PERSONALIZED VS. PRECISION MEDICINE

The emergence of AI-based medicine

and

digital health innovation

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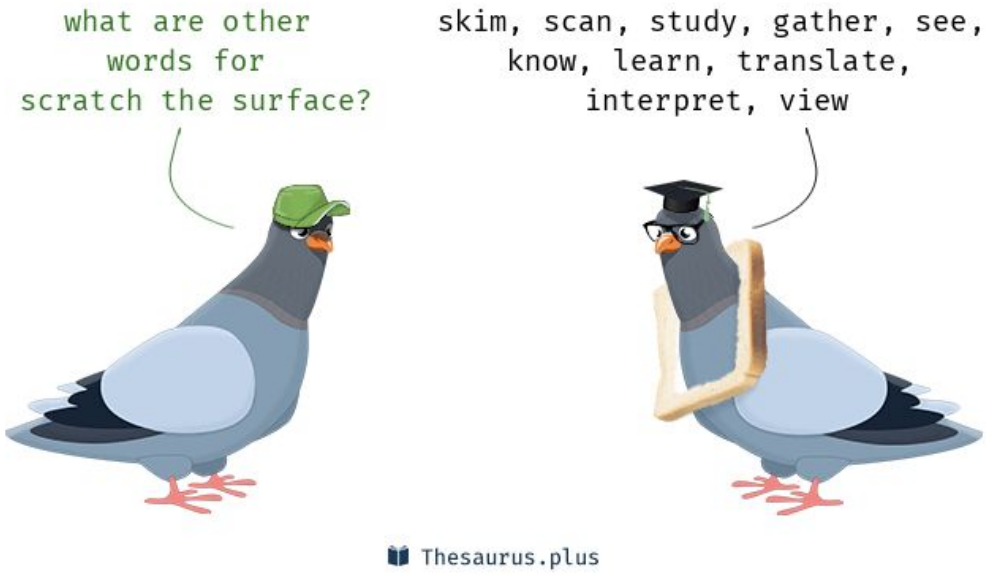
Precision vs. personalized medicine

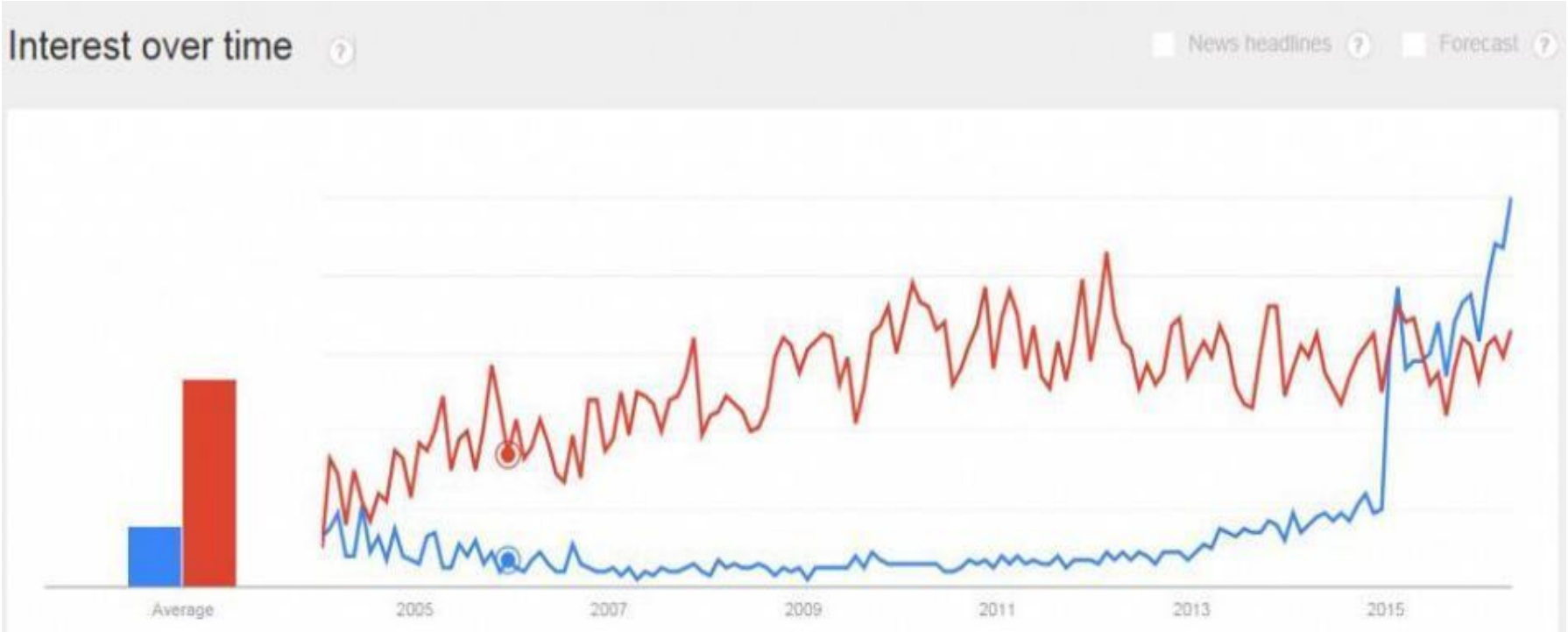


Precision vs. personalized medicine

Is there a difference?

Precision vs personalized medicine

Scientific trend



Relative Interest in Precision Medicine (blue) vs. Personalized Medicine (red), 2005-2016
(*Google Trend Search, April 10, 2016*)

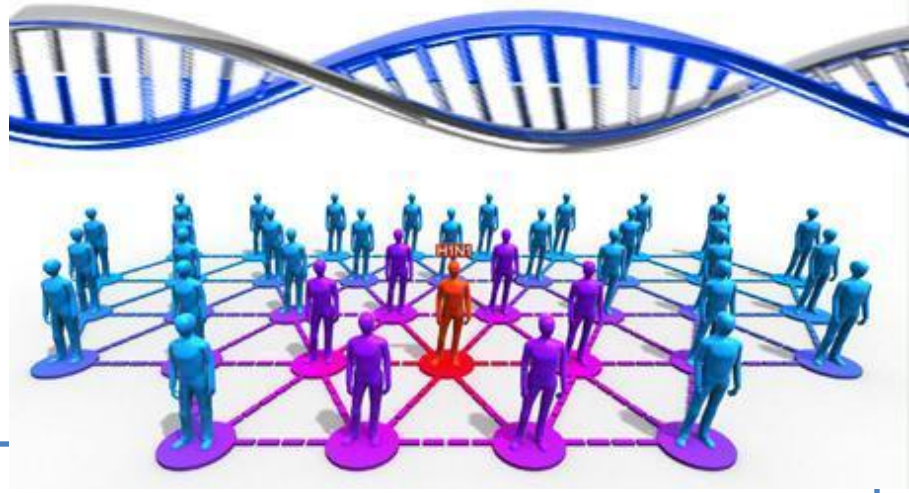
Precision vs personalized medicine

There is a difference!

Advances in genomics and other 'omic' technologies perpetuated a new era, inclusive of individual data capturing (bio)variability for treatment and prevention.

Personalized and precision medicine
- mostly used as synonyms

prominent shift from
- "personalized" towards "precision medicine"



not just semantics!
an important **conceptual shift** in the scientific understanding of health and disease and its application to treatment and prevention

https://blogs.cdc.gov/genomics/2016/04/21/shift/

Precision medicine

Definitions

U.S. National Institutes of Health (NIH)

"an emerging practice of medicine that uses an individual's genetic profile to guide decisions made in regard to the prevention, diagnosis, and treatment of disease"

U.S. FDA

"the best medical outcomes by choosing treatments that work well with a person's genomic profile or with certain characteristics in the person's blood proteins or cell surface proteins”

President's Council of Advisors on Science and Technology (PCAST)

"tailoring of medical treatment to the individual characteristics of each patient"

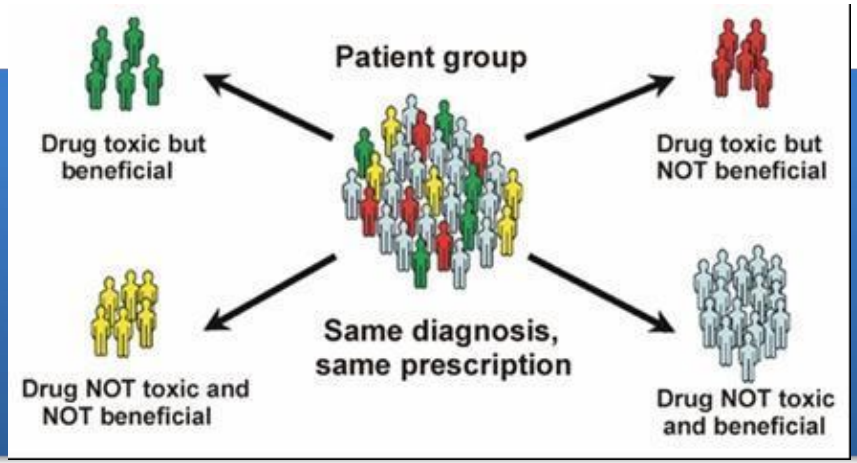
Precision vs personalized medicine

Definitions

“With the term 'precision medicine', we are trying to convey a more precise classification of disease into subgroups that in the past have been lumped together because there wasn't a clear way to discriminate between them.”

