Now. For the Future.

How genomic sequencing scales up health innovation

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Summary:

- In 2003 the Human Genome Project (HGP) completed and published the full sequence of the entire human genome, a tipping point in the genomic revolution.
- Since then, genomic sequencing has gained great significance in the research and development of personalised/precision medicine, as well as other therapeutics and vaccines, contributing decisively to the understanding and mapping of the SARS-CoV-2 virus and its variants, and to the development of vaccines in record time.
- Cost-effective personalised therapies facilitate the identification of patients' exact needs, and the prescription of individualised medicines and treatments.
- Increasing areas of application for genomics offer the opportunity to participate in the growth prospects of precision medicine.
- According to estimates, the global genomics market could reach USD 54.4 billion by 2025, driven by a double-digit growth rate during the next five years.

Genomic sequencing: detective work to determine diseases

In 2003, the Human Genome Project (HGP) succeeded in sequencing and mapping the genome of homo sapiens. This tipping point in the genomic revolution not only gave birth to genomic sequencing as a new and fascinating research area, but also ushered in a new era of precision medicine and personalised treatments.

> **"[...] it's a transformative textbook of medicine, with insights that will give healthcare providers immense new powers to treat, prevent and cure disease."**
>
> *(Dr. Francis S. Collins, Director, National Human Genome Research Institute, February 12, 2001).*[1]

Kofi Kodua
Director,
Portfolio Manager,
Global Thematic
Equity

Since then, genomic sequencing has taken significant steps, enabling scientists to classify and characterise viral samples, and thus significantly contributing to the development of vaccines in record time, with the help of genome engineering tools, among other things. It is indeed undeniable how important genetic epidemiology research has been in containing the COVID-19 pandemic. Similarly, gene sequencing has many other important applications, such as facilitating screening for early detection and treatment of diseases. Together with other gene-editing technologies and high-precision DNA synthesis platforms, it helps to modify, delete or correct precise DNA regions, and accelerate research and discovery. For example, together with other technologies like artificial intelligence, gene sequencing can have an enormous impact on clinical trials, helping to reduce failure rates and shorten the time to market for many essential drugs.

Deciphering a gene's superpower

> **By 2025, as many as 2 billion people could have their genomes sequenced.**

The archetypical conflict between good and evil is not only played out in cinematic settings, but also in the depths of our DNA. For a long time geneticists focused on deciphering the code of disease-provoking genes and their variants and/or mutations. However, with the discovery of genes that have the opposite, healing effect, the way was paved for the development of medication and treatments that could imitate or simulate the impact of disease-protecting genes.

The discovery and "re-modelling" of these "superpower genes" was particularly accelerated by the possibility of the timely sequencing of the genomes of millions of participants in globally conducted studies. This linking of research capabilities enabled scientists to significantly speed up the uncovering of several protective gene variants, and to create disease inhibitors with a similar protective effect to their genetic role models, while also preparing the ground for precision and personalised medicine.

Personalised medicine: the blueprint for sustainable health

Our genes form the foundation and basis of human health. They are key in determining, for example, if one is at an increased risk of developing certain conditions, or of suffering from inherited health problems.

The better we understand our unique genetic make-up, the more additional valuable information we can gain. This knowledge can help to:

- develop and prescribe tailor-made medical care perfectly matching not only the genetic make-up, but also the actual health status of an individual patient.
- significantly reduce potential side-effects.
- benefit from better outcomes and a more effective treatment.
- predict more accurately the individual response of a given treatment.
- avoid taking additional tissue or blood samples.
- develop tailor-made prevention strategies for specific diseases, in accordance with the corresponding genetic disposition.
- adapt the frequency of screenings to prevent or diagnose and treat diseases earlier.
- change our lifestyle precisely.
- guide decision-making surrounding our health through all stages of life.

In the context of personalised medicine, secondary findings – unexpected health results from genomic testing that are not related to the originally intended examination – have proven to offer the opportunity to identify in a timely fashion genomic variants that potentially or very likely point to severe though treatable diseases. Studies suggest that between 1% and 4% of people taking genomic tests get secondary findings.[2] At the same time a lively discussion has broken out on how clinicians should discuss non-intended results from genomic testing with their patients when they are confronted with a new diagnosis, and how potentially life-saving secondary findings should be used if patients refuse to receive them.

