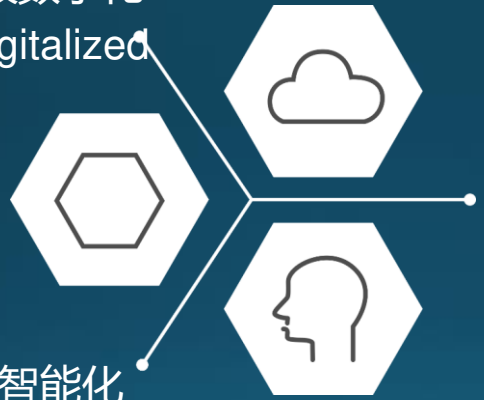
寻找碳基生命的硅基未来
MANAGE YOUR DIGITAL LIFE

Sherry Xian

2019.09.17

碳：生命以碳为基础，可以被数字化

Carbon: Life could be digitalized



云：数字生命可以被网络化

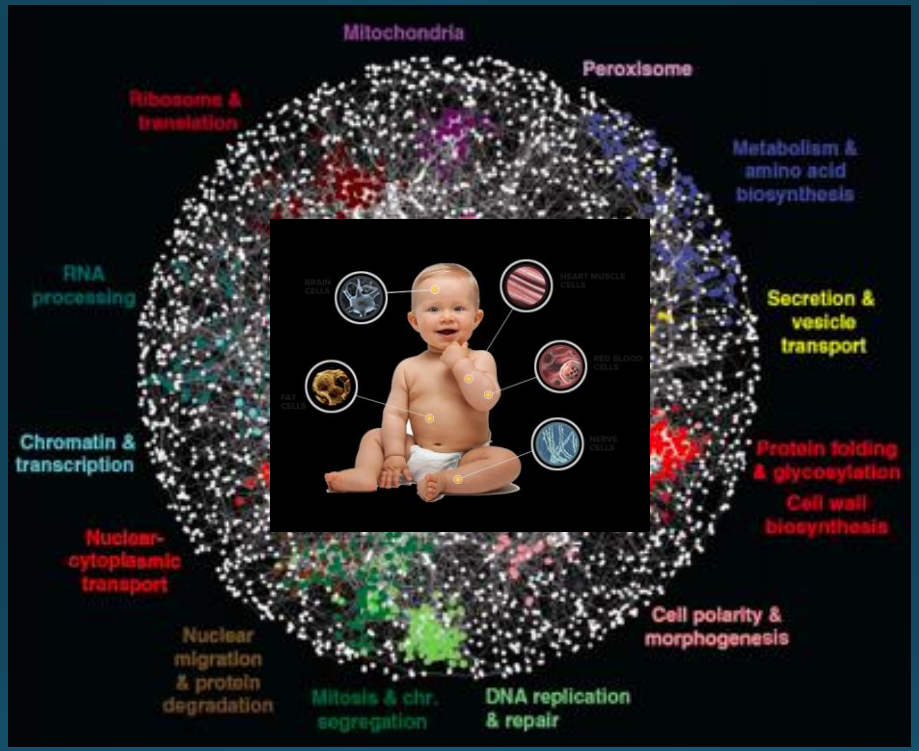
I: Digitalized life could be connected

智能：数字生命可以被人工智能化

X: Digitalized life could be “AI”ed

生命，起源于DNA

DNA: Blueprint of life



基因是生命程序的功能模块，不同的基因决定生命体不同的功能.
Genes are functional modules of life programs. Different genes determine different functions of living organisms.

生命程序对环境适应的策略
Adaptation strategy to the environment

基因程序的运行在不同条件环境下结果各异

Results of the genetic program are different under different conditions.

SPECIAL SECTION

GENES UNDER PRESSURE

By **Laura M. Zahn** *and* **Beverly A. Purnell**

INSIDE

REVIEWS

Going global by adapting local: A review of recent human adaptation *p. 34*

Transgenerational inheritance: Models and mechanisms of non–DNA sequence–based inheritance *p. 68*

Will it targe: Genomic dissection of the effect of cellular environment on immune response *p. 64*

Exposing the exposures responsible for type 2 diabetes and obesity *p. 69*

RELATED ITEMS

▸ EDITORIAL *p. 15*

Eons of selective pressure have shaped Earth's biological life, genetically optimizing organisms to survive varied environments and exposures. This selection may establish novel genetic variants in the genomes of a population or species, including humans. For example, genetic responses to diet and altitude helped humans adapt to new climes as they exited Africa and moved across the globe. Furthermore, the influence of environment can encompass the cellular level—for example, in shaping how cells in our immune system interact with both external and internal influences to maintain our health. Recent work shows that adaptation extends beyond changes in DNA sequences. The inheritance of environmentally influenced traits can also occur through epigenetic mechanisms. Although these mechanisms assist in adapting to new or shifting environments, some genetic and epigenetic changes may have resulted in modern pathology owing to recent and rapid changes in our diets, lifestyles, and exposures.

The challenge is to understand how we can mitigate harms caused by discordant responses to our surroundings. Understanding how human genetics and epigenetics respond to the multitude of external influences should help us prevent pathology and treat disease in ourselves and future generations.

Downloaded from http://science.sciencemag.org/ on October 7, 2016

Published by AAAS

A smoggy day in Qingdao, China. There is interest in the extent to which environmental pressures, such as pollution, may affect human genetic and epigenetic processes.

Downloaded from http://science.sciencemag.org/ on October 7, 2016

Published by AAAS

大环境的变化会影响健康

Environmental changes have significant impact on human health.