Precision medicine

Aim



ability to classify individuals into subpopulations that differ in their susceptibility to a particular disease or their response to a specific treatment

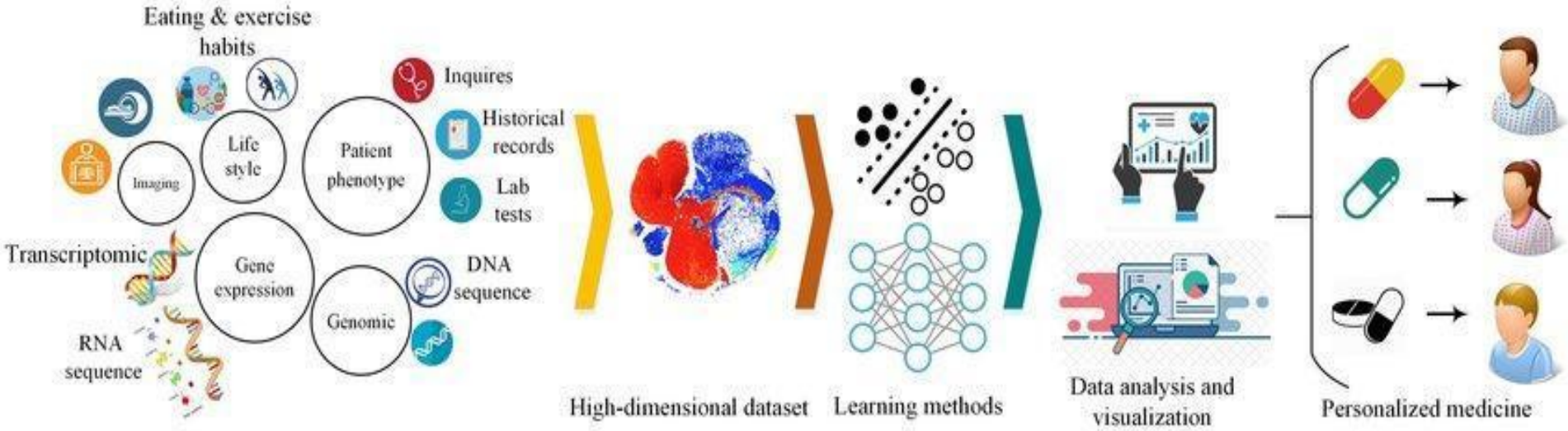
new treatment regimen is assessed on a group of carefully selected patients but not individuals

ultimate goal is to furnish the proper treatment to the right person at the right time

https://ec.europa.eu/info/research-and-innovation/research-area/health-research-and-innovation/personalised-medicine_en

Precision medicine

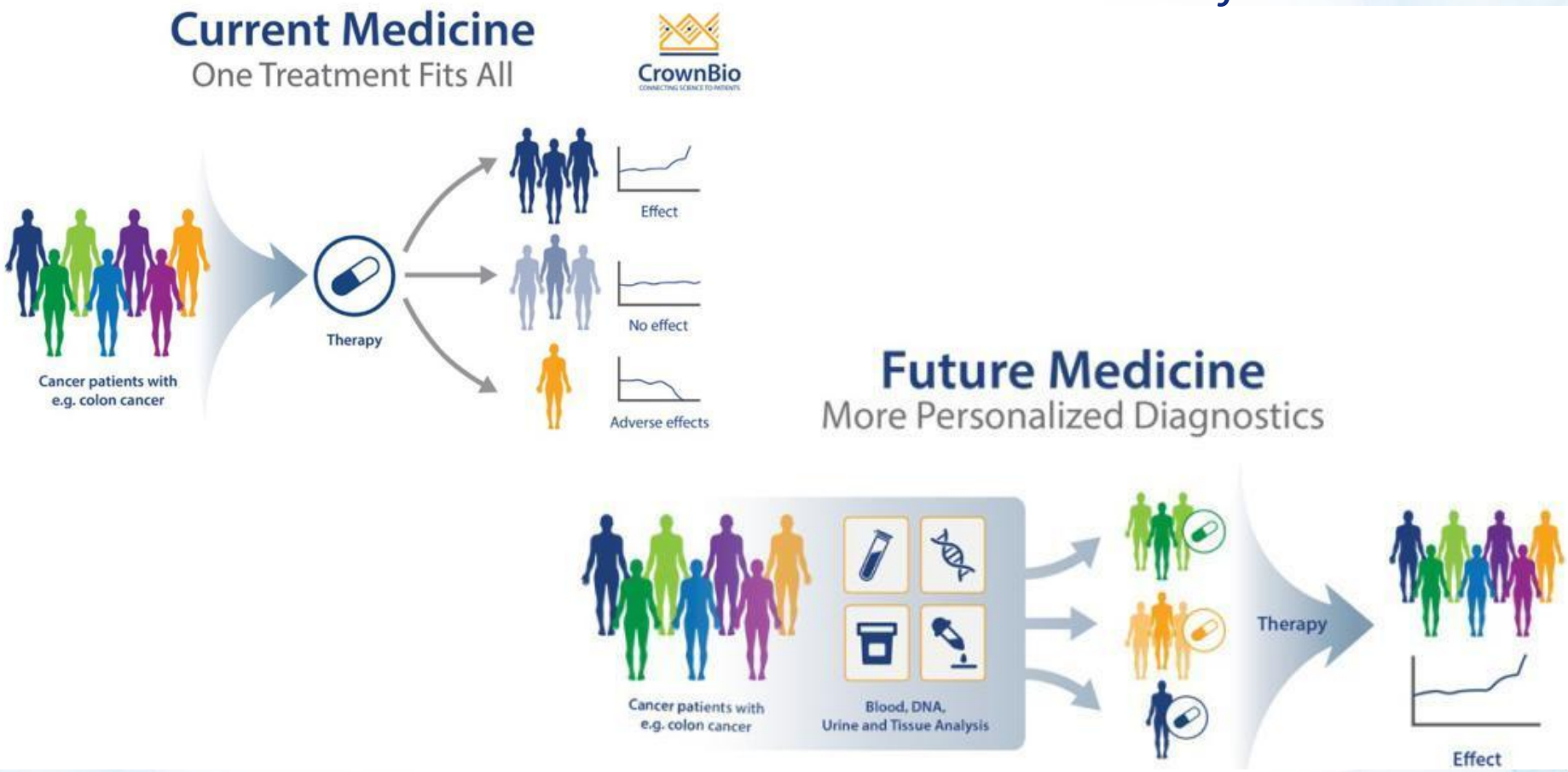
Concept



https://blog.crownbio.com/pdx-personalized-medicine

Precision medicine

The future is now

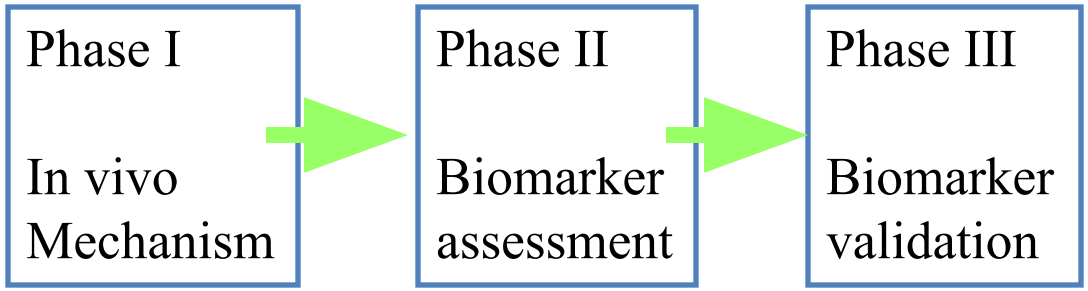


https://blog.crownbio.com/pdx-personalized-medicine

Precision medicine

The future is now
biomarkers

Find the 'right' biomarkers -> Validate in robust datasets -> Apply



Fundamental questions

When is surgery enough?

