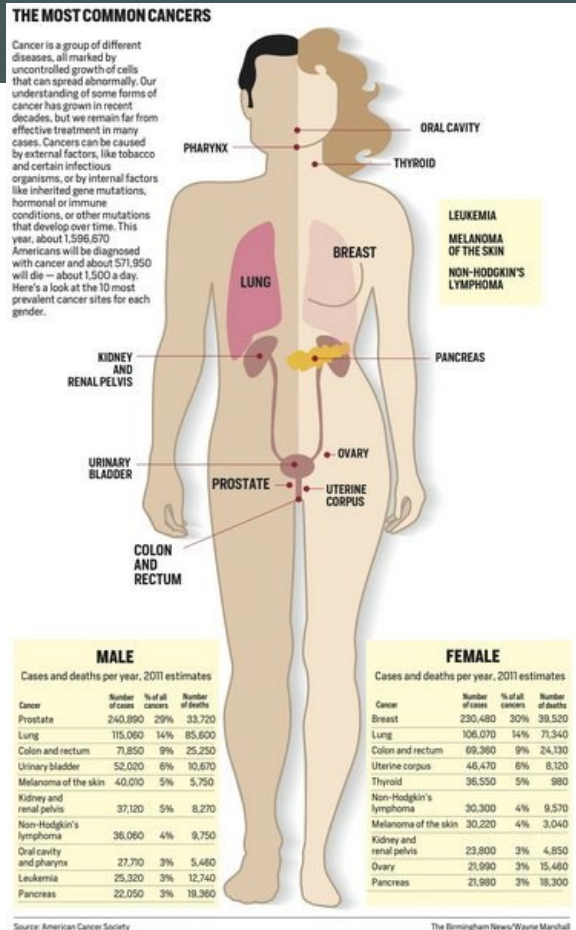


Towards Truly Personalized Medicine

Dr. Michael Forstner, CSO

MedGenie AG
Bottmingen, Switzerland

Cancers



Over 200 types of cancer
Categorized by where they start in the body and the type of tissue they affect.

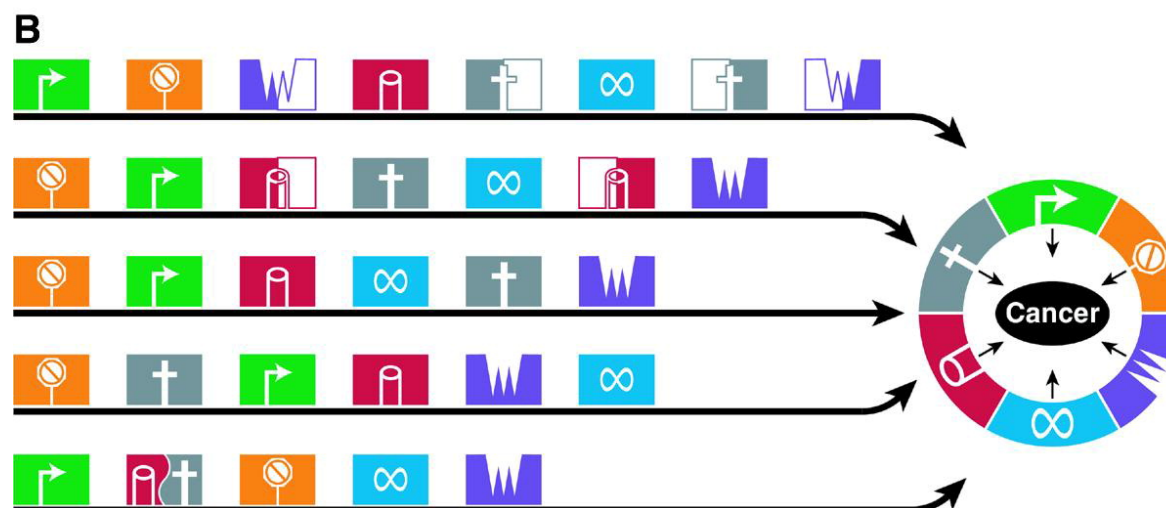
Three main types: solid cancers (like carcinoma and sarcoma), blood cancers (like leukemia and lymphoma), and mixed types.