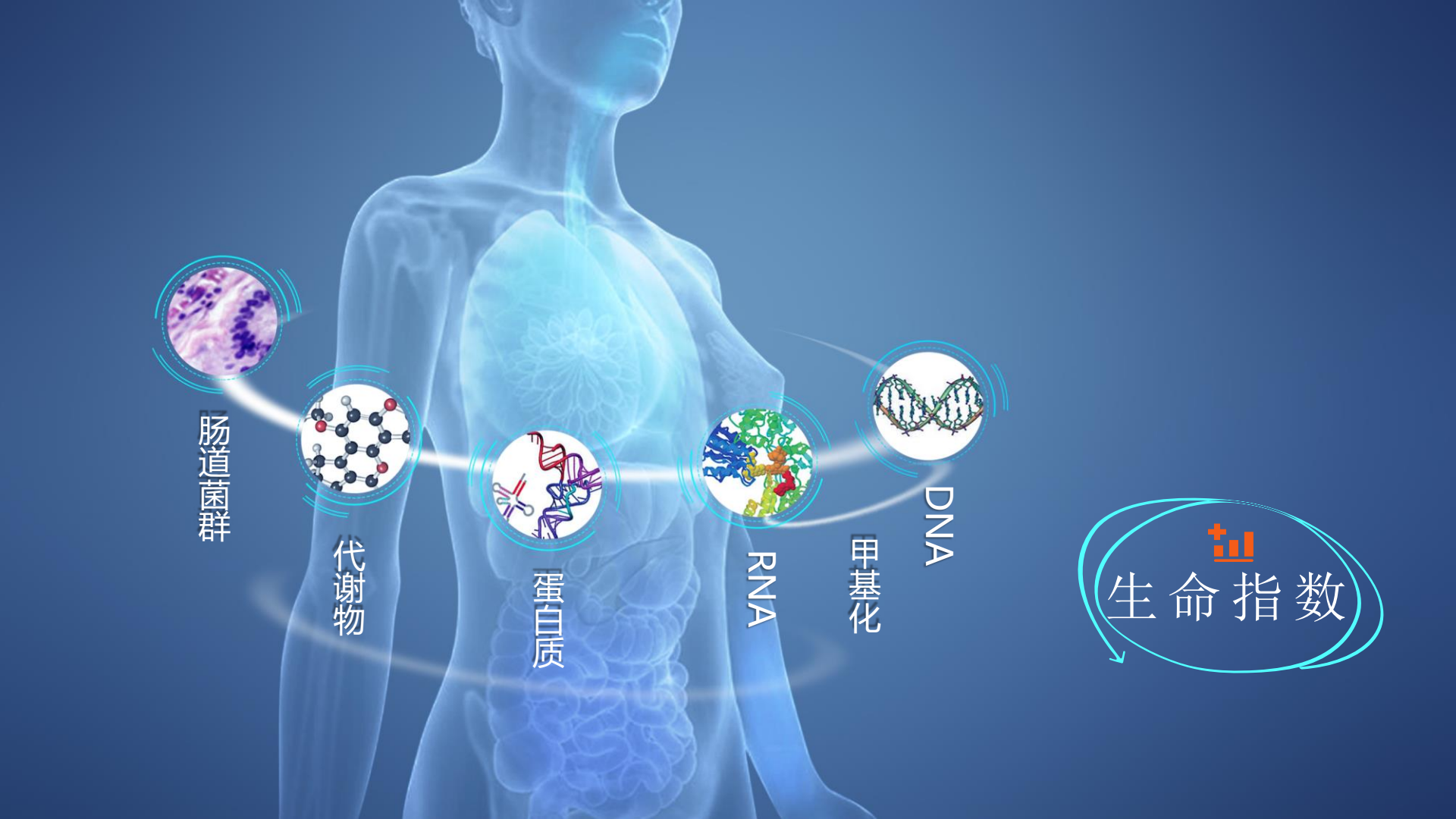
微生物是最重要的一种外环境

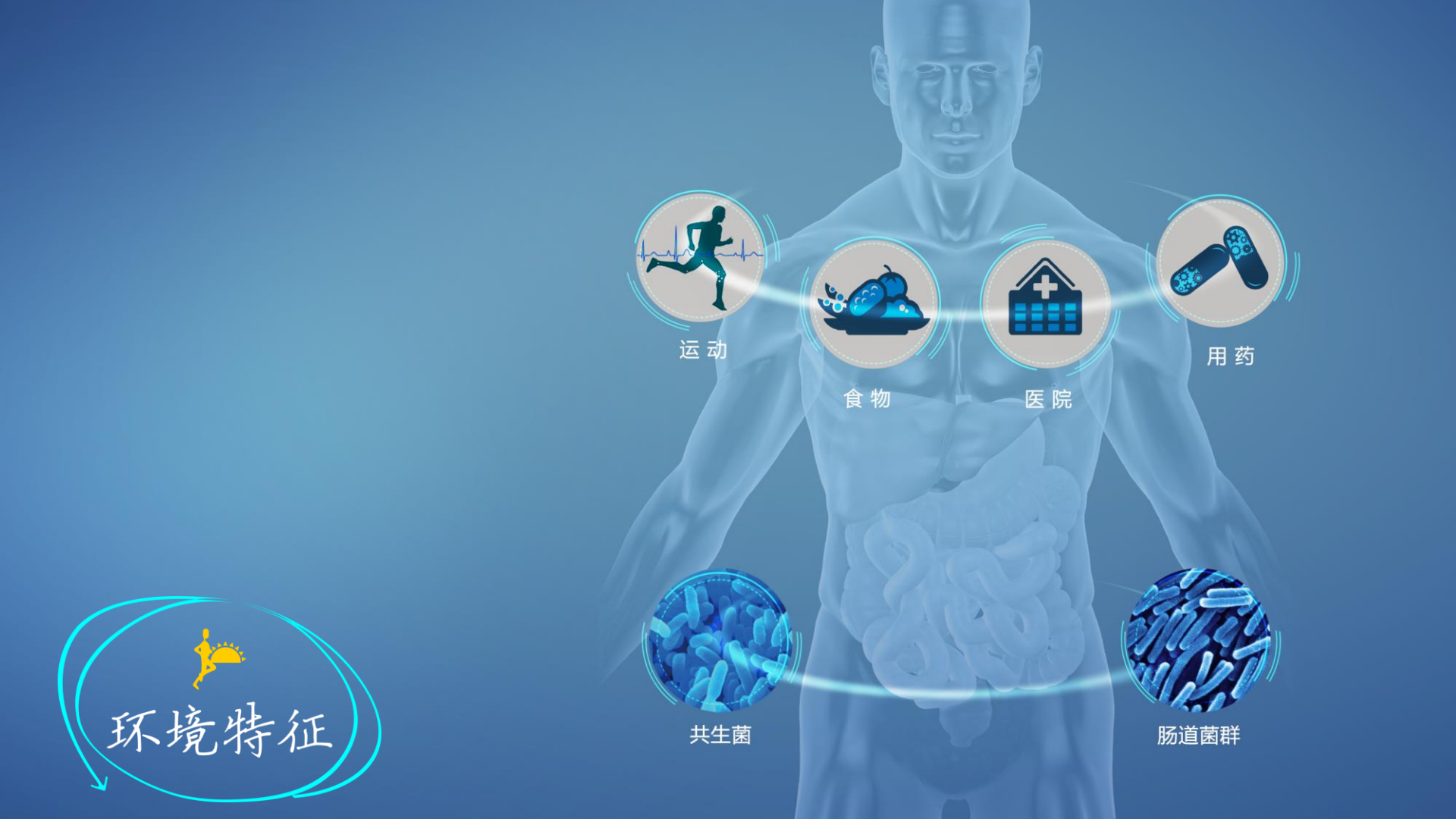
Microbiota is an ensemble of microorganisms that literally share our body space.

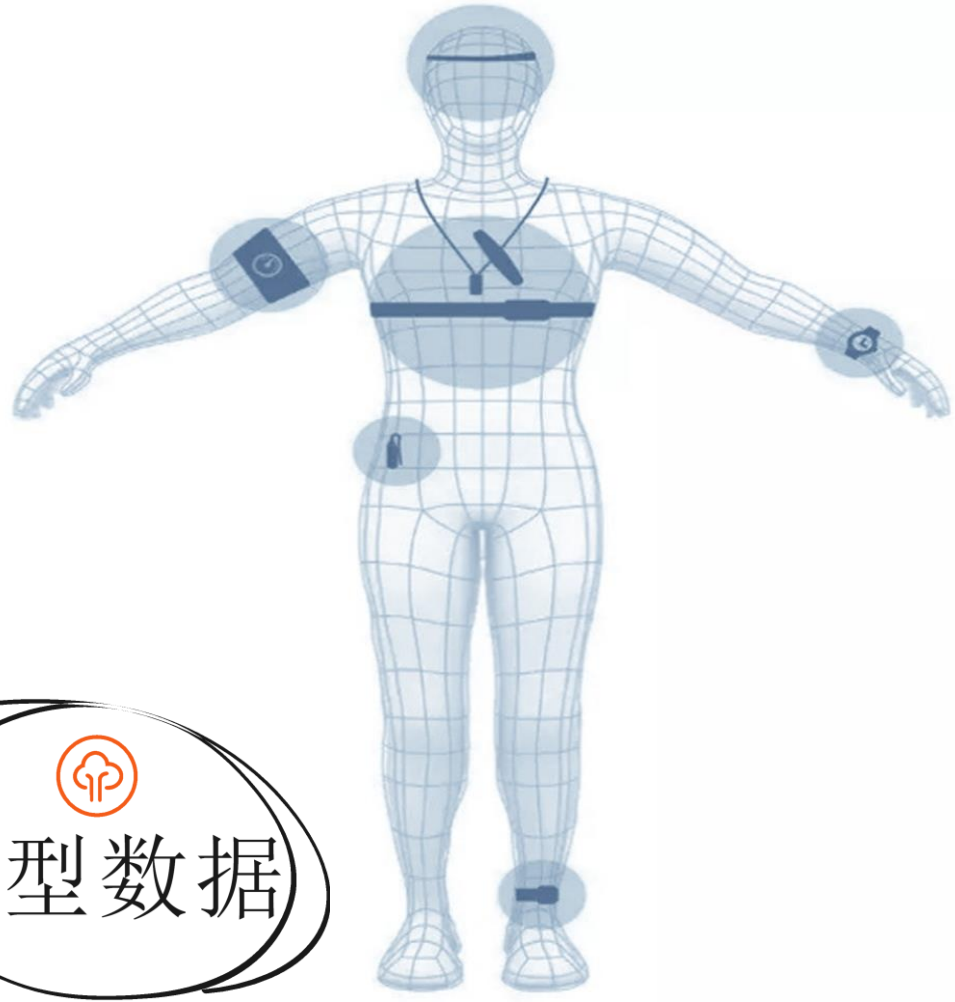
意识和心理压力等内在环境也会影响个体基因表达
Internal environment, such as consciousness and stress, can also affect individual gene expression.