Should we use chemotherapy?

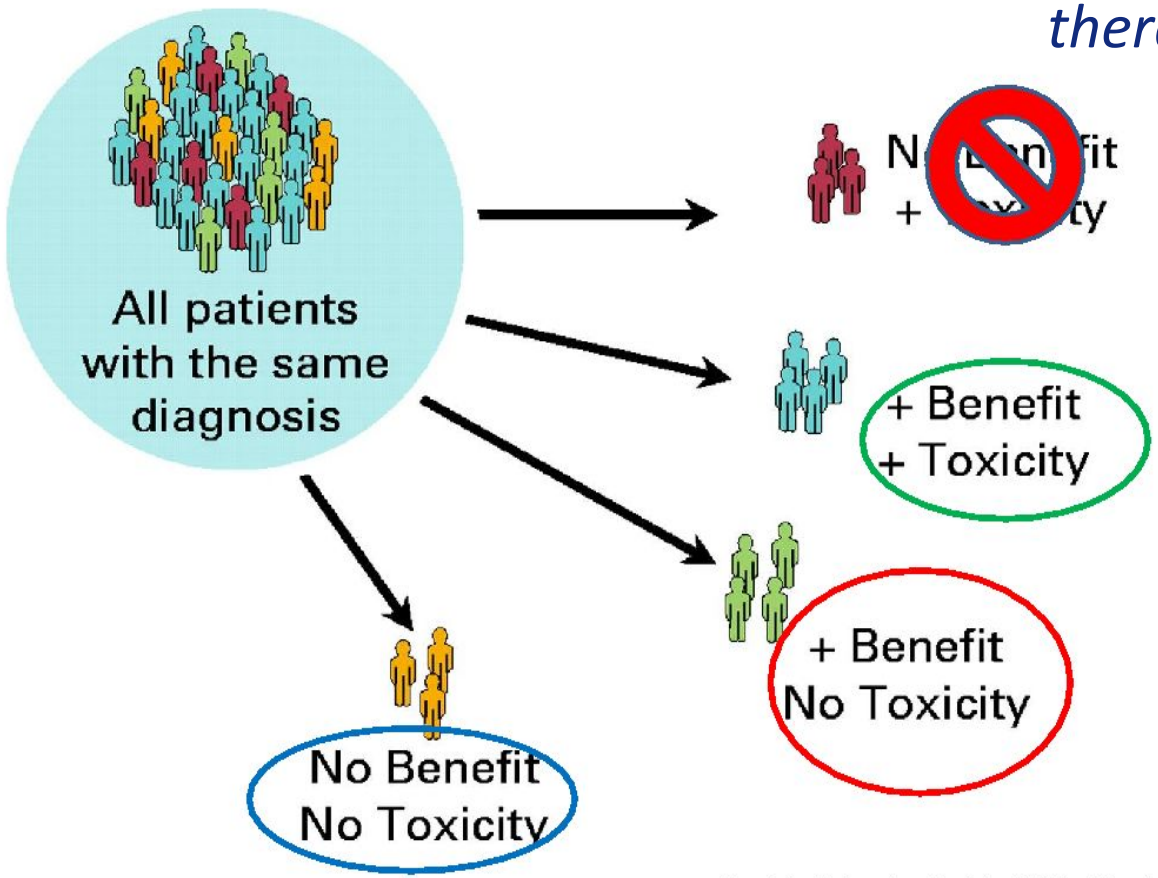
Which treatment should we use?

- toxicity - many 'equal' therapies
- efficacy
- dosage

https://blog.crownbio.com/pdx-personalized-medicine

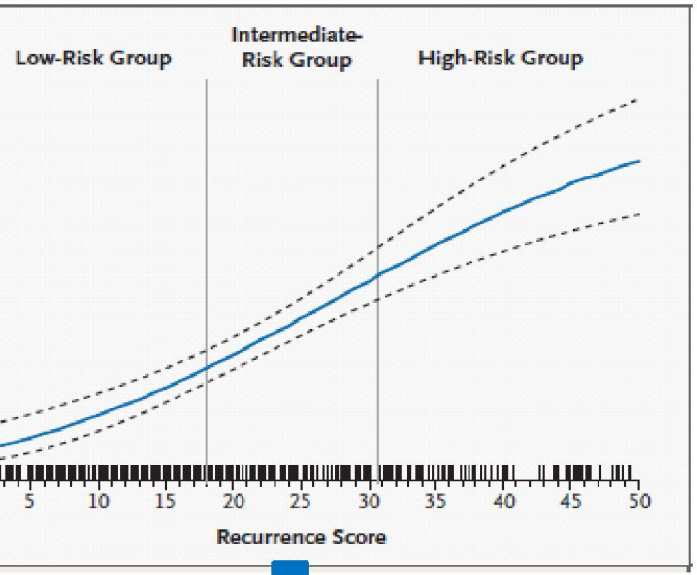
Precision medicine

The future is now therapy



Walgren et al. *JCO* 2005;23:7342-7349

Precision medicine

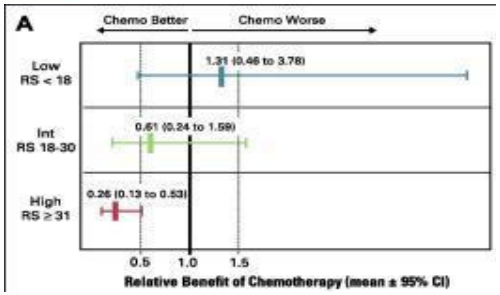


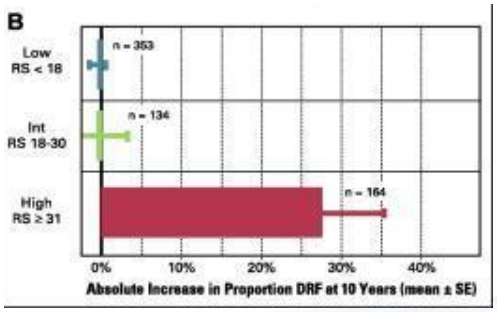
The likelihood of distant recurrence ↑ continuously as the RS ↑