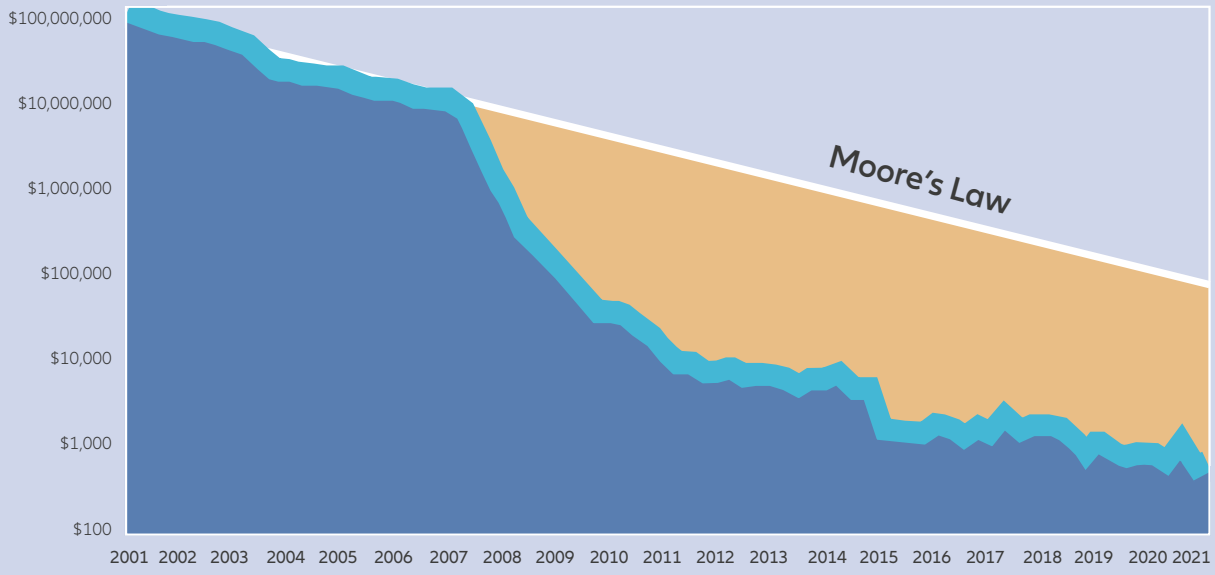
> **1 in 6 healthy adults is at increased risk of a serious health condition due to their genetics—and probably doesn't know it.[3]**

Despite the controversy around the (future) role of secondary genomic findings, they are a crucial part of the progress that genomics is making in helping us care for our health. It is putting the power in our hands to more effectively guide our treatment options – be it in cancer care, heart disease, pregnancy etc. – by finding the precise method of care needed, as dictated by our genes. Fewer cookie-cutter treatments and more tailor-made solutions can make for a more robust and effective healthcare system, where the consumer feels empowered, confident and hopeful. Knowing that physician recommendations were guided by our unique genetic make-up, resulting in a personalised health plan, paves the way for more sustainable health, and can only continue to grow by leaps and bounds as we further our research in this area of genomics.

Are the costs for genetic sequencing following Moore's Law?

Following recent estimates around the cost trend for genomic sequencing, the rate of cost decline seems not only to follow, but also to exceed Moore's law, as costs have approximately halved every two years. If this pattern is maintained, the cost per genome will soon fall below USD 1,000.