Cancers

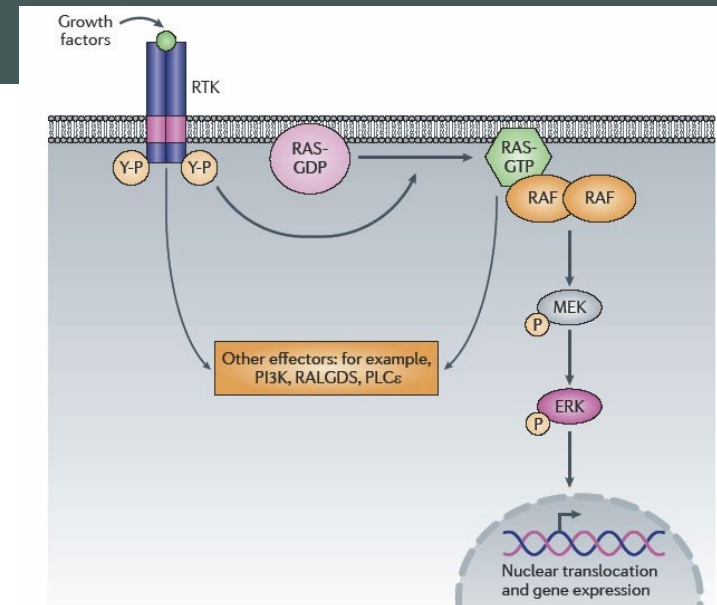


Med Genie

A		
Component	Acquired Capability	Example of Mechanism
	Self-sufficiency in growth signals	Activate H-Ras oncogene
	Insensitivity to anti-growth signals	Lose retinoblastoma suppressor
	Evading apoptosis	Produce IGF survival factors
	Limitless replicative potential	Turn on telomerase
	Sustained angiogenesis	Produce VEGF inducer
	Tissue invasion & metastasis	Inactivate E-cadherin



