



## Harnessing Innovation Together: How Technology is Shaping Healthcare's Future

Editorial by Dr. Björn Zoëga

**Introduction-** Healthcare is evolving in surprising ways, even for experienced professionals. New technologies worldwide are being used in unexpected ways beyond just speeding up diagnostics and predicting care needs through biotechnology. AI in healthcare is making transformative and disruptive advances.

Countries like the US, Switzerland, the UK, and China are already home to some of the largest biotech and pharmaceutical companies and research programs. In the UK, AI is helping radiologists identify lung cancer with greater accuracy, while Germany's genomic researchers are integrating AI to customize therapies based on the genetic profile of each tumor. Researchers in Switzerland have already developed CRISPR-based therapy to cure sickle cell disease and another hemoglobin-affecting genetic disorder (beta Thalassemia).

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# EDITORIAL

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### I. INTRODUCTION

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Countries like the US, Switzerland, the UK, and China are already home to some of the largest biotech and pharmaceutical companies and research programs. In the UK, AI is helping radiologists identify lung cancer with greater accuracy, while Germany's genomic researchers are integrating AI to customize therapies based on the genetic profile of each tumor. Researchers in Switzerland have already developed CRISPR-based therapy to cure sickle cell disease and another hemoglobin-affecting genetic disorder (beta Thalassemia).

Yet, these developments are far from confined to any single country or institution; instead, we have a unique opportunity to learn from one another's experiences and build a collective understanding of how best to implement these advances. In this dynamic and interconnected space, innovation knows no boundaries in a universal mission to better human lives.

### II. EMBRACING EMERGING POTENTIAL

In Saudi Arabia, cutting-edge medical technology has fundamentally altered the practice of medicine. Biotech advancements, particularly in genomics, provide unprecedented insights into human biology. While these technologies are gaining ground globally, their impact is most significant when integrated into comprehensive healthcare strategies considering local needs and contexts. This is why Saudi Arabia's National Biotechnology Strategy has set clear strategic goals to advance self-sufficiency in vaccines, biomanufacturing, and genomics.

This strategy fosters a pro-innovation environment that enables us to leverage this high-growth sector to improve people's health and well-being. At King Faisal Specialist Hospital & Research Centre

(KFSHRC), AI is used in early diagnosis and patient management. A KFSHRC-developed metagenomic protocol successfully diagnoses infectious diseases that traditional methods have failed to identify. Patients can now receive highly accurate results within 24 hours. In radiology, AI enhances the detection and treatment of diseases such as cancer and cardiovascular disorders, improving diagnostic accuracy by 25% (with an 18% drop in misdiagnosis rates).

Another example is Whole Genome Sequencing (WGS), which is prioritized for early detection and treatment of genetic disorders. Over 7,000 WGS tests were conducted in 2023. Utilizing CRISPR technologies, KFSHRC researchers have recently uncovered the crucial role of a protein (Phosphatidylserine C Zeta) in the normal development of embryos during the early stages of pregnancy.

Meanwhile, robotics enhance surgical precision, reduce recovery times, and allow procedures that were once considered highly complex to be performed with excellent safety and efficiency. For example, in August 2023, KFSHRC performed the world's first fully robotic liver transplant.

These advancements-unattainable without leveraging the innovation-ready environment-will go a long way toward improving the future of human health not just for Saudi Arabia but for the entire world.

### III. NAVIGATING ETHICAL CHALLENGES

Embracing the power of biotech and AI requires responsible integration. Advances such as CRISPR – now more widely used for diagnostics - call us to confront new ethical questions about patient consent, data security, and equitable access to care. Institutions worldwide strive to set moral standards, prioritizing the responsible use of these critical technologies and balancing innovation with patient safety and privacy.

Globally, organizations like the World Health Organization (WHO) and the Global Partnership on Artificial Intelligence (GPAI) are creating ethical frameworks that ensure these breakthroughs benefit all patients while maintaining safety and transparency. These global efforts highlight the importance of

Artificial Intelligence (GPAI) are creating ethical frameworks that ensure these breakthroughs benefit all patients while maintaining safety and transparency. These global efforts highlight the importance of developing universal moral standards. Institutions worldwide also contribute to these discussions by applying these principles in diverse contexts, sharing their experiences, and refining best practices. By sharing and developing ethical frameworks and protocols that can be adapted globally, we can contribute to a more effective, inclusive, and connected universal healthcare system.

#### IV. THE PATH FORWARD: WORKING TOGETHER

AI-driven drug discoveries, AI-powered robotic surgeries, and genomics are just a few instances of how technology is already transforming healthcare and enhancing treatment outcomes.

Yet, the path forward is not simply about deploying the latest technology. It is about how we can thoughtfully leverage these advancements in medical research and patient care to achieve a tangible impact. Whether through shared study, cross-border partnerships, or open forums for discussion, we have much to gain from working together.

For healthcare providers everywhere, the question is how we can learn from these diverse advances and apply them meaningfully in our contexts. By adopting a global outlook, we can better understand how these technological breakthroughs reshape patient care and fundamentally contribute to making it more precise, accessible, and effective for all.