藏族人基因的功能突变使他们比汉族人更能适应高原

Functional mutations in the genome of Tibetans make them more adaptive to the plateau than the Han Chinese.


肠道菌群
代谢物
蛋白质
RNA
甲基化
DNA
生命指数


运动
食物
医院
用药
共生菌
肠道菌群
环境特征



表型数据

身体姿势
Lumo
Zephyr
Jins Meme

肌肉活动

血压
iHealth
Withings

皮肤导电情况
Basis
Body Media
Empatica
Neumitra

运动
Fitbit
Nike Fuelband
Jawbone Up Band
Garmin
Samsung
MC10
Zephyr
Withings
Spire
iHealth
Jins Meme
Proteus
Neumitra
Body Media
Empatica
Owlet

携氧能力
iHealth
Withings
Owlet

含水量
Corventis
MC10

体温
Tempdrop
MC10
Empatica
BodyMedia
Basis
Owlet

大脑活动
Melon (acquired by DAQRI)
Emotiv

血糖
Dexcom
Glysens Incorporated

眼动跟踪

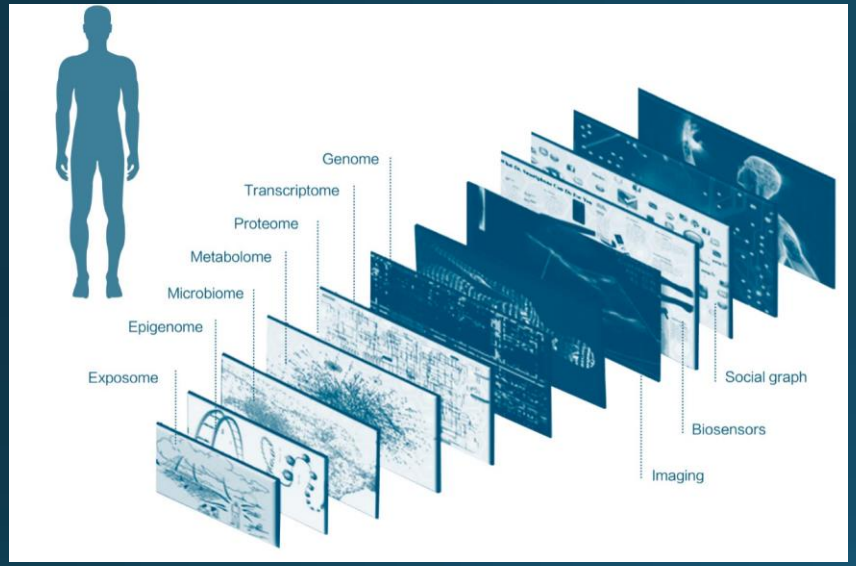
睡眠
Rest Devices
Garmin
Nike
Amiigo
BodyMedia
Withings
Samsung
Misfit
Jawbone
iHealth
Basis
Owlet

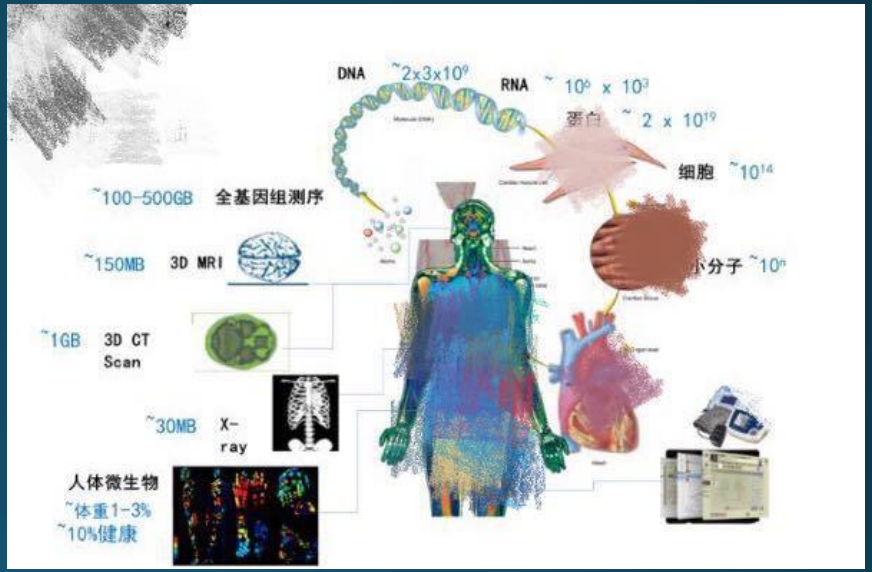
呼吸
Zephyr
Rest Devices

消化情况

心脏监护
Withings
Sprouting
Proteus
iHeath
Basis
Corventis
AliveCor
Samsung
Garmin
Empatica
Owlet