Personalized Medicine – First promises



Nature Reviews | Drug Discovery

The reality



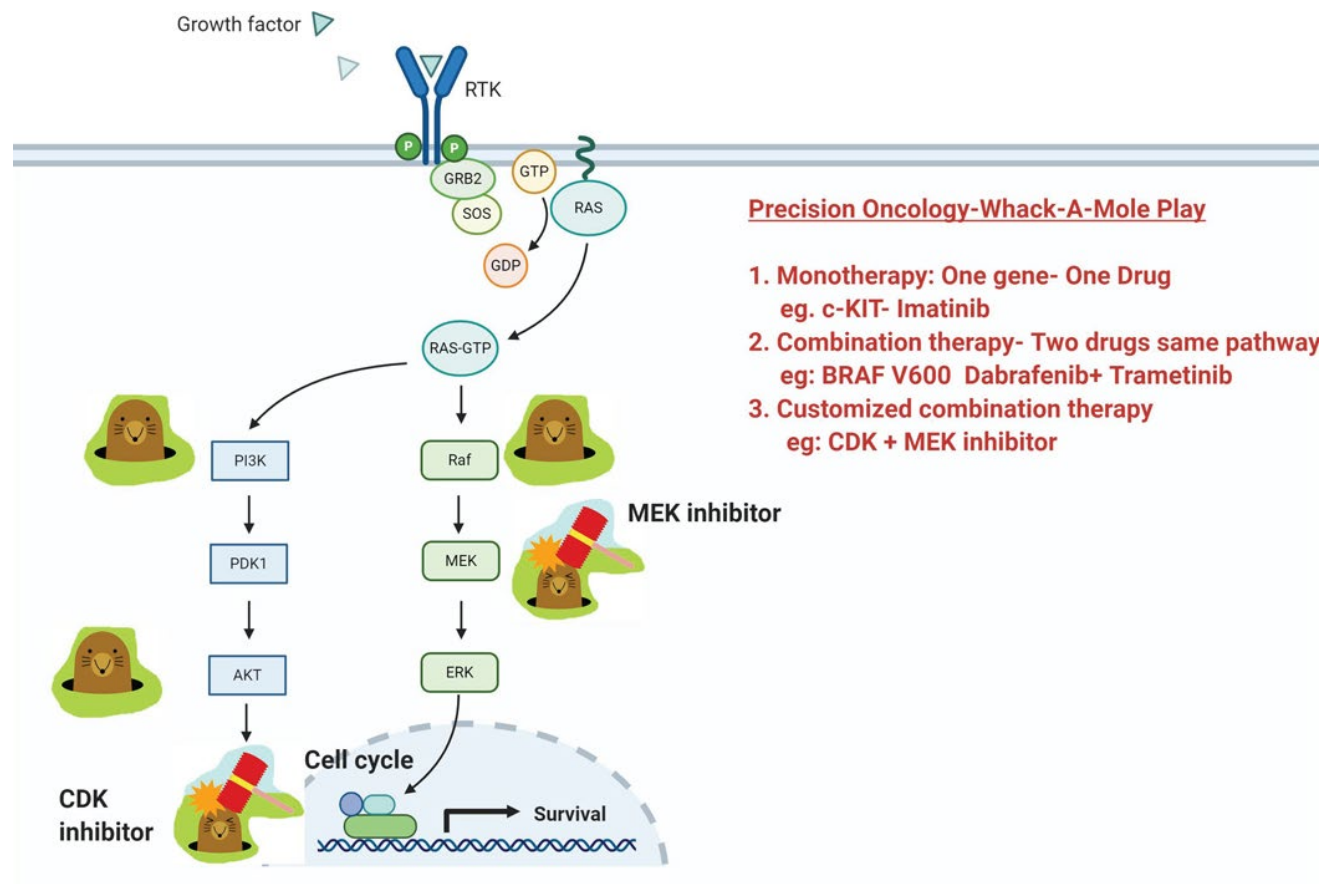
Med Genie



The reality



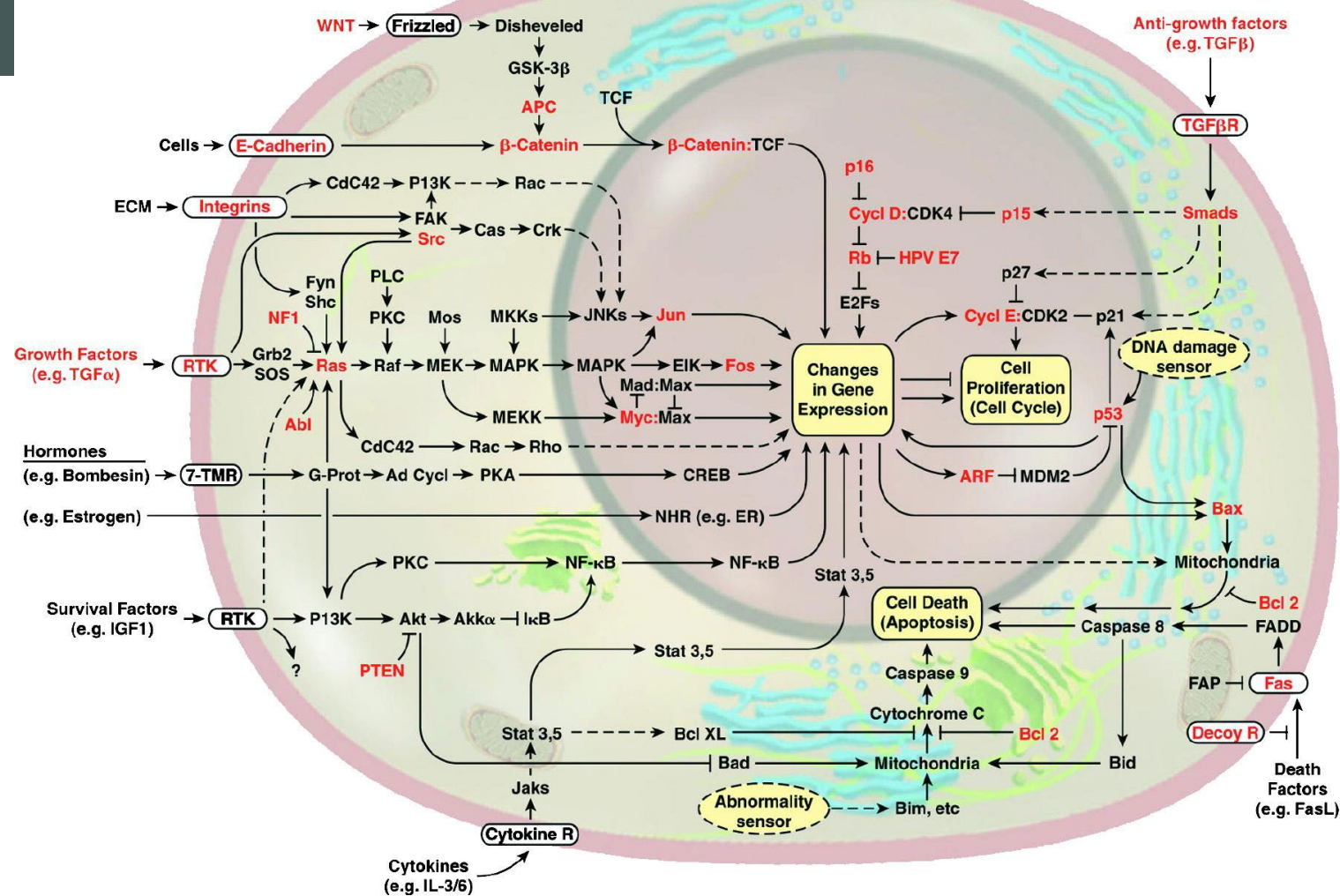
Med Genie



The reality



Med Genie

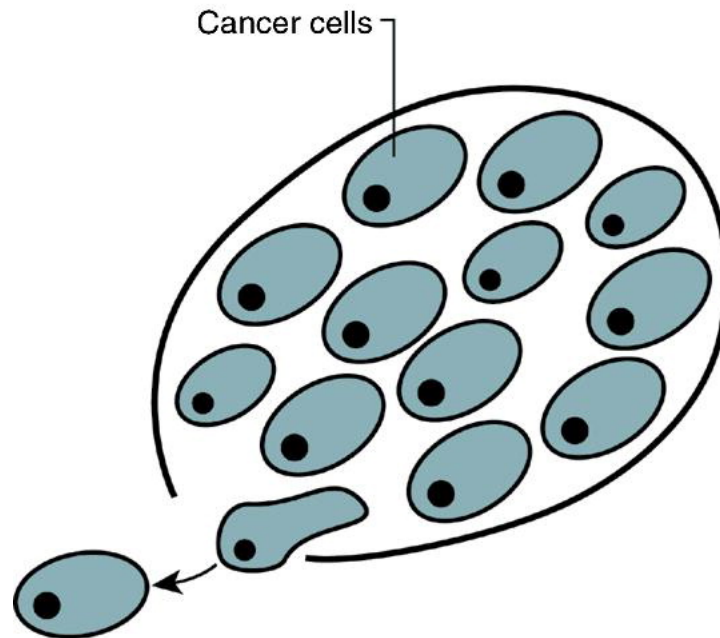


The reality

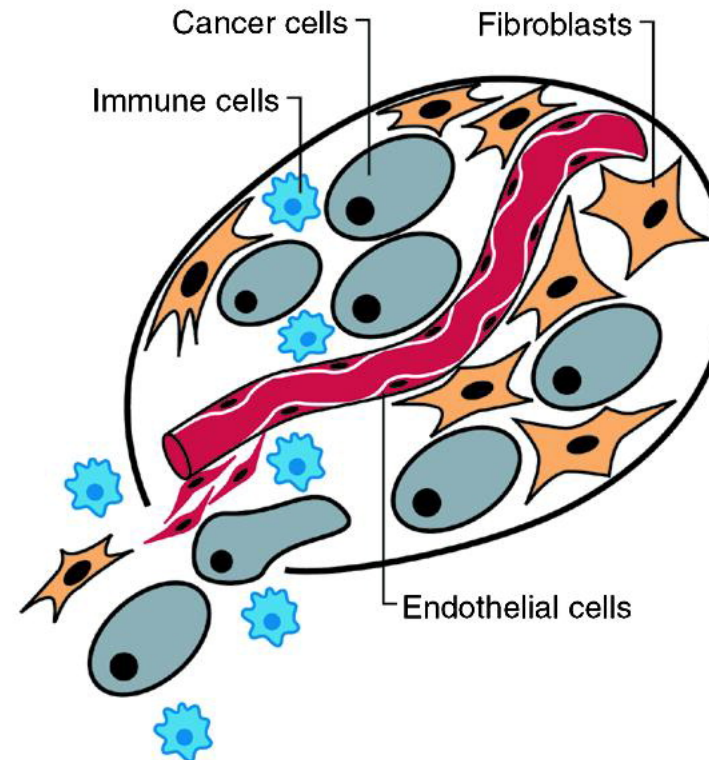


Med Genie

The Reductionist View



A Heterotypic Cell Biology



Oncology drugs



Six main types of chemotherapy with over 100 types of chemotherapy medicines

Since 1990: almost 600 new cancer drugs launched

Used in different combinations, regimens, doses, etc

Additionally, many different drugs are used for supportive care, such as those for pain or nausea

Plus other treatments: radiation, surgery, ...