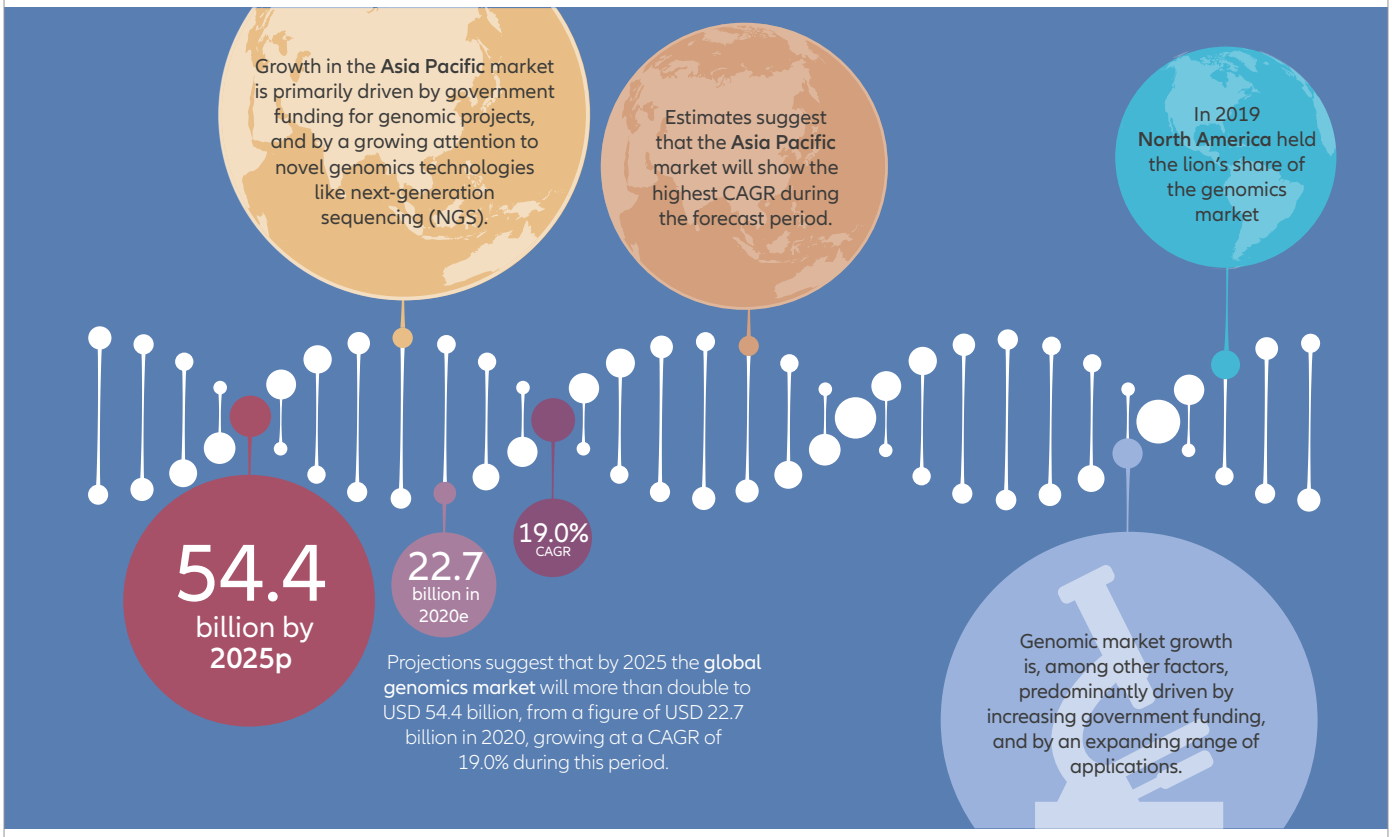
Cost per Human Genome



Source: https://www.genome.gov/about-genomics/fact-sheets/Sequencing-Human-Genome-cost, 2021.

This decline in costs is in contrast to the significant growth of the global genomics market, with forecasts predicting the segment to reach a value of USD 54.4 billion – a double-digit CAGR-growth of 19.0% – by 2025.[4]

Global Genomics Market Trend



e = estimated | P = projected. Source: MarketsandMarkets.com

The genomic sequencing market is ripe with opportunity for investors. With the rise of more viral diseases globally, and the declining costs of genomics – which would allow for more personalised treatments – as well as significant investment from governments and companies, we will continue to see major growth. With genomic sequencing becoming less costly, and more areas for application becoming available, there will be greater and more sustainable opportunities for specialised companies.

Allianz Global Investors identifies genomic sequencing innovators

To further accelerate the genomic sequencing research, and to widen its application areas, investments are needed. Redirecting capital flow towards key enablers helps to develop and refine personalised-medicine solutions that offer more individualised time- and cost-effective treatment options, while at the same time reducing side-effect risks.

Allianz Global Investors continues to identify innovators specialising in the detection of disease-provoking genes, as well as the improvement and acceleration of conventional drug development processes. This offers investors not only opportunities to participate in growth prospects, but also to contribute to the development of a more robust and effective healthcare system.

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[1] https://www.genome.gov/10001379/february-2001-working-draft-of-human-genome-director-collins

[2] Haverfield E, Esplin ED, Aguilar S, et al. Multigene panel screening for hereditary disease risk in healthy individuals. Poster presented at: ACMG Annual Meeting; April 12, 2018; Charlotte, NC.

[3] https://www.genome.gov/news/news-release/from-one-genomic-diagnosis-researchers-discover-other-treatable-health-conditions

[4] https://www.marketsandmarkets.com/Market-Reports/genomics-market-613.html

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