The future is now therapy

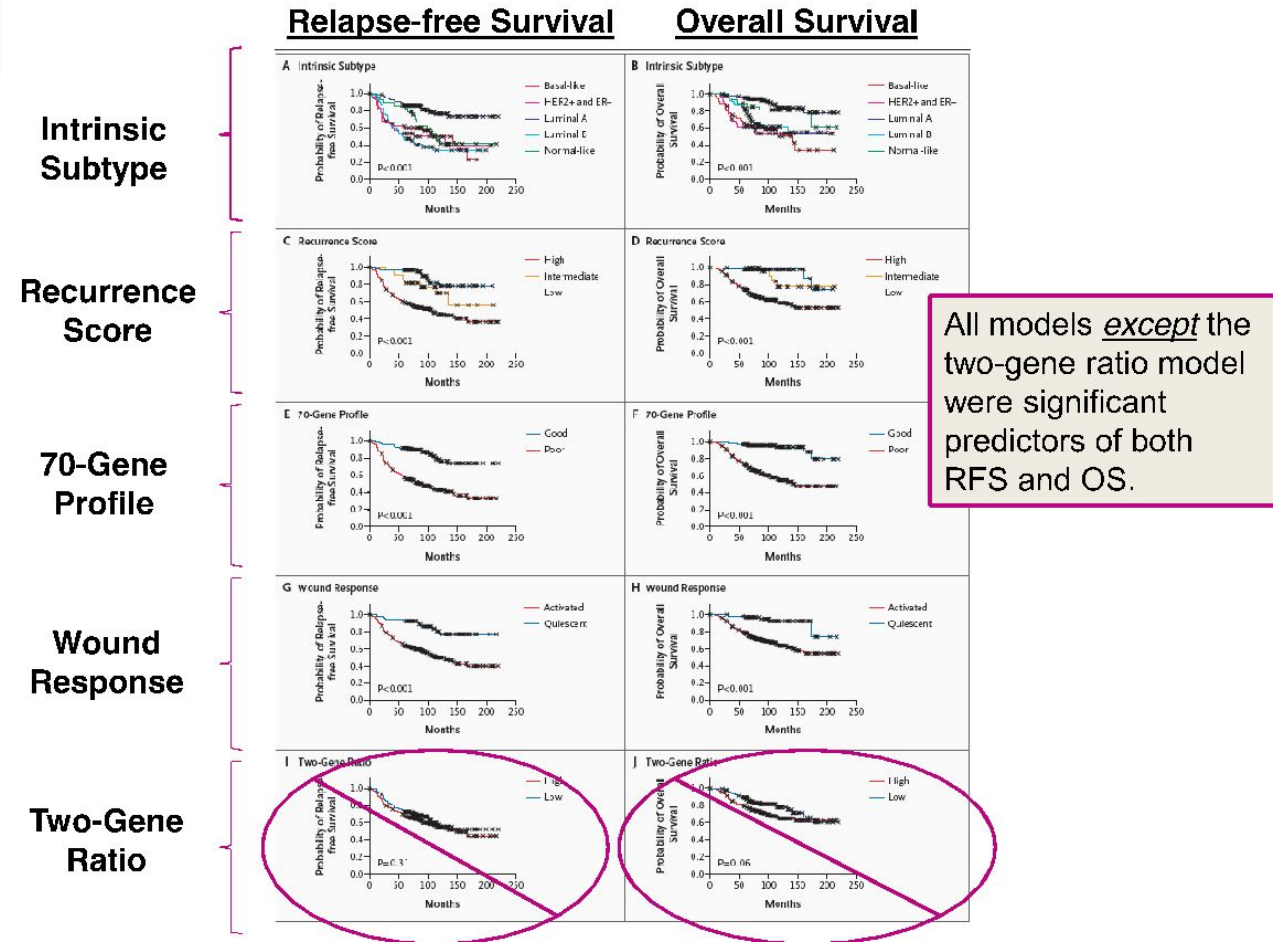
Validated on 651 tamoxifen- or tamoxifen and chemotherapy treated patients from NSABP B-20.

Paik, S. *JC(*





Precision medicine



The future is now therapy

- Gene signatures augment current clinicopathological variables in assessing risk of recurrence

- Gene expression profiles may be both prognostic and predictive for patients

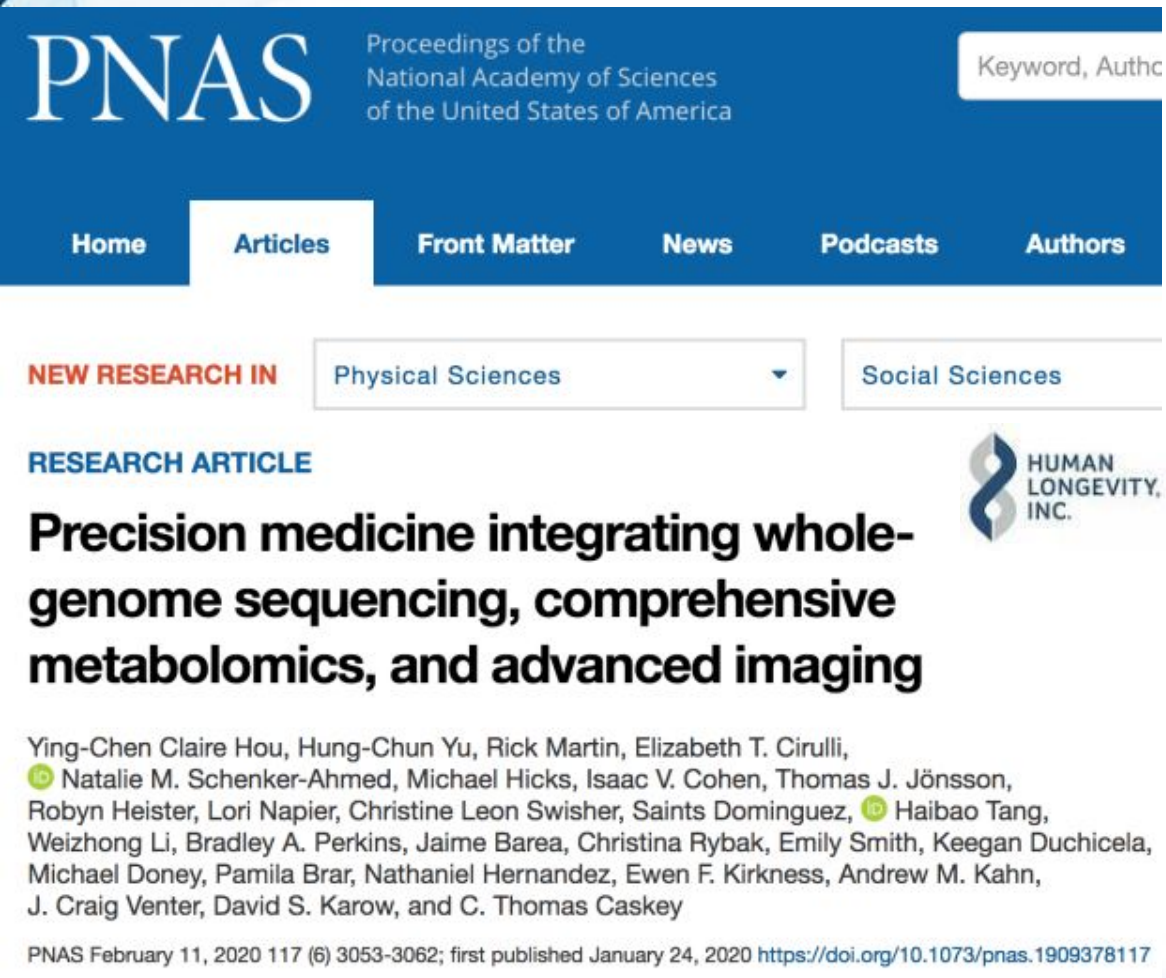
AI transforming medicine

Reactive

Proactive

Personalised medicine

Translation to the clinic



PNAS

Proceedings of the National Academy of Sciences of the United States of America

Keyword, Autho

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NEW RESEARCH IN | Physical Sciences | Social Sciences

RESEARCH ARTICLE

HUMAN LONGEVITY, INC.

Precision medicine integrating whole-genome sequencing, comprehensive metabolomics, and advanced imaging

Ying-Chen Claire Hou, Hung-Chun Yu, Rick Martin, Elizabeth T. Cirulli, Natalie M. Schenker-Ahmed, Michael Hicks, Isaac V. Cohen, Thomas J. Jönsson, Robyn Heister, Lori Napier, Christine Leon Swisher, Saints Dominguez, Haibao Tang, Weizhong Li, Bradley A. Perkins, Jaime Barea, Christina Rybak, Emily Smith, Keegan Duchicela, Michael Doney, Pamila Brar, Nathaniel Hernandez, Ewen F. Kirkness, Andrew M. Kahn, J. Craig Venter, David S. Karow, and C. Thomas Caskey

PNAS February 11, 2020 117 (6) 3053-3062; first published January 24, 2020 https://doi.org/10.1073/pnas.1909378117