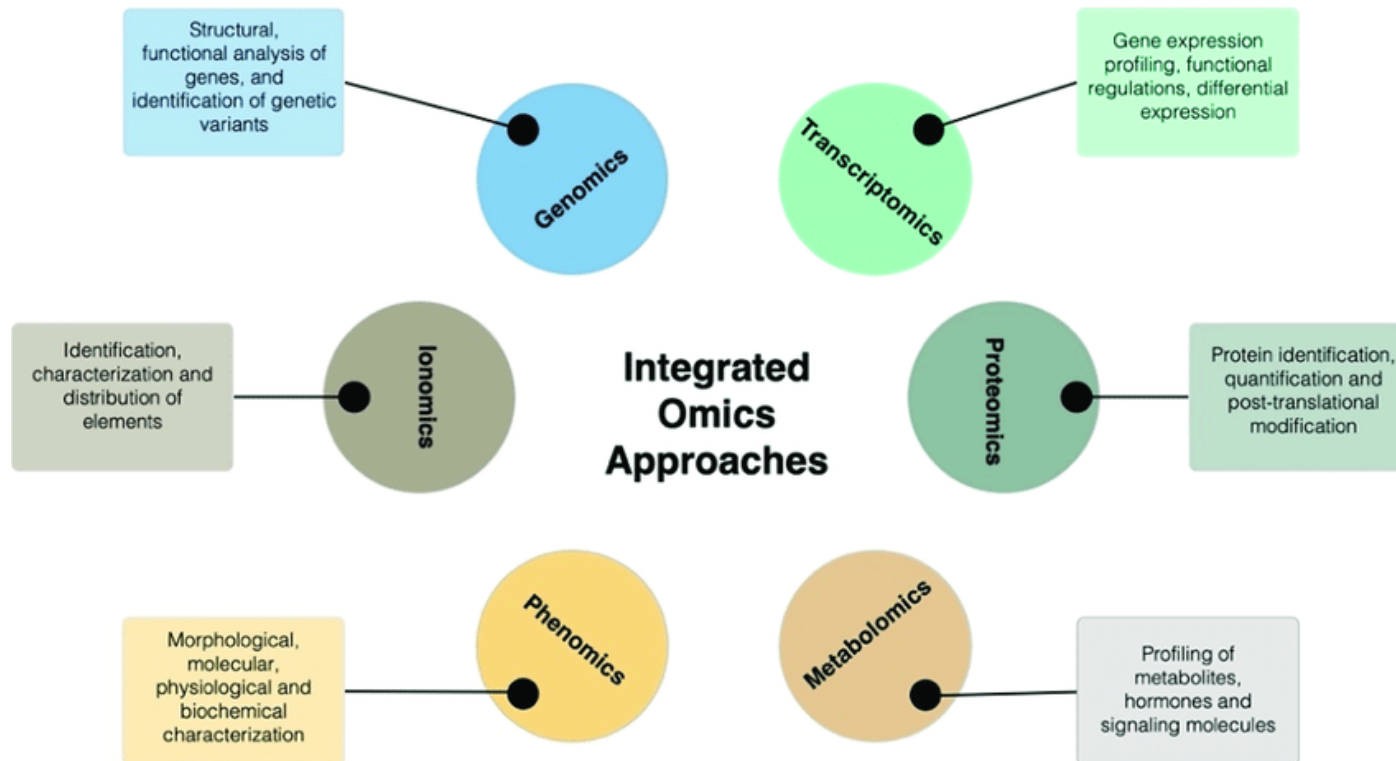
Patients



What are the characteristics of a «typical cancer patient»



