

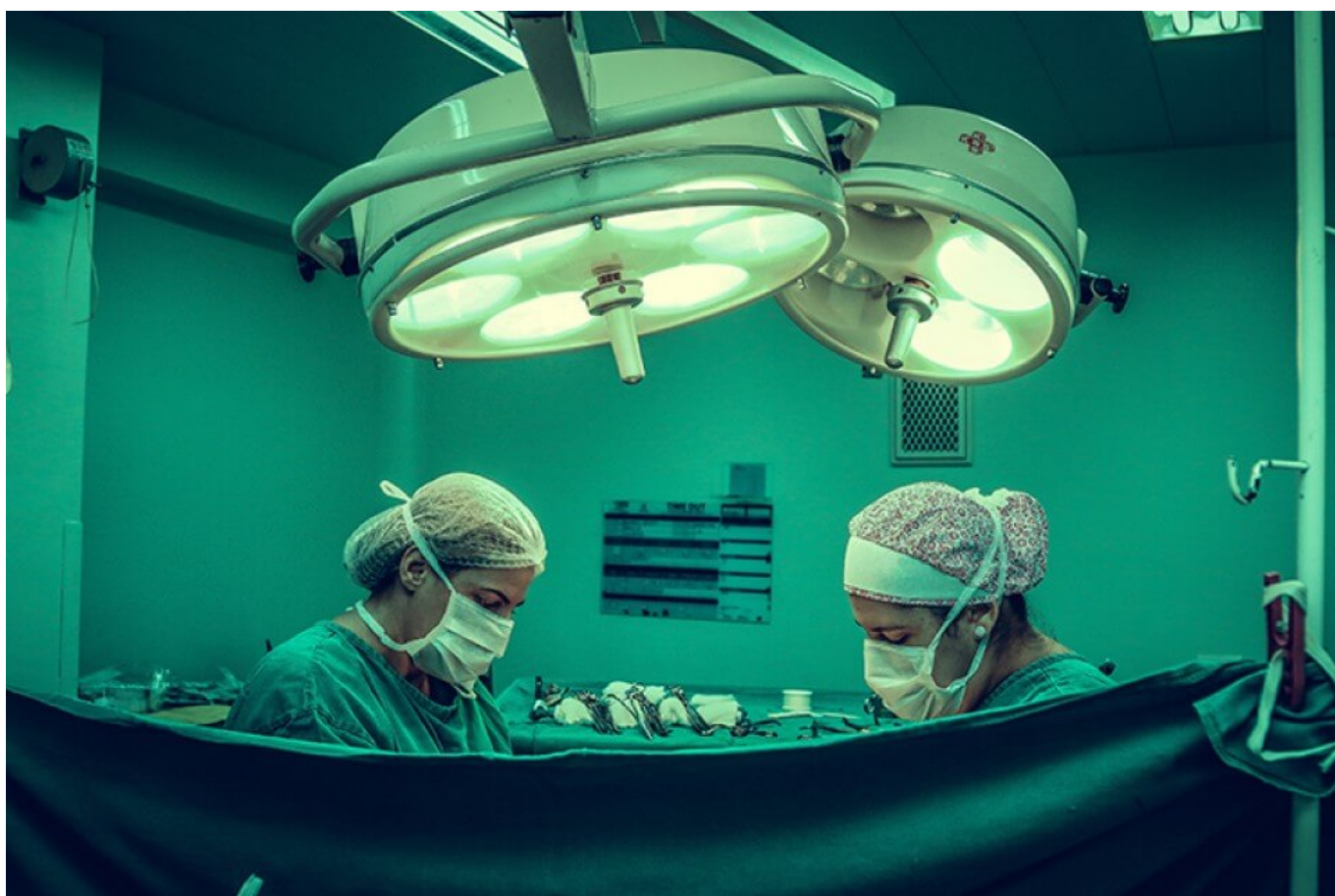
The Geopolitics of Human Gene Editing

by

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on

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A cursory warning was left by renowned physics professor Stephen Hawking regarding a future where a race of superhumans, manipulating their DNA, would taking control of their own evolution. The warning came just before his death in March of this year.

The Washington Post in its article, "[Stephen Hawking feared race of 'superhumans' able to manipulate their own DNA](#)", would explain (my emphasis):

*Before he died in March, the Cambridge University professor predicted that people this century would gain the capacity to edit human traits such as intelligence and aggression. **And he worried that the capacity for genetic engineering would be concentrated in the hands of the wealthy.***



To be clear, Professor Hawking wasn't warning about the technology in and of itself, but its monopolization by a handful of wealthy interests.

The Threat of Technological Monopolies

When we look at any chapter in human history, disparity in technology has always led to tragic episodes of exploitation, violence, atrocities and even genocide. The invention and use of firearms by Western Europeans against tribes everywhere from Asia and Africa to North and South America provide us one look at how huge advantages in technology have been abused against those who lack access to it.