Personalised medicine

Translation and clinic

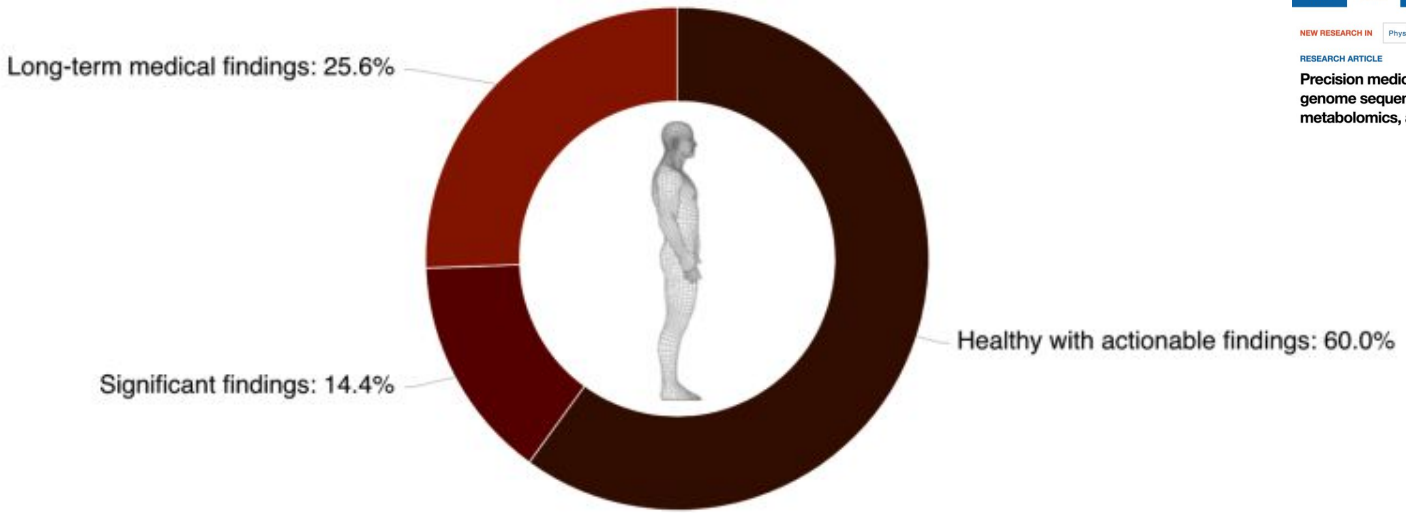
Knowledge is power. Especially when it comes to your health.

Our data has the power to change and even save lives. In a recent study of over 1,000 of our Health Nucleus patients who were largely asymptomatic, 40% required some form of medical intervention to preempt or treat disease, while 14% required urgent attention. For those without the identification of immediate risks, we can help you make changes to aid in the preemption of disease and creation of your healthiest, most prolific lifestyle.

Personalised medicine

Translation and clinic

Clinically significant findings in Health Nucleus clients*




PNAS Proceedings of the National Academy of Sciences of the United States of America

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NEW RESEARCH IN Physical Sciences | Social Sciences

RESEARCH ARTICLE

Precision medicine integrating whole-genome sequencing, comprehensive metabolomics, and advanced imaging

25.6%
Long-term medical findings that require medical attention and monitoring but are not immediately life threatening

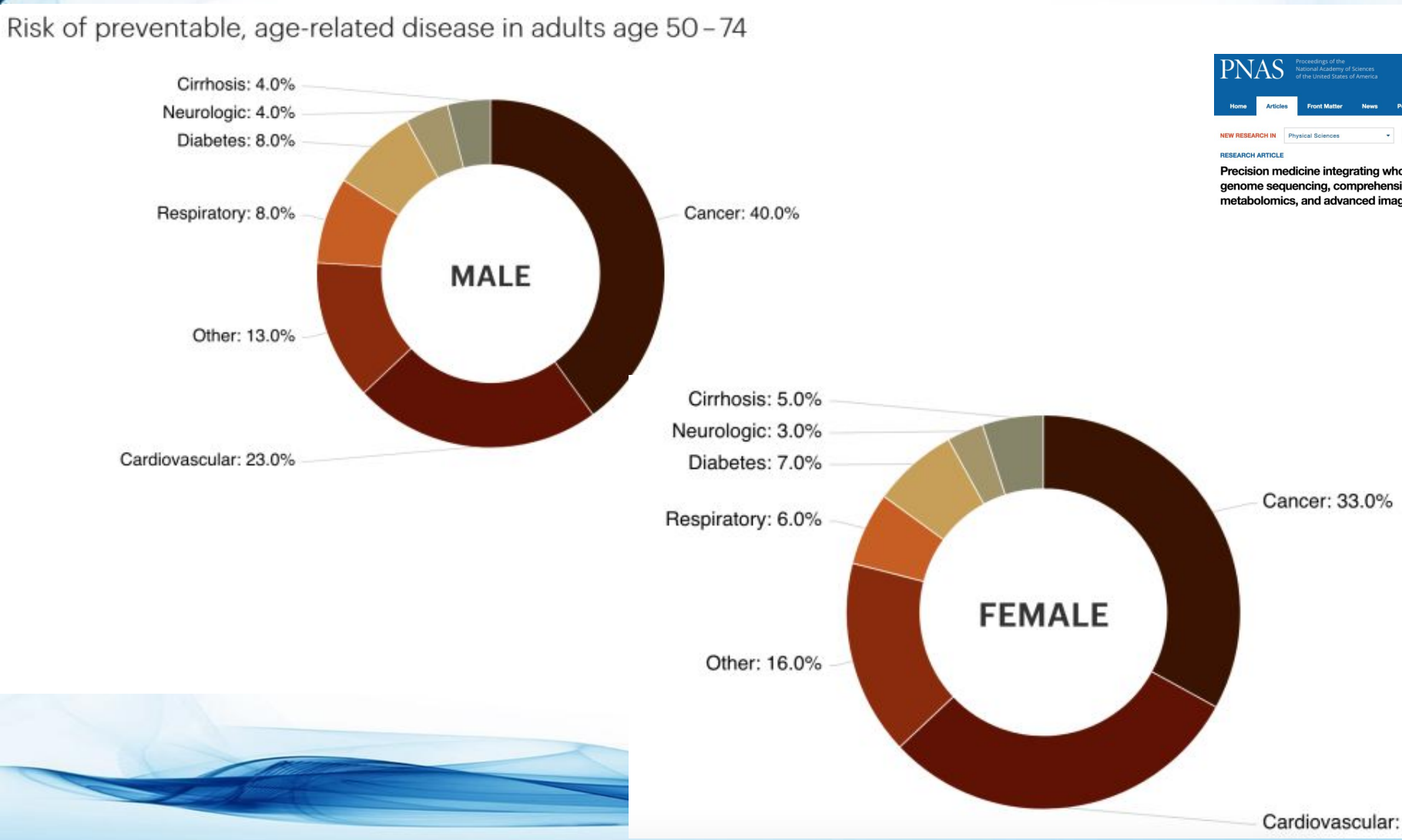
14.4%
Significant actionable findings that require immediate or near-term intervention and follow-up

60%
Healthy actionable findings that could enhance quality of health and wellbeing

*Clients screened for the first time.