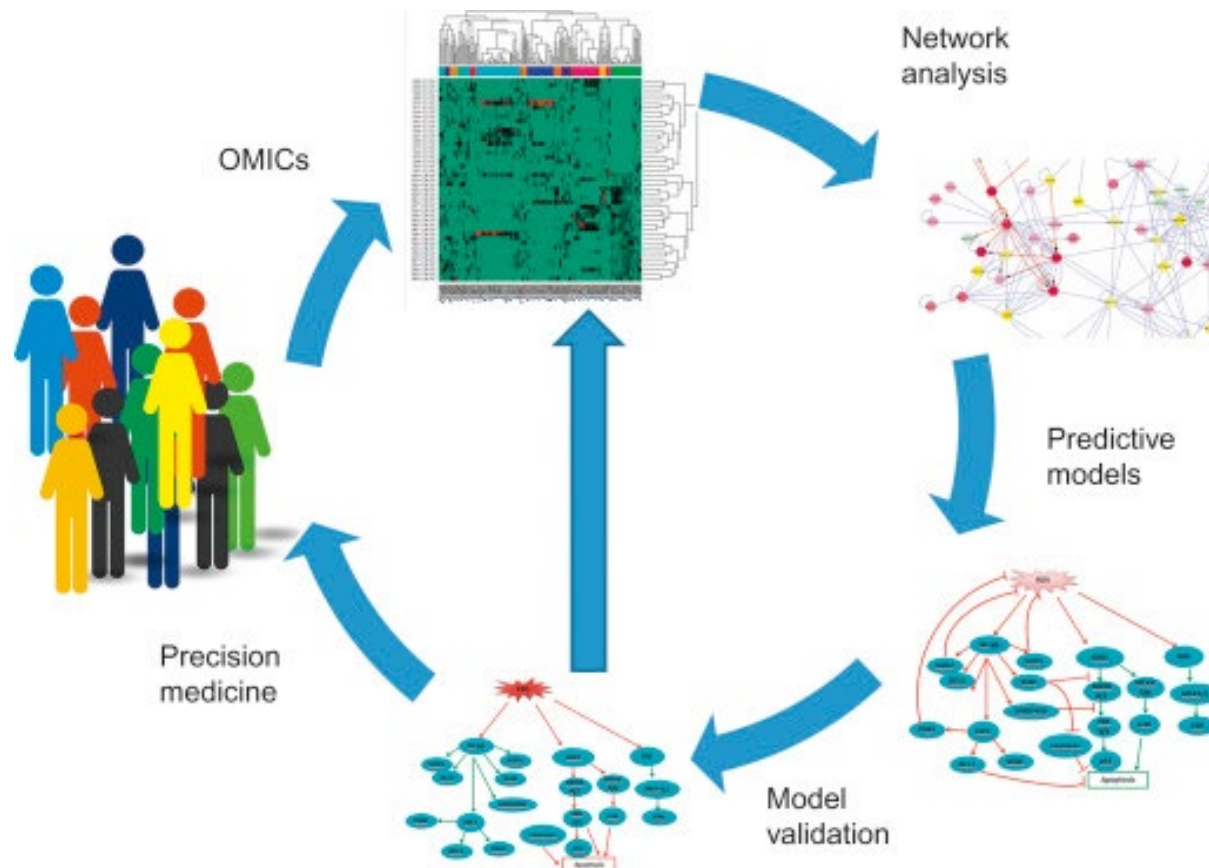
Patients



What are the characteristics of a «typical cancer patient»

- phenomenology
- «-omics»
- treatment regimen
- beliefs, values, desiderata

Systems Medicine



Systems biology approaches applied to biomedical research

«Systems medicine is the application of systems biology with medical purposes with the ultimate goal of transition to a predictive, preventive, and personalized medicine»

Delphi-2M



Med Genie

Article

Learning the natural history of human disease with generative transformers

<https://doi.org/10.1038/s41586-025-09529-3>

Received: 18 May 2024

Accepted: 13 August 2025

Published online: 17 September 2025

Open access

 Check for updates

Artem Shmatko^{1,2,3,13}, Alexander Wolfgang Jung^{2,4,5,6,13}, Kumar Gaurav^{2,13}, Søren Brunak^{4,7},
Laust Hvas Mortensen^{5,7,8}, Ewan Birney^{2,9}, Tom Fitzgerald^{2,9} & Moritz Gerstung^{1,2,8,10,11,12}✉

Decision-making in healthcare relies on understanding patients' past and current health states to predict and, ultimately, change their future course^{1–3}. Artificial intelligence (AI) methods promise to aid this task by learning patterns of disease progression from large corpora of health records^{4,5}. However, their potential has not been fully investigated at scale. Here we modify the GPT⁶ (generative pretrained transformer) architecture to model the progression and competing nature of human

Forecast individual likelihood of developing 1258 diseases on the basis of medical history
Uses EHRs and lifestyle factors
Trained on 400,000 participants of UK Biobank, tested on 1.9 million people in Danish National Patient Registry (50 years back)
Matched or exceeded accuracy of single-disease models

A step further



What is «personalized medicine»?