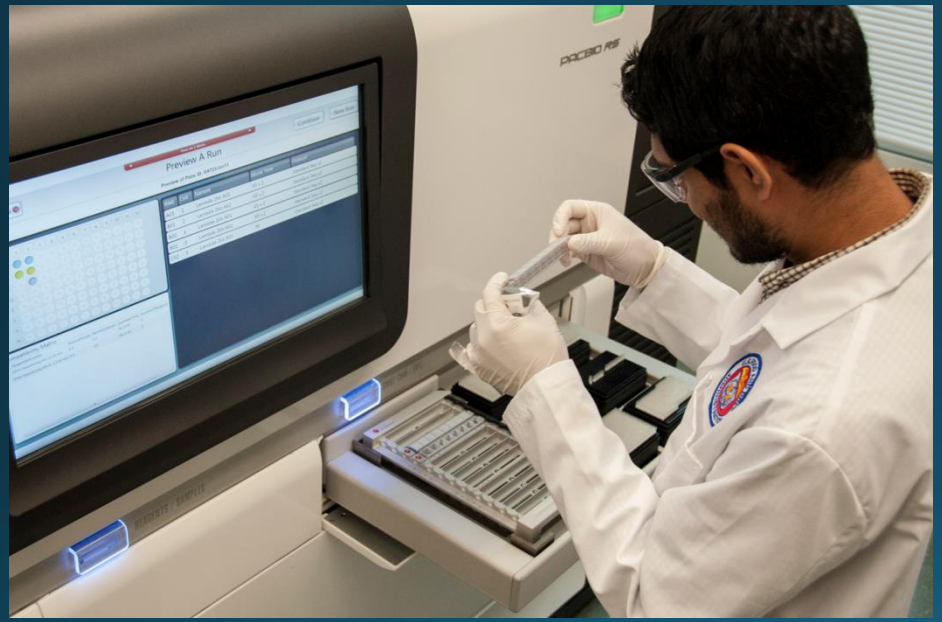
硅基世界的你
Life in the silicon-based world

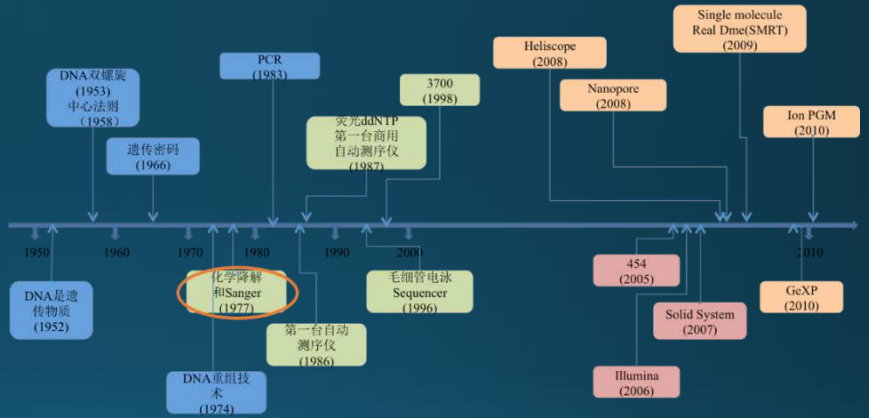




生命指数的收集，健康管理的基础

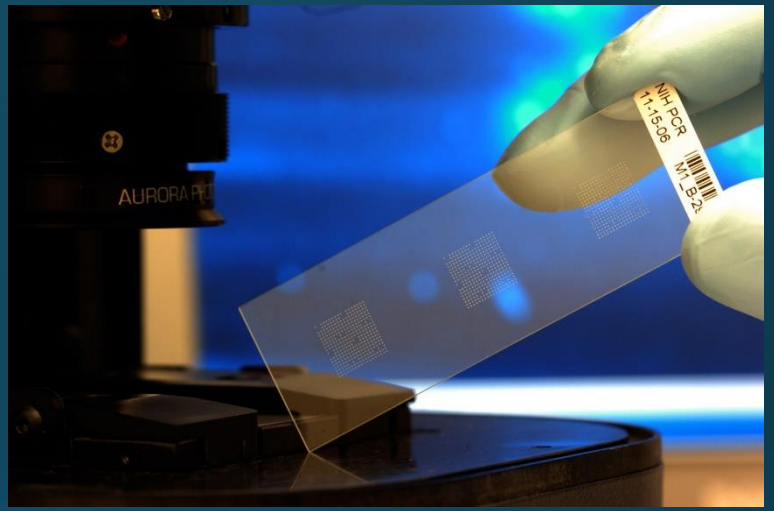
Collection of the comprehensive life data is the basis to build a precision healthcare management system

