OPPORTUNITY 5

SCOPE VISIONARY

UNCERTAINTIES

Technology, Values

MEGATRENDS

Materials Revolution

TRENDS

3D Printing
Biomaterials
Biotechnology
Genomics
Personalised Medicine

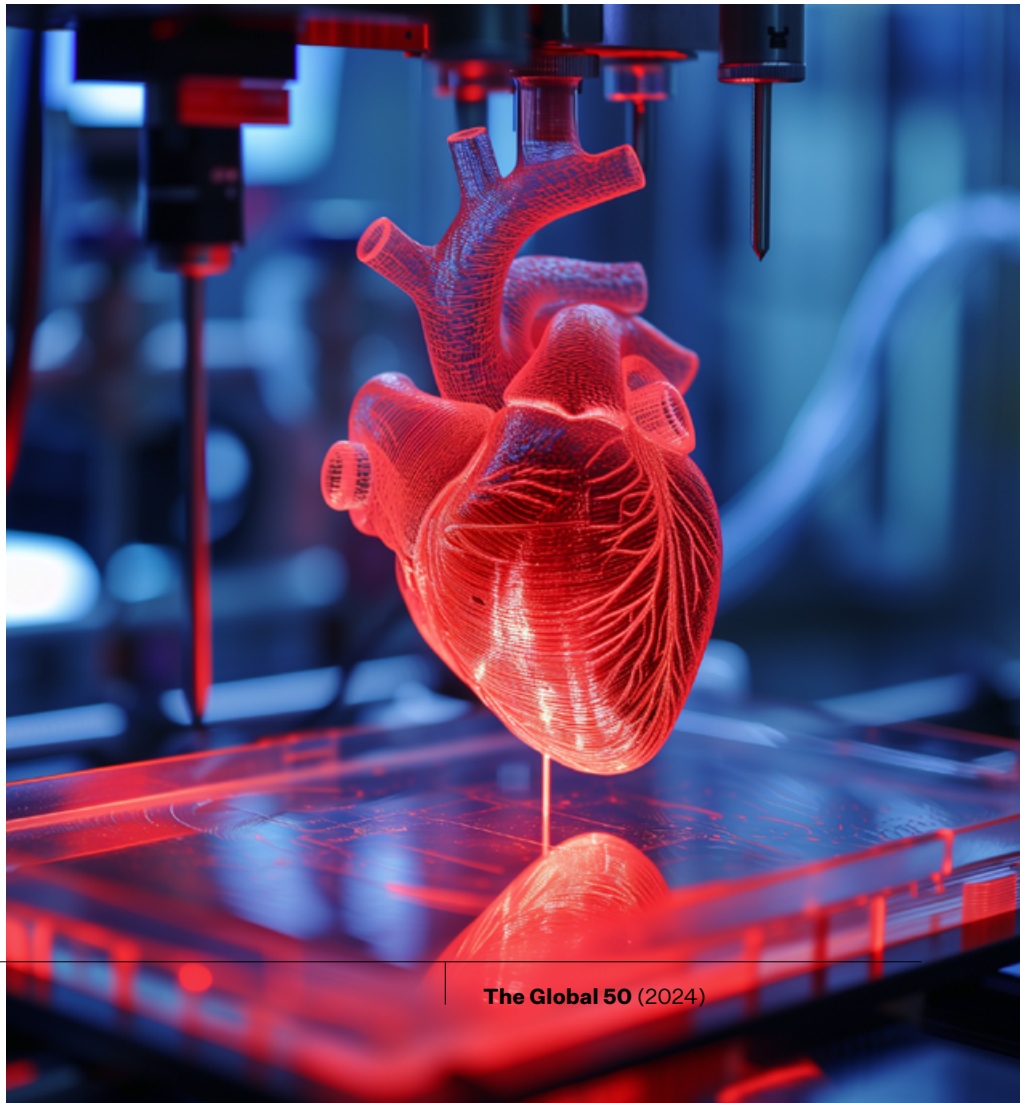
SECTORS IMPACTED

Agriculture & Food
Automotive, Aerospace & Aviation
Chemicals & Petrochemicals
Consumer Goods, Services & Retail
Data Science, AI & Machine Learning
Digital Goods & Services
Education
Financial Services & Investment
Government Services
Health & Healthcare
Infrastructure & Construction
Insurance & Reinsurance
Materials & Biotechnology
Professional Services
Real Estate
Sports
Travel & Tourism
Utilities

What if organ transplant waiting lists were eliminated?