The invention of the atomic bomb gave the United States a period of time where it held a virtual monopoly over nuclear weapons. It eagerly used not one, but two atomic bombs on the already defeated Japanese at the end of World War II. Before America's nuclear monopoly was finally broken up by first Soviet and then Chinese nuclear weapon tests, the US had considered using further nuclear weapons during the Korean War and at at least two junctures during the Vietnam War.

Today, corporate monopolies over the very sort of biotechnology that will give rise to the race of superhumans Professor Hawking warned about, are already a source of constant, steeply controversial use and abuse.

Whether it is deceptive business practices by large agricultural corporations like Cargill, Monsanto and Bayer peddling unsafe genetically modified organisms (GMOs) or pharmaceutical corporations seizing, then price gouging charity and publicly-funded breakthroughs like gene therapy, we can already see attempts being made to concentrate biotechnology in the hands of the wealthy, and it already being eagerly abused against those without access or control over it.

It Has Already Started

The Washington Post article would elaborate further, quoting from Professor Hawking:

Humanity, he wrote, was entering "a new phase of what might be called self-designed evolution, in which we will be able to change and improve our DNA. We have now mapped DNA, which means we have read 'the book of life', so we can start writing in corrections."

Initially, he predicted, these modifications would be reserved for the repair of certain defects, such as muscular dystrophy, that are controlled by single genes and therefore make for relatively simple corrections.

Nevertheless, I am sure that during this century people will discover how to modify both intelligence and instincts such as aggression - Hawking wrote.

There would be an attempt to pass laws restricting the genetic engineering of human traits, he anticipated. "But some people won't be able to resist the temptation to improve human characteristics, such as size of memory, resistance to disease and length of life", he anticipated.

Hawking would also point out that, obviously, unimproved humans would be unable to compete and that significant political problems would result amid this growing disparity.

It is already possible to modify human DNA, and not necessarily before birth, but in living, breathing individuals. The process of gene therapy is the targeted editing of DNA through the use of viruses reprogrammed to, instead of hijacking a human cell and making copies of itself as it does in nature, inserting edited DNA designed to serve a specific purpose.

For example, researchers at Penn State University and the Children's Hospital of Philadelphia were able to edit the T-cells of leukemia patients who had otherwise terminal cancer, [according to the New York Times](#).



The edits made the patients' immune system capable of seeing and destroying cancer cells throughout their bodies. Patients who were not responding to chemotherapy and would have otherwise certainly died in days, have been put in so-far permanent remission.

But if edits can transform ordinary immune systems to be cancer-conquering, future breakthroughs could accomplish everything from further improvements of our immune systems, to regenerative medicine (regrowing healthy cardiac cells in aging hearts [as this study attempted to do in the UK](#)).

Where would the limit be and was Professor Hawking's fears unrealistic or unfounded?

The breakthrough at Penn State, funded entirely by charity and public funds, was later hijacked by pharmaceutical giant Novartis who would go on to raise the price for the FDA-approved therapy several times higher than even costs during the highly customized and experimental research and development phase. Similar fates await other breakthroughs, paid for by the public and then scooped into the "hands of the wealthy," just as Professor Hawking warned.

It is clear that future breakthroughs improving human strength, intellect and longevity will likewise also be scooped up by these well-positioned biotechnology monopolies if nothing is done. While Professor Hawking's warning sounded like a far-fetched warning about threats in the distant future, we are already seeing that dark future take shape right now.

The Geopolitics of Human Gene Editing

Human resources are what defines any nation and forms the cornerstone of its wealth and security. Healthy, well-educated and intelligent populations make strong nations. Thus, a nation with segments of its population possessing superhuman abilities, augmented by gene editing, would possess an obvious advantage over other nations or even over other segments within their own nation lacking these traits.

We, right now, have people walking among us who have had their genes edited to fight diseases like leukemia. A biotechnology startup, BioViva, has already tested gene therapies on its founder and CEO Elizabeth Parrish as a means of defeating human aging, the [South China Morning Post reported](#).

It's not a matter of if, or even when, because it has already begun. The real question is, when will such editing and gene therapies start having an impact on economics and security, and what are nations doing to build the fundamental necessities to both leverage this technology and defend against those abusing it?

Nations like China have invested heavily in biotechnology and gene therapy, providing a counterbalance to what was at one point a clearly North American and European monopoly. Individuals and small organizations around the globe are currently building up a community of opensource research and development, to further ensure this technology ends up in as many hands as possible.

While some may fear runaway "proliferation", we should stop and think about why the US stopped dropping atomic bombs on other nations. It was not from self-restraint but from the threat of retaliation from nations who eventually acquired nuclear weapons as well. What emerged was a dangerous but effective balance of power that has prevailed for decades since.

A similar balance of power is required for biotechnology, a technology so powerful and with implications so profound that it may redefine our very humanity.

Nations would benefit from investing in education to build up a workforce capable of researching, developing and effectively utilizing this emerging technology. Nations would benefit from investing in start ups and cultivating independent institutions capable of producing breakthroughs to give nations parity with current leaders in biotechnology.

Professor Hawking was a brilliant man in life, and provided us with a somber but essential warning



as he departed us. We will ignore the looming threat of biotechnology and human gene editing being monopolized at our own peril.