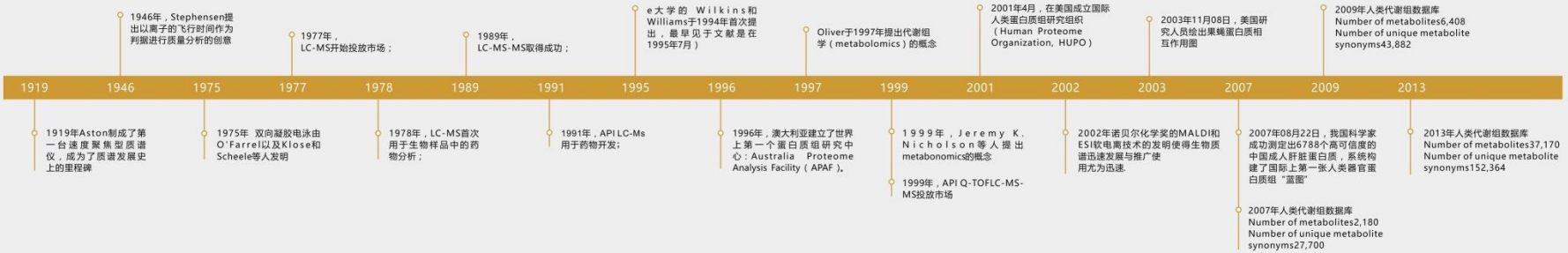


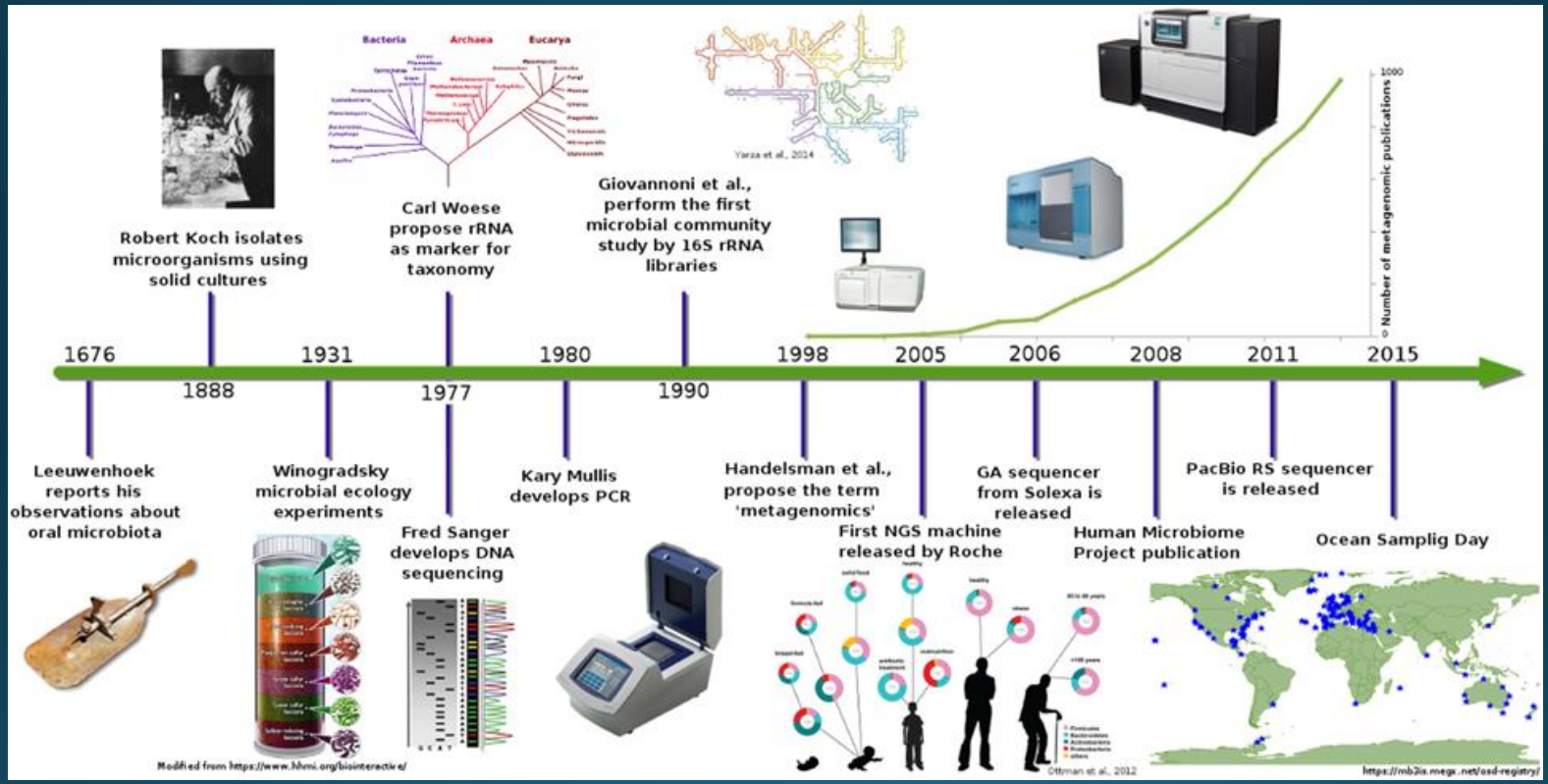


测序技术的发展
Development of the sequencing technology

蛋白和代谢物检测技术的进展
Development of protein & metabolite technology





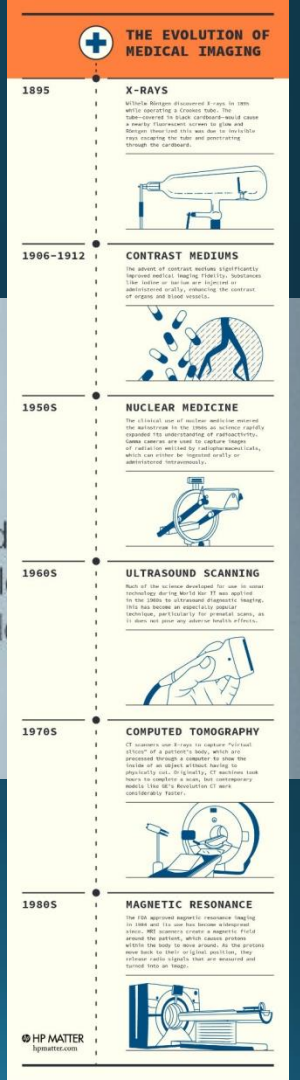


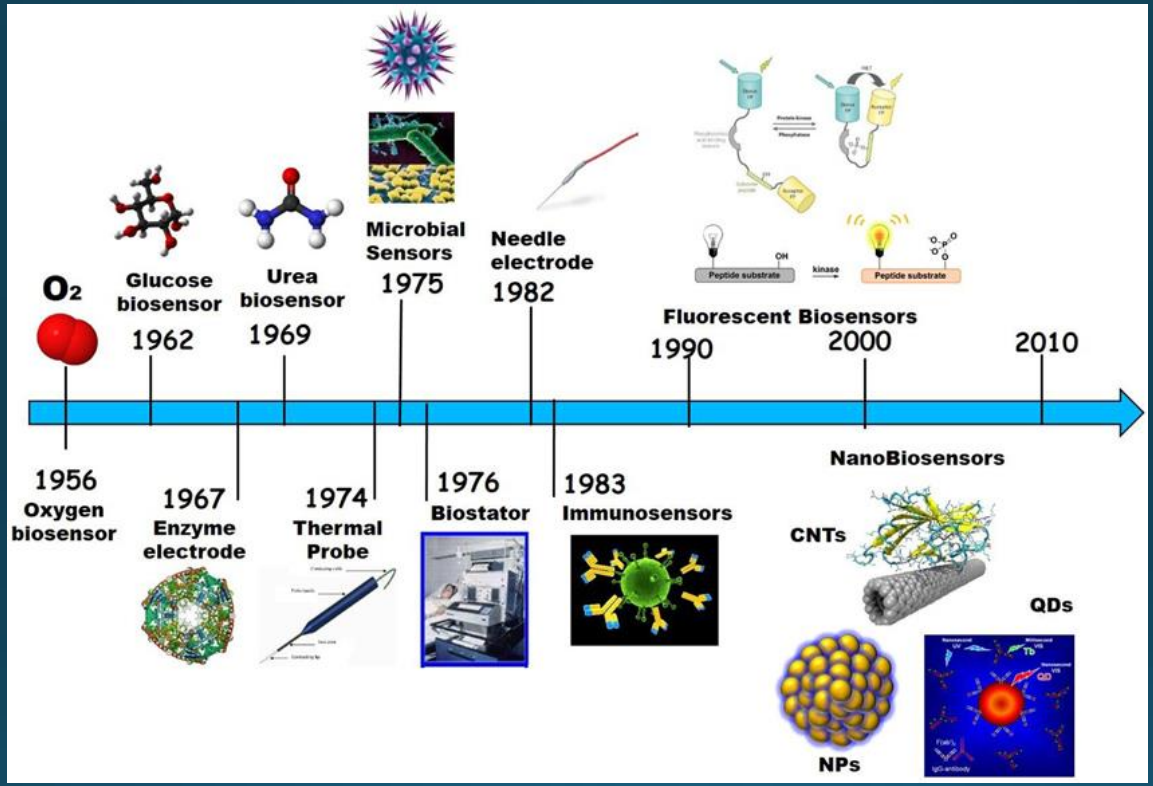
微生物检测技术的发展

Development of microbiome technology

医学影像技术的发展

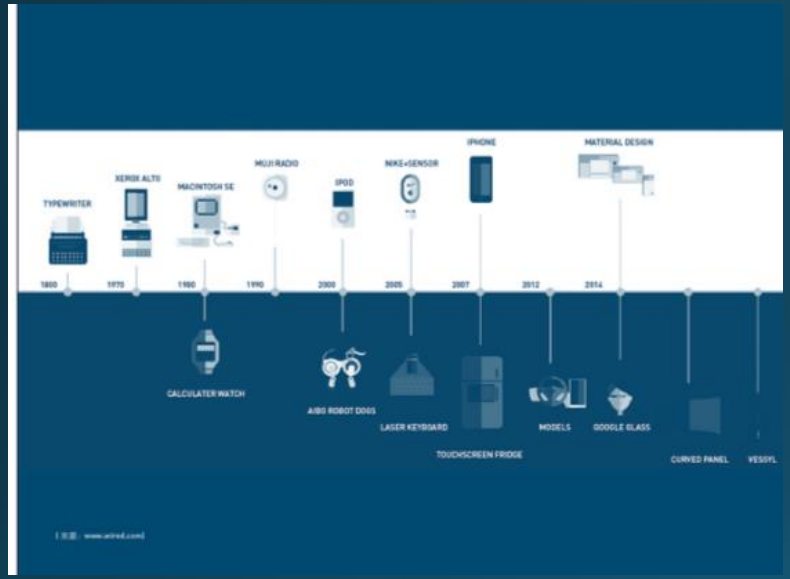
Development of medical imaging technology