ORGAN PRINTING GenAI

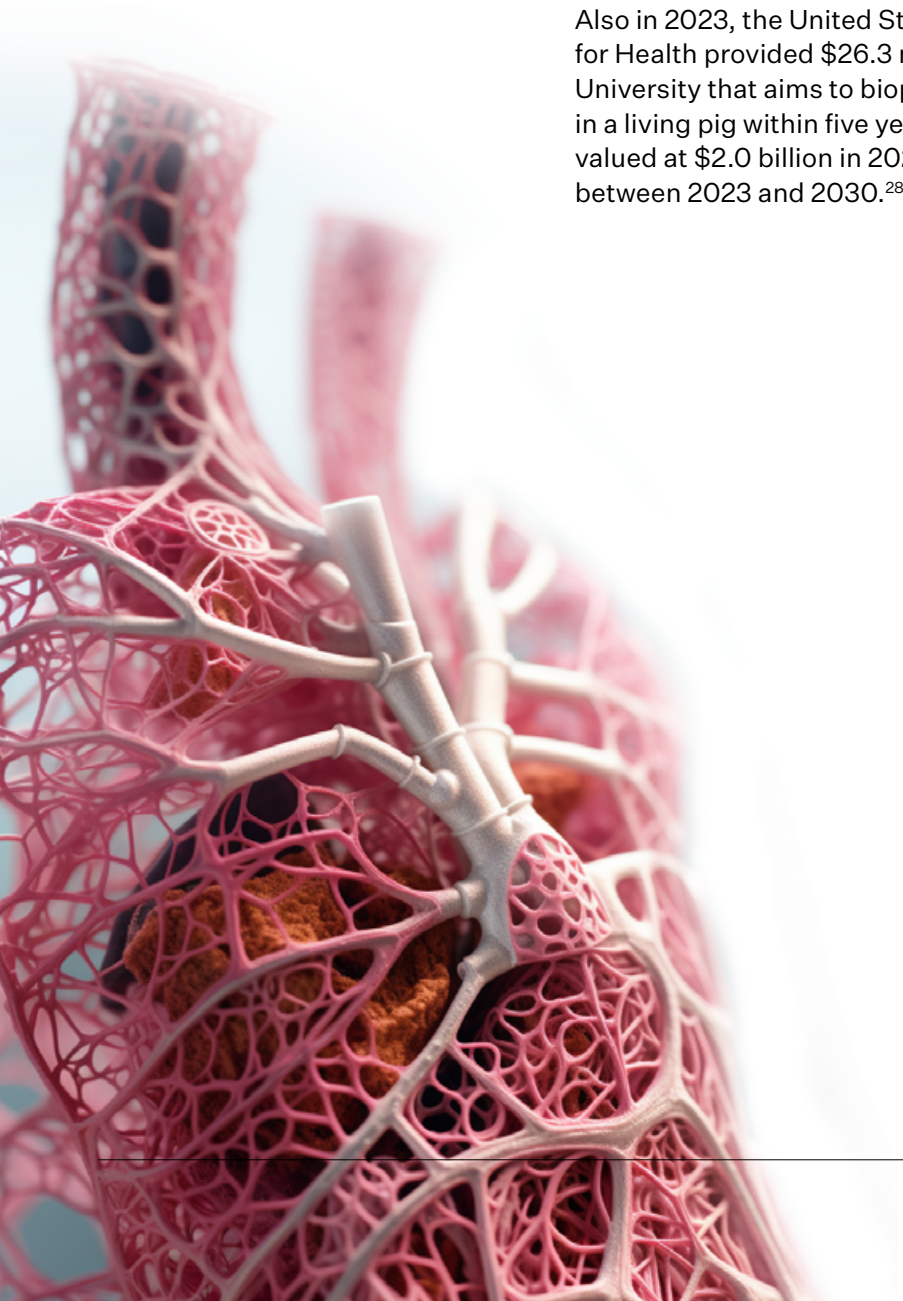
Personalised bioprinting and genomics transform organ transplantation, reducing or potentially eliminating waiting lists, reducing organ rejection, and improving survival rates.



