



# TECHNOLOGY

Can it deliver a more precise, individual and empowering approach to health?

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Innovation in technology continues to influence society, and healthcare can expect both opportunities and challenges.

## GENETICS AND PRECISION MEDICINE

Sixty years since the structure of DNA was discovered, understanding of the role of genes in health and disease has advanced enormously, alongside technologies that identify the genetic make-up of individuals. These advances could shift the healthcare model from treatment based on generalized demographics to precision medicine, which matches patients with drugs targeting specific genetic drivers. Leading pharmaceutical companies have doubled investment in precision medicine in the last five years and a further increase is expected in the next five. This would mean oncologists could use genetic tests to identify which treatments a tumor is likely to respond to, sparing patients from receiving treatment that may do more harm than good. In 2017, for the first time, the US FDA approved a cancer treatment based on a common biomarker rather than the location in the body where the tumor originated.

An emerging debate, likely to continue as precision medicine becomes widespread, concerns the market dynamics of genome medicines such as gene editing and gene therapy, which offer the promise of a 'one shot cure'. How might business models need to change as advances move the industry from a focus on disease and treatment to prevention and cures?

**MACHINE LEARNING IS MATURE ENOUGH TO START ACCURATELY PREDICTING MEDICAL EVENTS—SUCH AS WHETHER PATIENTS WILL BE HOSPITALIZED, HOW LONG THEY WILL STAY, AND WHETHER THEIR HEALTH IS DETERIORATING DESPITE TREATMENTS.**

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## WEARABLE AND MOBILE DEVICES

Wearable devices are becoming a part of everyday life for some, collecting real-time data on biological and environmental changes. Some 20 billion devices are already connected to the internet, expected to grow to 50 trillion by 2045. How will having 20,000 times more digital information in 2025 than there is today impact health? People will be more aware of their health than ever, able to measure signs such as heart rate or body mass index as well as be reminded about interventions such as taking insulin or increasing movement. This could increase treatment adherence and efficacy, and spur more personalized treatment. Privacy and trust, already challenged, will be vital to ensure patient data is not exposed to unnecessary risk or discrimination.

Connected devices can also transform healthcare in lower resource settings. Mobile phones and mHealth solutions can extend care, new payment models, and health-related information to remote areas as well as monitor health services and consumption of vaccines and medicines.

With wearables that may track symptoms, the pace of consumer engagement might accelerate. Social networks are poised to enable powerful customer engagement, allowing patients and health actors to interact in new ways. Information might be shared and disseminated through peer-to-peer support networks such as PatientsLikeMe and HealthUnlocked. How will consumer demand for transparent, convenient, and high-quality care grows challenge business models? Companies that offer meaningful and highly personalized solutions will succeed in this environment.

## ARTIFICIAL INTELLIGENCE (AI) AND SMART ROBOTS

When applied to data collected through connected devices, AI could benefit healthcare through increased productivity and improved product quality. AI enabled machines could also perform administrative and clinical functions such as medical imaging, risk analysis and diagnosing health conditions. Deep learning could identify patterns in large data sets, revealing new linkages between genes and disease more rapidly than its human counterparts. Some estimate that clinical health AI applications could save the US healthcare economy USD 150 billion annually by 2026. Recognizing significant opportunities presented by AI, actors across the health ecosystem must also assess the appropriate roles of technology and establish standards to manage what to delegate to machines.