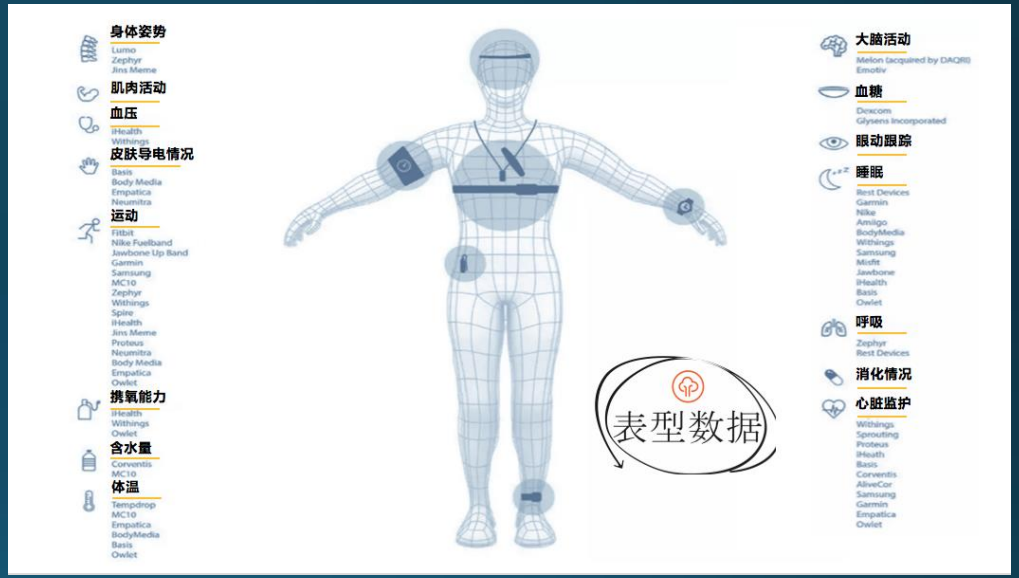




生物传感技术的发展

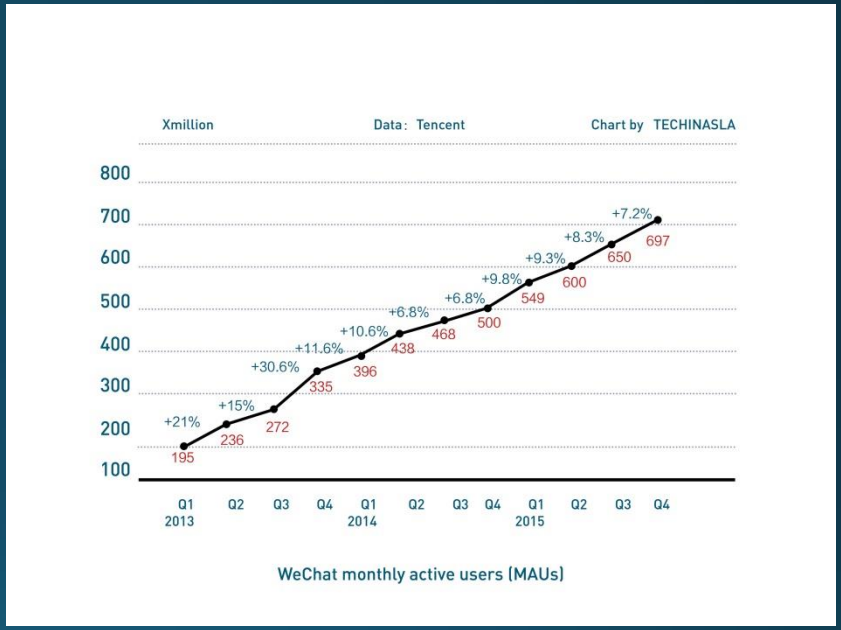
Development of biosensor technology



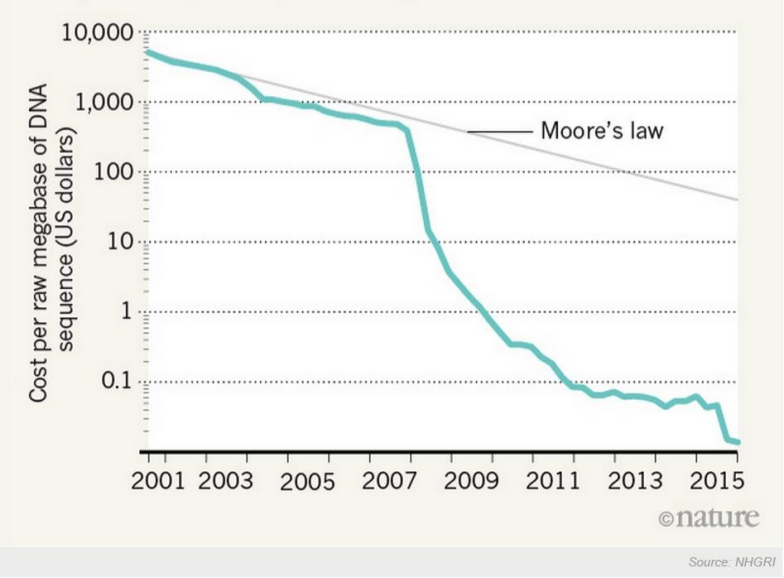


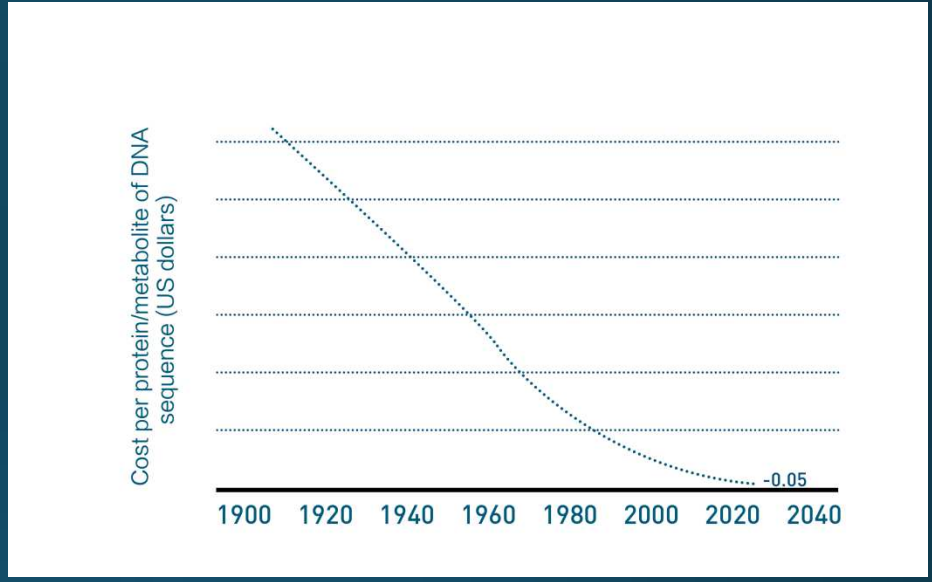
可穿戴设备和智能家居的飞速发展，让个人健康体征数据能够被实时检测和纪录下来

Rapid development of wearable devices and smart home enables individual phenotype data to be monitored and recoded automatically



社交媒体的飞速发展
Development of social media





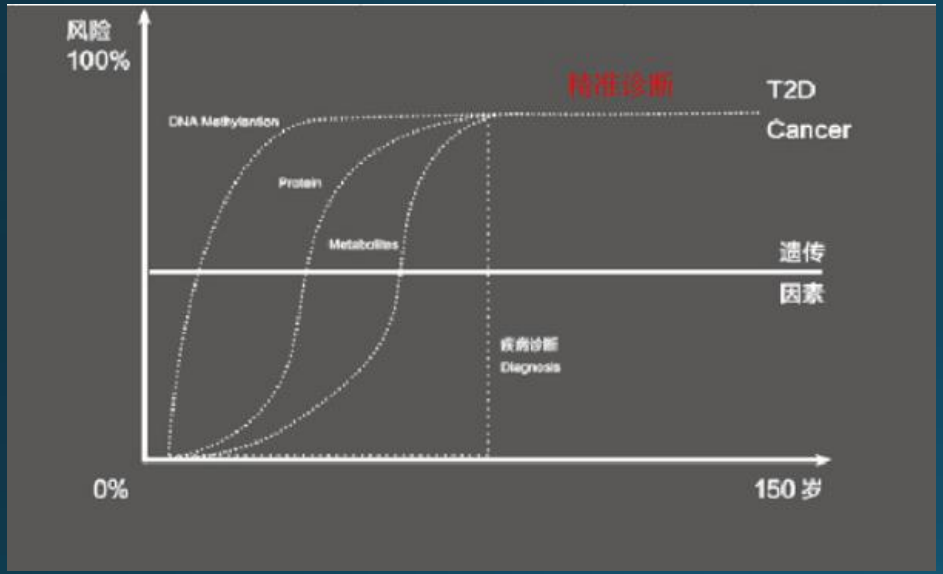
(From China's bid to be a DNA superpower. Nature 534, 462–463 (23 June 2016) doi:10.1038/534462a)

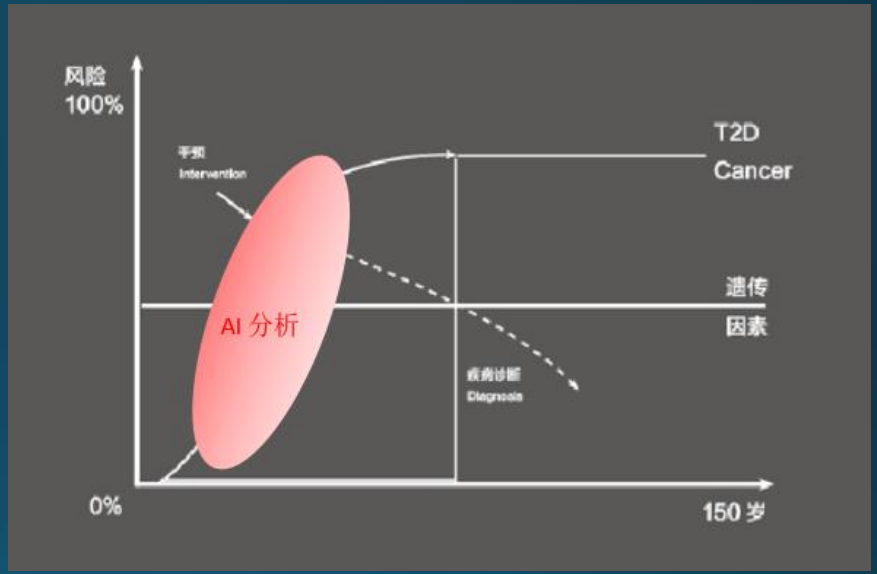
随着基因检测费用日趋降低，大量的数据积累和生命解析技术进化之后，数据产生的价值将远超过所需成本

With the increasingly lower cost of genetic testing, plus the accumulation of large amounts of heath data, and the evolution of analytical techniques, the value of life data will be far greater than the cost.