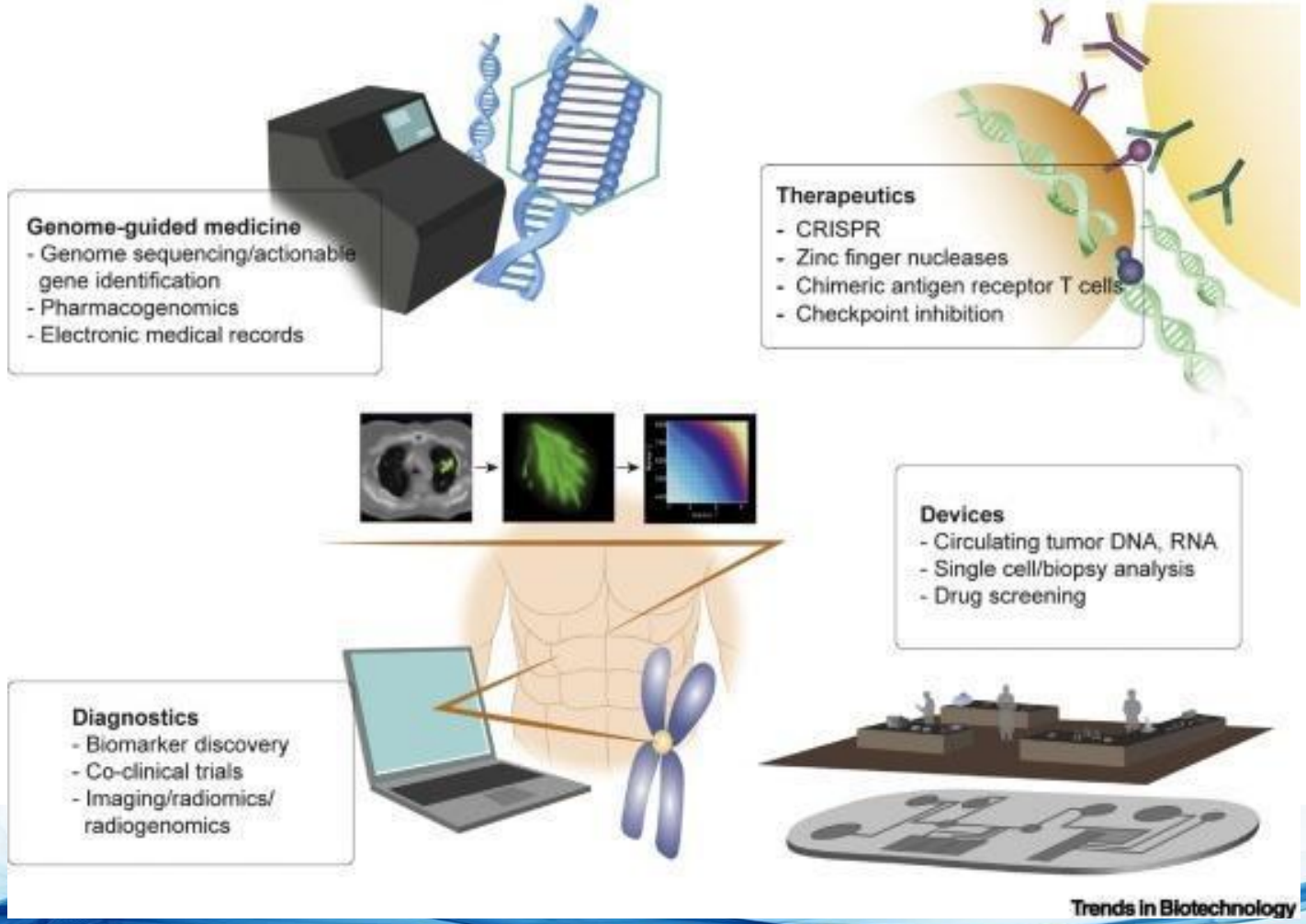
Personalised medicine

Translation and clinic



Personalised medicine

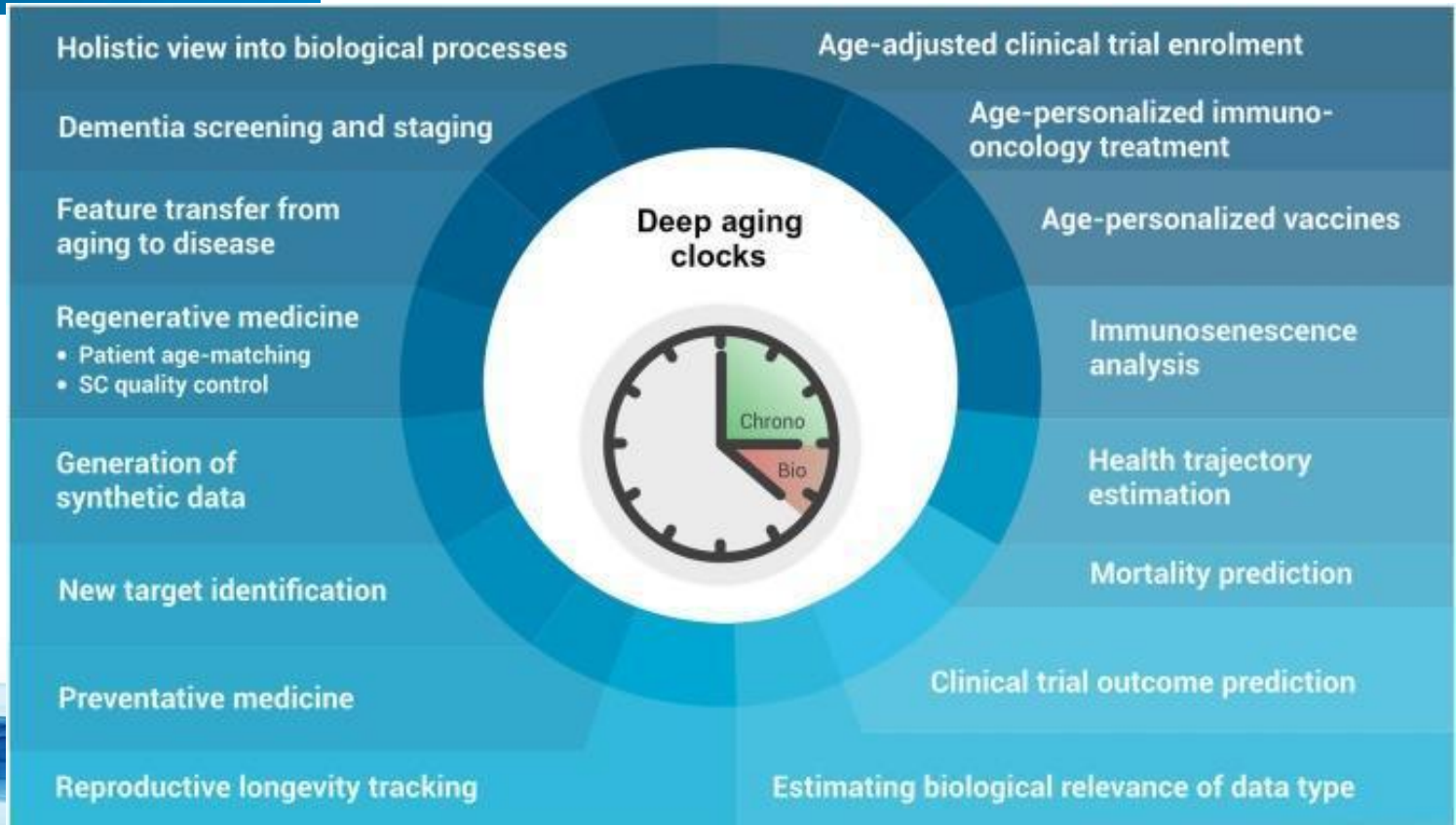
Tools



Personalized medicine

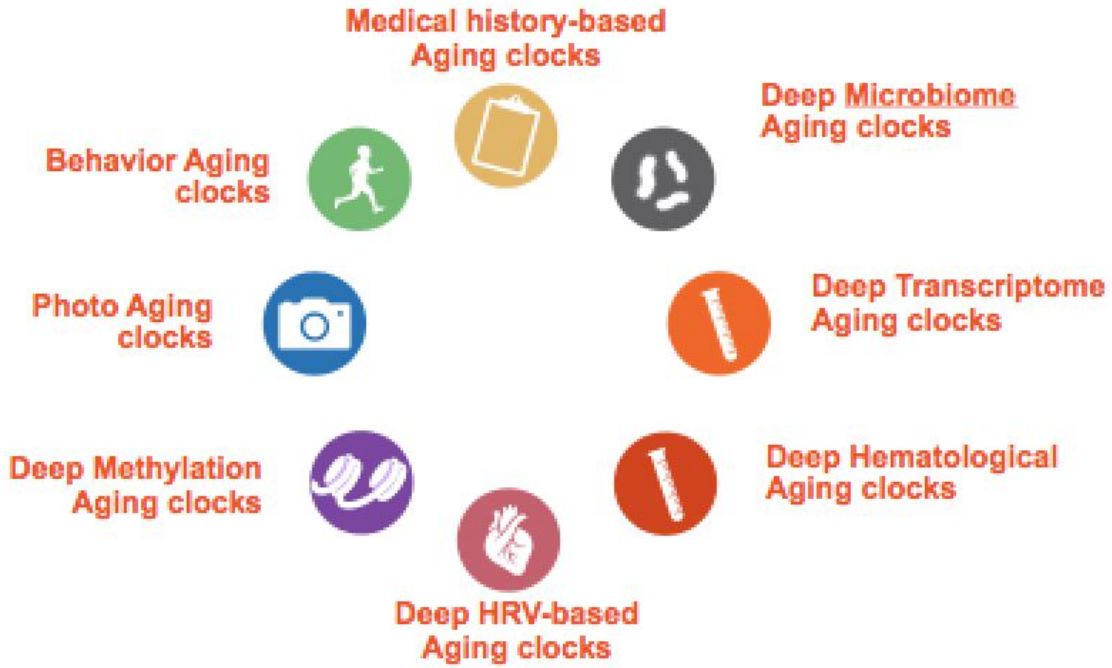
Deep Aging Clocks

Zhavoronkov, 2015



Personalized medicine

Deep Aging Clocks



Zhavoronkov, 2015

www.aging-us.com AGING 2019, Vol. 11, No. 22

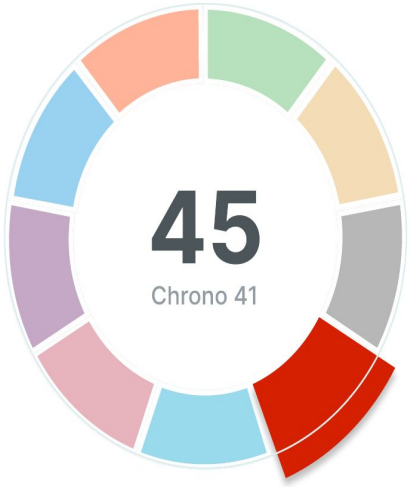
Review

Deep biomarkers of aging and longevity: from research to applications

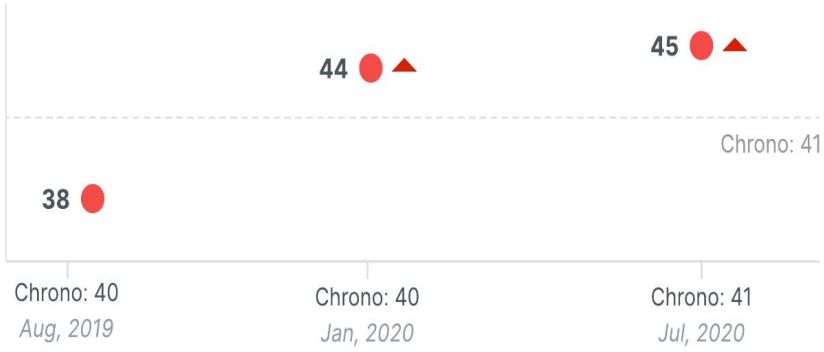
Alex Zhavoronkov[1,2,3], Ricky Li[4], Candice Ma[5], Polina Mamoshina[6]

Personalized medicine

Deep Aging Clocks



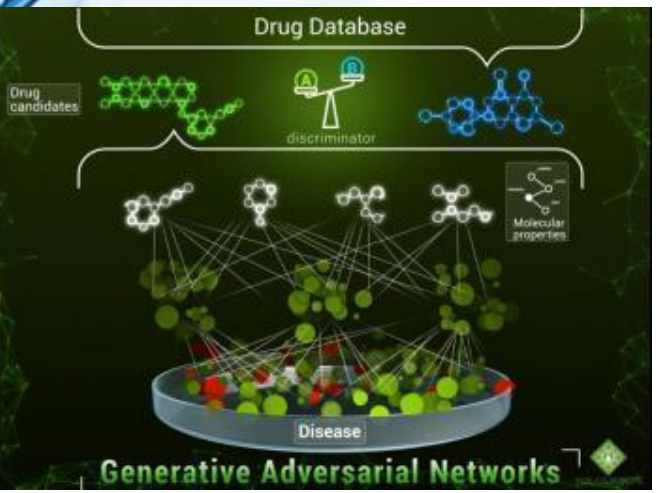
Blood Age	**45** (Jul 2020)	
	44 (Jan 2020)	
	38 (Aug 2019)	
Subjective Age	Submit Data	
Medical History	Submit Data	
Microbiome Age	Submit Data	
Heart Age	Submit Data	
Met Age	Submit Data	