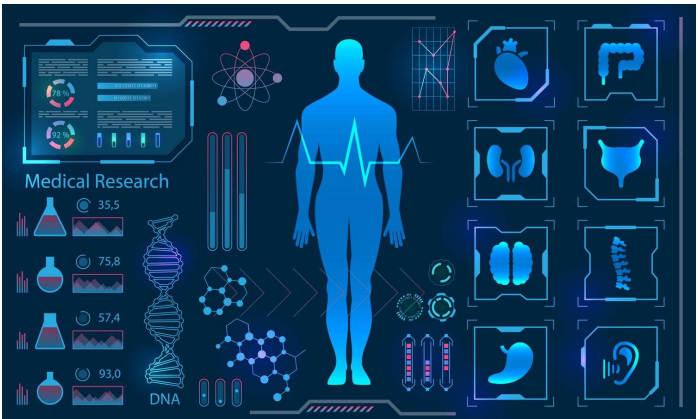
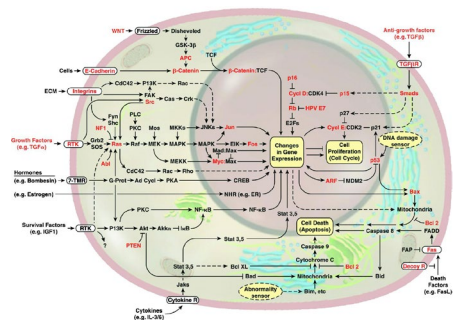
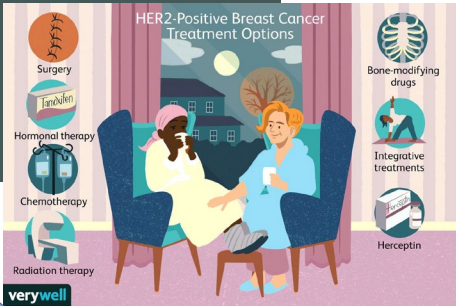
Ultimately, the optimization of the benefit-risk profile of a preventative or curative treatment that an individual patient will experience, aligned with their «-omics», lifestyle factors, and personal preferences



A step further



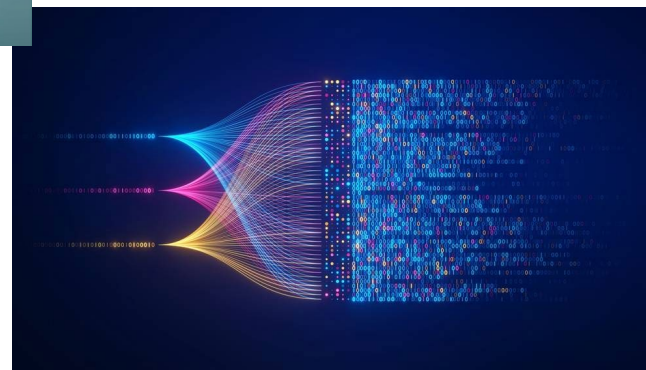
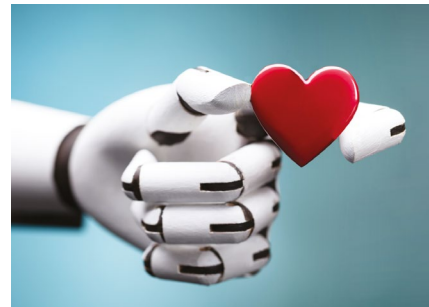
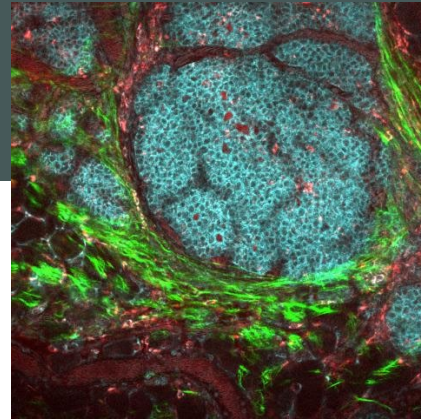
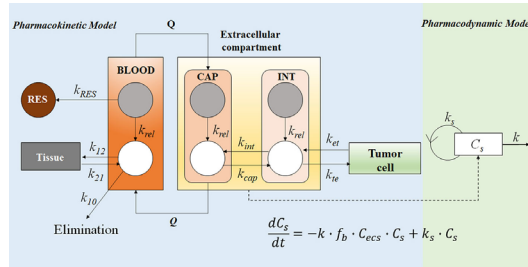
Med Genie