根据健康数据分析，精准健康管理

Big data analytics allow precise health management.





复杂疾病发生发展过程存在一种普遍的临界现象，基于人工智能对生命数据进行分析，对于疾病前兆的诊断具有重要指导意义。

a common critical phase exists during the complex disease development. The analysis of life data based on artificial intelligence has important guiding value to the diagnosis of disease precursors.

基于对生命的认知，通过整合和挖掘生命数据，创造每个人的“阿凡达”

iCarbonX is building a health-centered platform, through the integration and mining of life data, to create your personal ‘Avatar'.

健康数据经过数据挖掘和深度学习，形成每个人的健康管理GPS

Through data mining and deep learning, we give everyone their own healthcare GPS.

让机器协助医护人员诊断病情、照顾病人

Let AI assist medical staff to diagnose and care for patients

What is mHealth?

"I am Baymax, your personal healthcare companion"

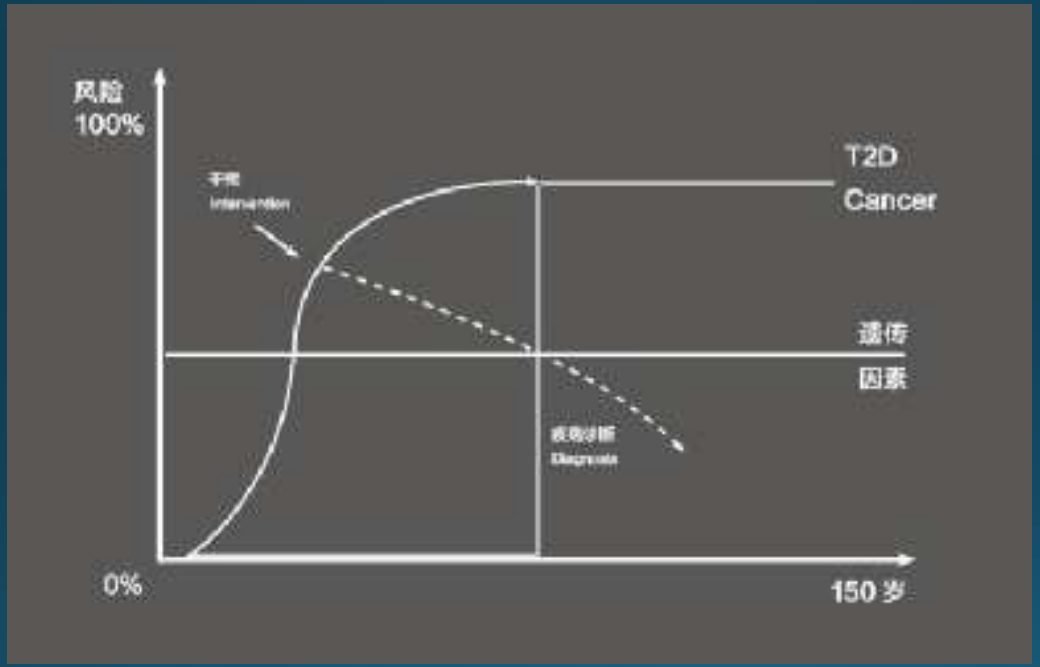
每个人都需要一个“大白”

Everyone needs a Baymax

精准管理数字生命

Managing digital life through personalized product

预测· 监测· 决策
Predicting· Monitoring· Decision-making



精准干预手段——美容护肤

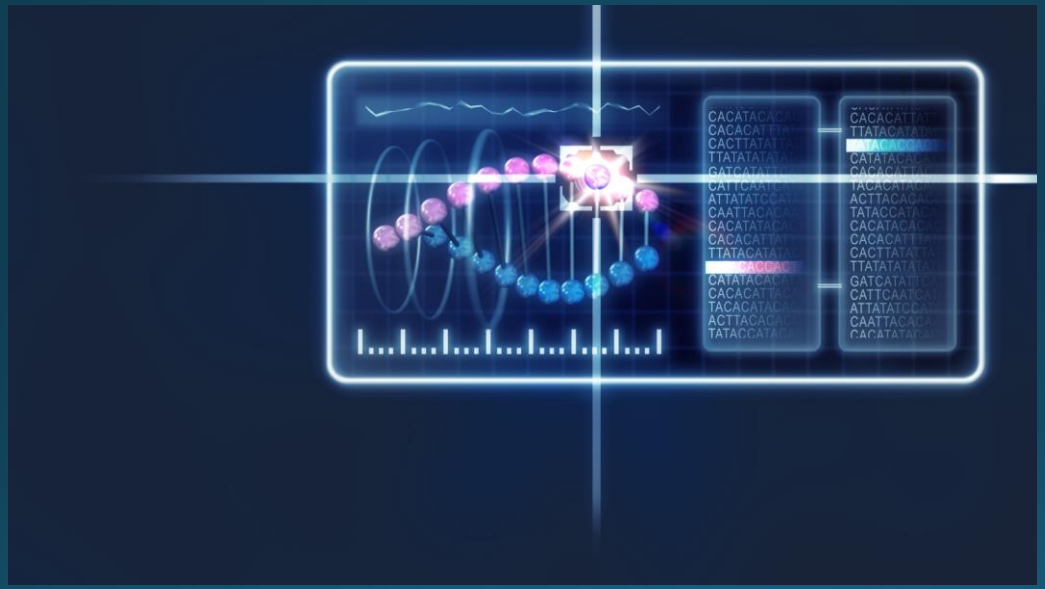
Precise intervention—— Skin Care & Hair Care