Photo Age	Submit Data	
Transcriptome Age	Submit Data	
Behavior Age	Submit Data	

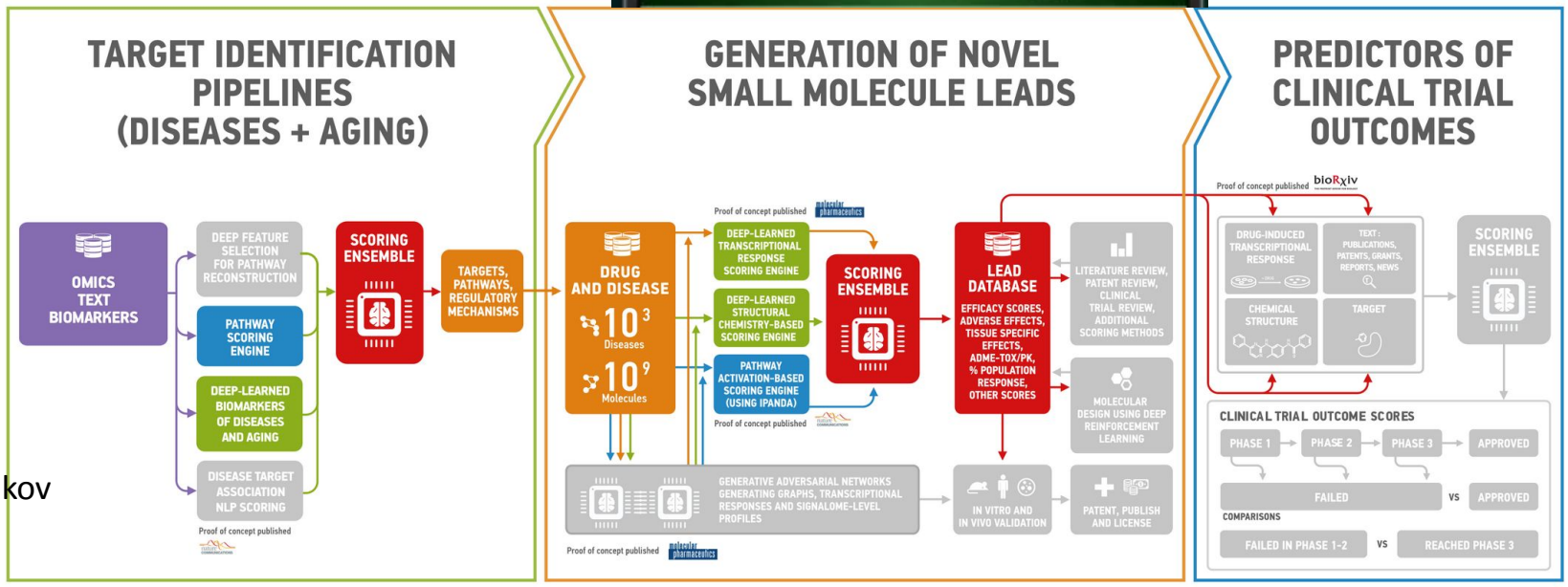


Plots below show the optimal blood parameter values predicted using your recent blood test. In contract to reference ranges, optimal blood parameters are associated with your optimal performance. **With the optimal blood parameters, your Blood Age is predicted to reach 36 years.**

Personalized medicine

Therapies



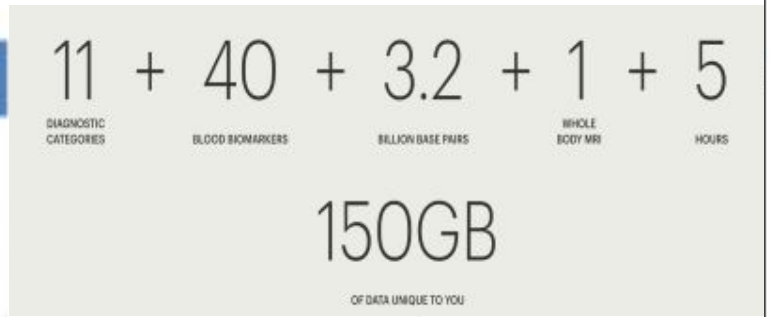


Insilico Medicine

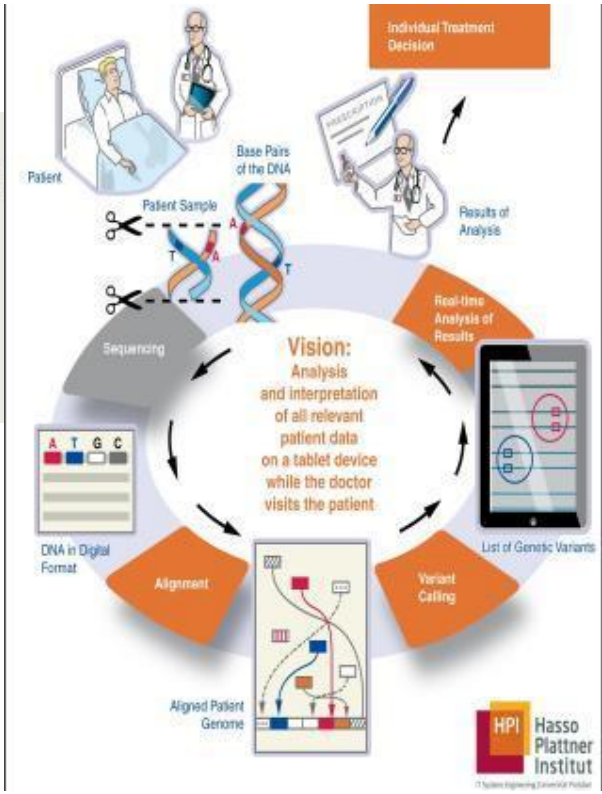
Courtesy of
Dr.Alex Zhavoronkov

Personalized medicine

Clinic



Full Body MRI | Whole Genome Sequencing | Coronary Calcium Score | Echocardiogram | Electrocardiogram (EKG) | Wireless Heart Rhythm Monitoring | Health Assessment | Comprehensive Labs | Insulin Sensitivity Testing | Body Composition | DEXA | Balance Tracker | Multi-Targeted Stool DNA Test