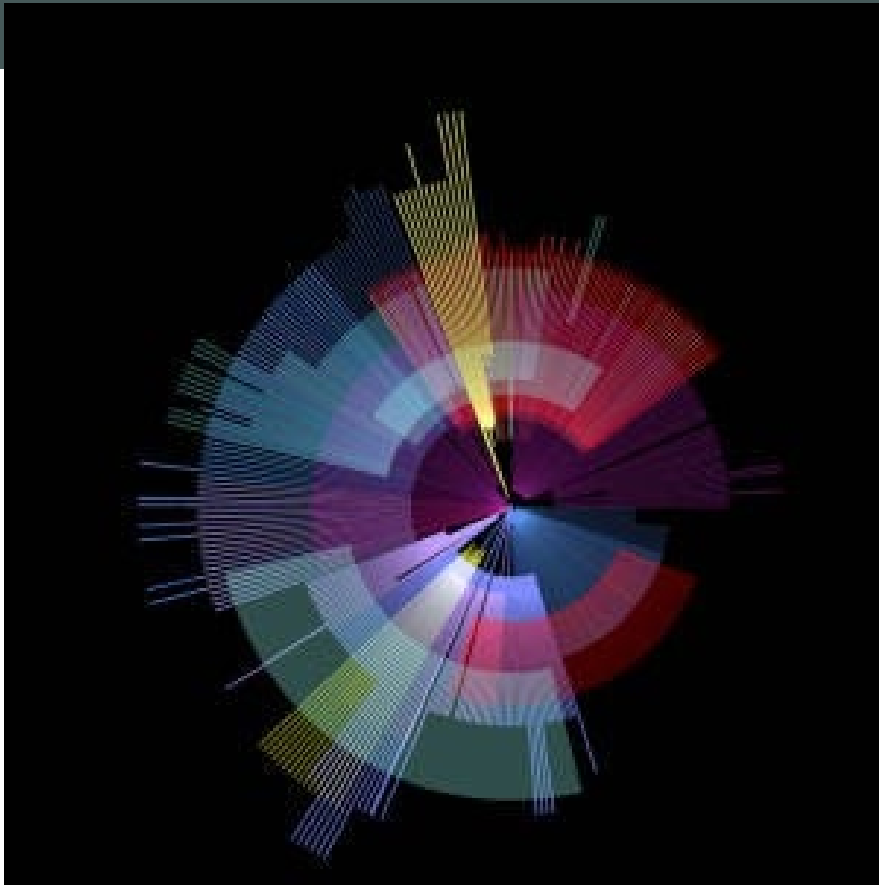
How to bring this to patients?



Med Genie

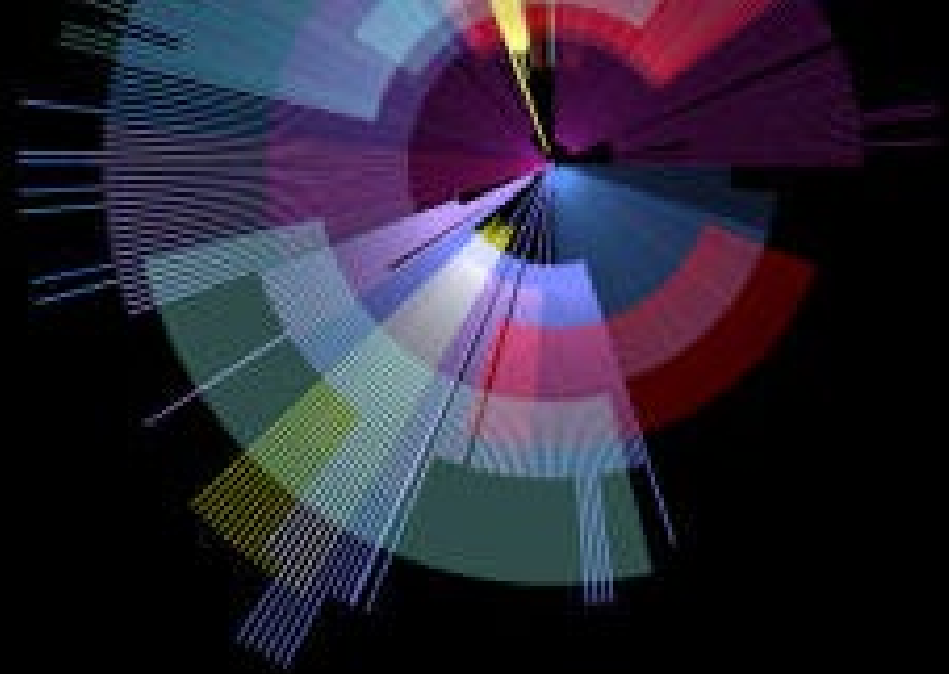


How to bring this to patients?



PREDICTIVE PATIENT SAFETY

Do I want to take a specific
drug/undergo a specific
treatment? Yes or no?



Thank you!