精准干预手段——营养
Precise intervention——Nutrition

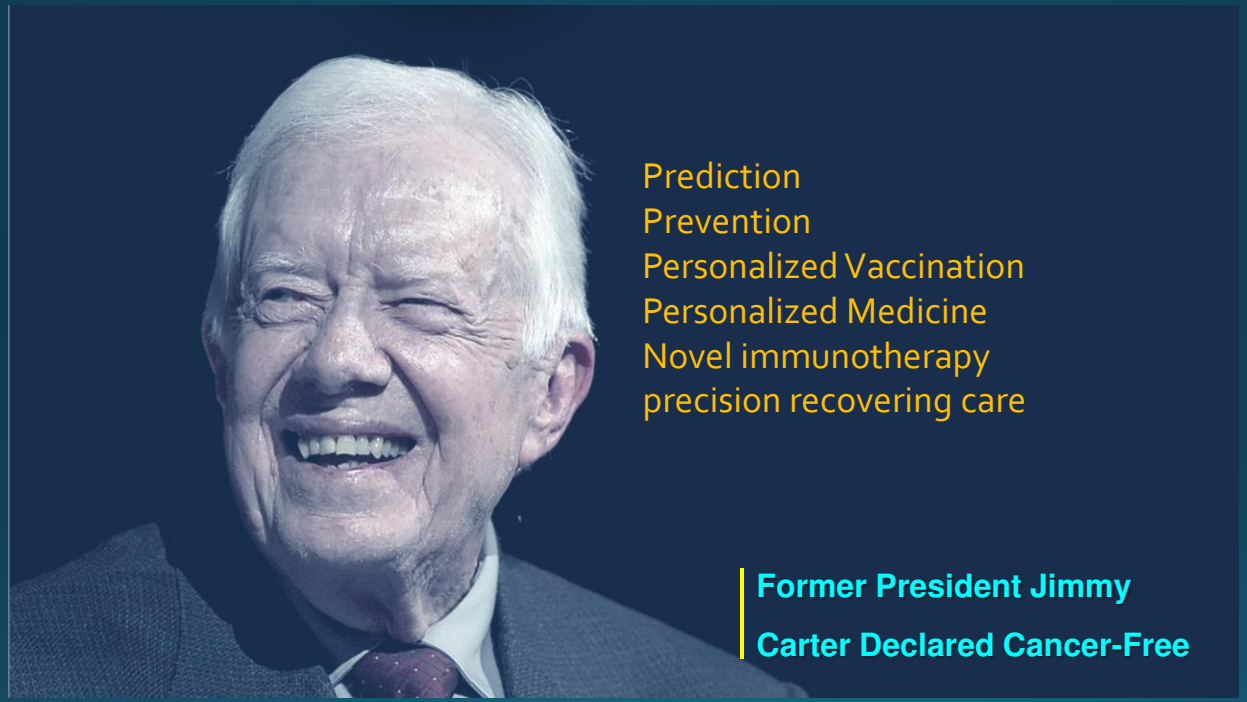
精准干预手段——运动管理
Precision intervention——Sport Management

精准干预手段——微生物调节
Precision intervention——Microbial Regulation

精准干预手段——慢性病管理
Precise intervention —— Chronic Disease Management

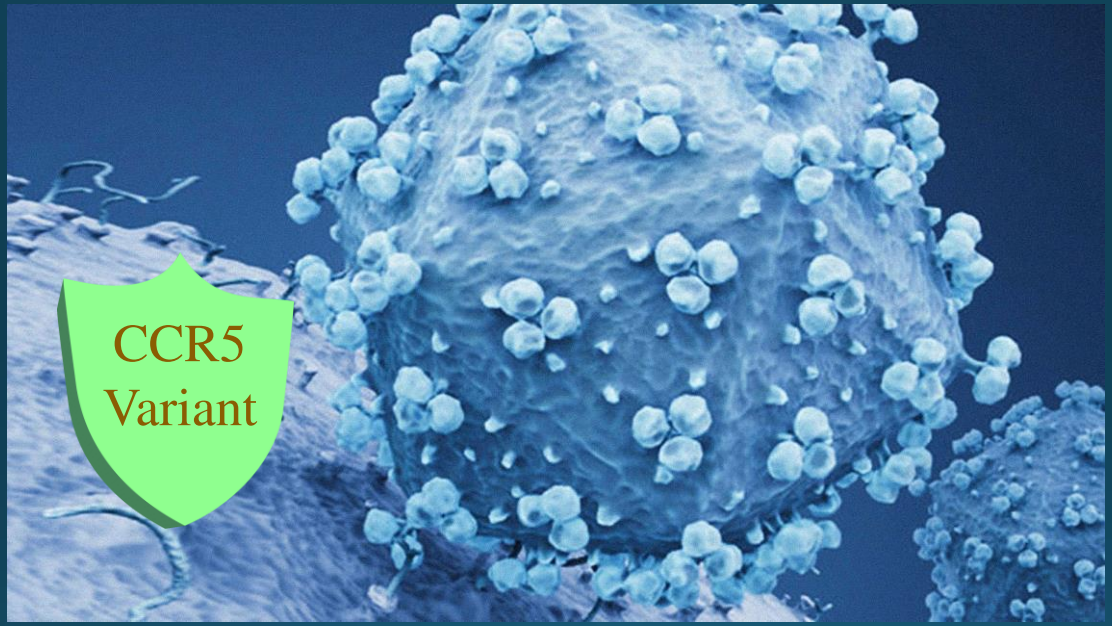


精准干预手段——肿瘤治疗
Precise intervention ——Cancer Therapy



联网硅基世界的你，构筑数字生命网络

Connect the silicon-based individuals, and build up the digital life network



骨髓捐献者的细胞信息在艾滋病人身上得到了重新利用，并治愈了患者的艾滋病

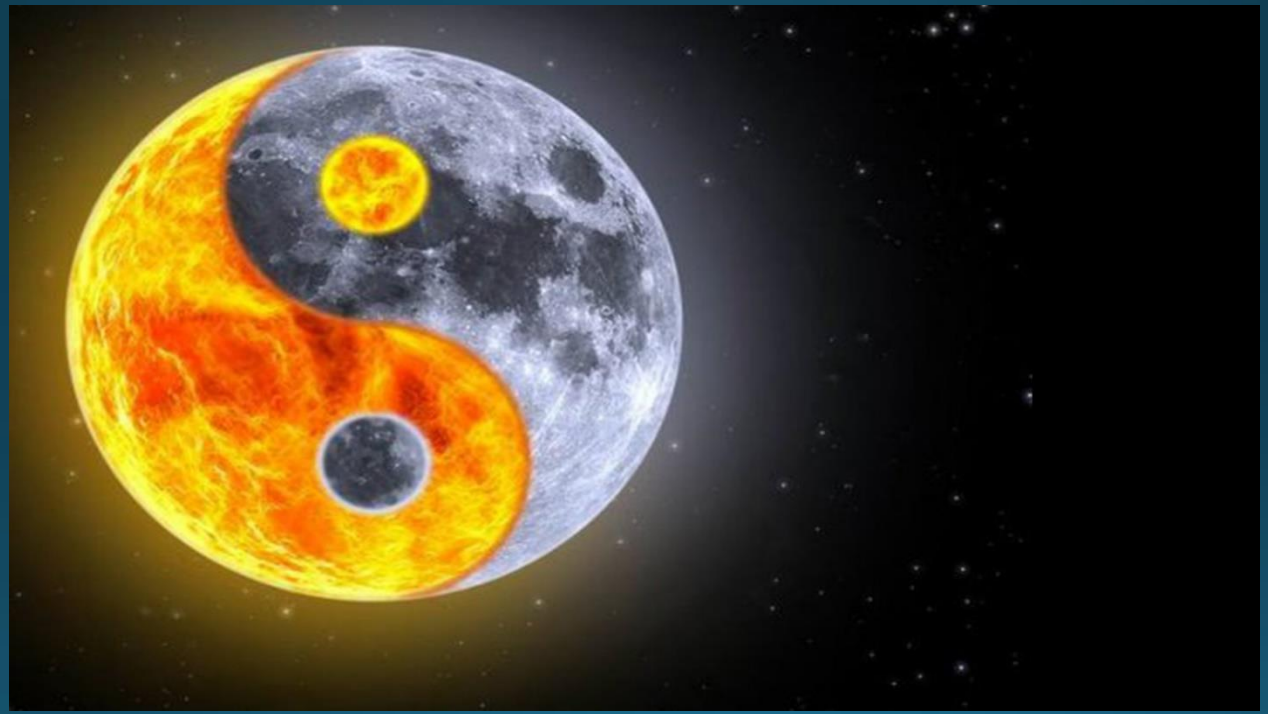
A bone marrow donor's cell functions has been re-used in an AIDS patients, and cured the patient's AIDS.

以患者为中心的网络，疾病基因特征和治疗经验自由共享，不仅帮助更多相似的病患，也大大加速人性化临床试验和药物研发

A patient-centered network, in which disease-causing genetic features and treatment experiences are freely shared, will greatly help similar patients and will accelerate clinical trial design and drug R&D.

构筑数字生命村落　Build up a tribe of digital life

生命是什么？
What is Life?



THE END

THANK YOU!