Personalized medicine

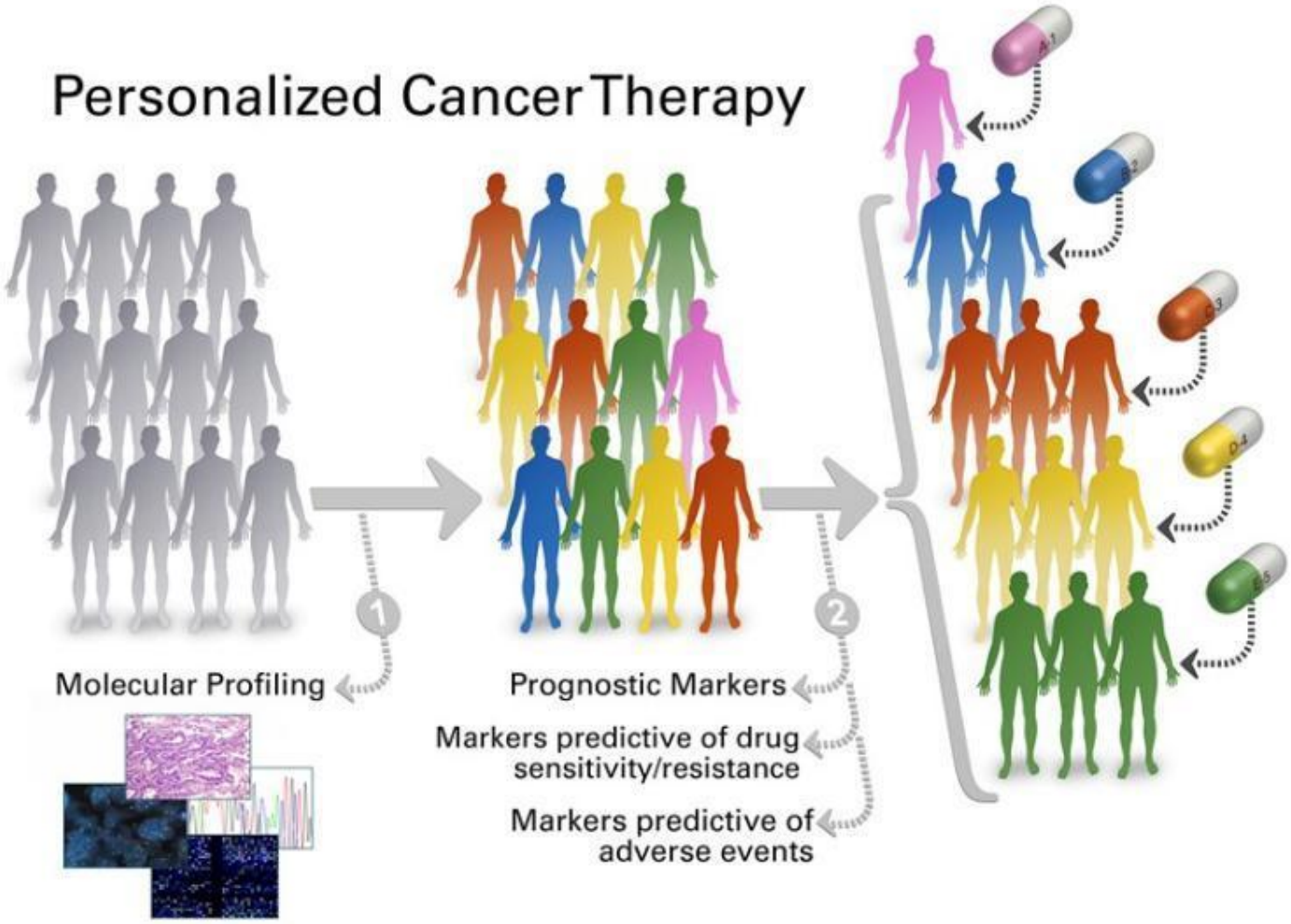
Clinic

- Optimize targeted therapies
- Discover novel targeted agents
- Increase cure rates in early stage disease
- Improve life expectancy and palliation for advanced stages
- Novel ways of identifying patients benefiting from new targeted agents
- Luminal B breast cancer and TNBC therapies
- Overcome resistance to targeted therapy

DiLeo, 2015

Personalized medicine

Clinic



MD Anderson
https://pct.mdande

4-P medicine

cornerstones of clinical medicine model that shifts the healthcare paradigm through the individual's participation

Summary

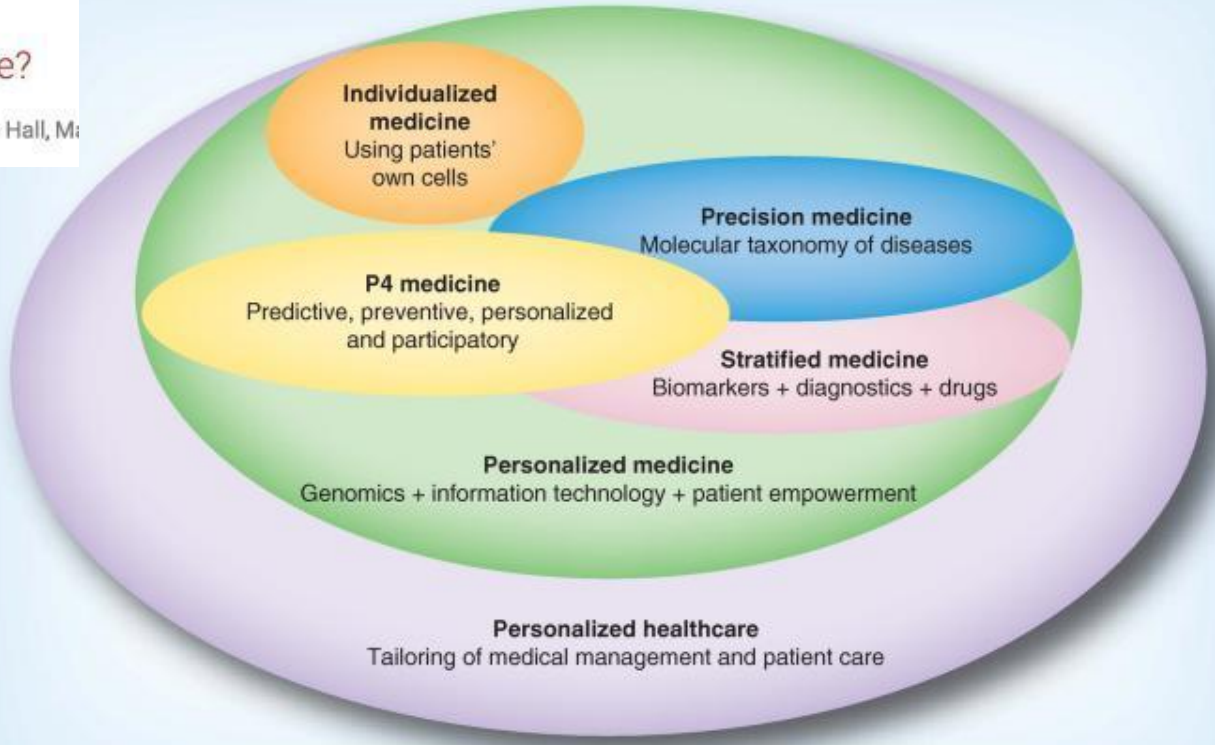
Future Medicine

JOURNALS BOOKS ABOUT US CONTACT US

PERSONALIZED MEDICINE, VOL. 11, NO. 2 | PERSPECTIVE

'Personalized medicine': what's in a name?

Anna Pokorska-Bocci, Alison Stewart, Gurdeep S Sagoo, Alison Hall, Ma



https://www.futuremedicine.com/doi/10.2217/pme.13.107

Thank you

Thank you

Never tire to study
and to teach others.

学而不厌
诲人不倦

孔子