WHY IT MATTERS TODAY

There is a critical organ donor shortage globally. In the United States alone, there are over 100,000 people on organ transplant waiting lists.[272] Seventeen of those people die every day while awaiting a transplant.[273] In 2022, 157,494 organs were transplanted worldwide, an 9.1% increase compared with 2021.[274] Only 3 in 1,000 people die in a way that allows deceased organ donation,[275] and organ rejection affects 10% of recipients.[276]

Amidst increasing demand for organ donations, global recognition of the prospects of bioprinting – patterning and assembling biological materials to fulfil a biological function – is increasing.[277] In 2022, 3DBio Therapeutics printed and transplanted a 3D printed ear for a woman born with a misshapen right ear.[278] In 2023, researchers at Rensselaer Polytechnic Institute 3D printed hair follicles in lab-cultured human skin.[279] Also in 2023, the United States' Advanced Research Projects Agency for Health provided $26.3 million in funding to a project at Stanford University that aims to bioprint a working human heart and implant it in a living pig within five years.[280] The global 3D bioprinting market was valued at $2.0 billion in 2022 and is forecast to grow at a CAGR of 12.5% between 2023 and 2030.[281]



OPPORTUNITY

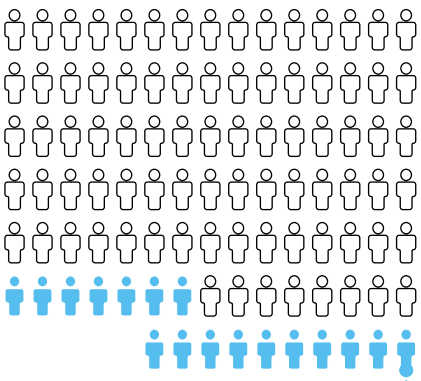
Personalised bioprinting transforms organ and tissue transplantation, reducing or eliminating transplant waiting lists and rejection risk. People in need of an organ donation can receive a 3D bioprinted transplant almost immediately, decreasing their risk of mortality and increasing their long-term health and quality of life. Powered by genomics, 3D printed patient-identical tissues could be used to restore retinal health, repair heart muscle, and treat burns, significantly improving patient outcomes.

BENEFITS

Those in need of transplants will no longer be dependent on organ donations or require anti-rejection treatment for the rest of their lives. Quality of life will increase throughout society as new solutions to organ- and tissue-related medical challenges are discovered.

RISKS

There may be unforeseen long-term health effects of personalised bioprinting. The technology may also be medically or ethically misused to manipulate human physical capacities.



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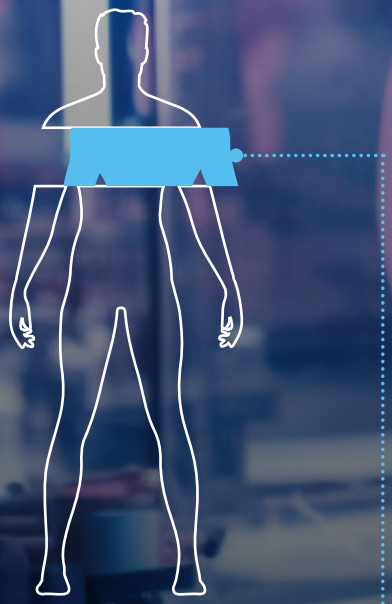

Organ rejection affects 10% of recipients