Study: US government catalyzed and substantially invested in mRNA COVID-19 vaccine development over decades

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In the 35 years before the COVID-19 pandemic, the U.S. government invested at least $337 million into critical research that led to the mRNA COVID-19 vaccines, according to a study published by *The BMJ* today.

The U.S. government also paid $31.6 billion during the pandemic to support vaccine research, production, and to purchase vaccines for all

Americans and for global donation.

These public investments saved millions of lives—and mRNA vaccine technology also has the potential to address future pandemics and treat other diseases. But the researchers point out that products developed with public funding, including mRNA COVID-19 vaccines, are often sold at high prices.

As such, they assert that to maximize overall health impact and fairness, greater effort is needed to ensure equitable and affordable access to publicly funded health technologies.

Estimates of the extent of public investment for COVID-19 vaccines vary widely. So, a team of U.S. researchers at the Program on Regulation, Therapeutics, and Law (PORTAL) at Brigham and Women's Hospital and Harvard Medical School, set out to assess how much the U.S. government invested in research that directly led to the development of mRNA COVID-19 vaccines.

They identified public funding from January 1985 to March 2022 through three primary data sources—the National Institutes of Health (NIH) Research Portfolio Online Reporting Tool Expenditures and Results (RePORTER), the Department of Defense (DoD) Contracts database, and the Biomedical Advanced Research and Development Authority (BARDA) Medical Countermeasures Portfolio.

NIH-funded grants were scored as directly, indirectly, or not likely related to four key innovations underlying mRNA COVID-19 vaccines—lipid nanoparticle, mRNA synthesis or modification, prefusion spike protein structure, and mRNA vaccine biotechnology—and were grouped into pre-pandemic (1985–2019) vs. pandemic (2020–March 31, 2022).

The researchers identified 34 NIH-funded research grants that were directly related to mRNA COVID-19 vaccines. These grants combined with other identified U.S. government grants and contracts totaled $31.9 billion, of which $337 million was invested pre-pandemic.

Pre-pandemic, the NIH invested $116 million (35%) in basic and translational science while BARDA invested $148 million (44%) and the DoD invested $72 million (21%) into mRNA vaccine development and clinical trials.

After the pandemic started, $29.2 billion (92%) of U.S. public funds purchased vaccines, $2.2 billion (7%) supported clinical trials, and $108 million (less than 1%) invested in manufacturing plus basic and translational science.

This is the first study to systematically catalog the direct pre-pandemic U.S. public investments in mRNA COVID-19 vaccines and provides a robust, yet conservative estimate, say the researchers.

But they acknowledge that this study does not include the financial support from other countries, foundations, or companies and is therefore likely a substantial underestimate of the total pre-pandemic investment of public funds.

They suggest policy reforms to improve equitable access to publicly-funded inventions like mRNA COVID-19 vaccines could include adding access, affordability, and equity conditions to government contracts, and encouraging public funding agencies to follow up on technology licenses to ensure that manufacturers are making the products appropriately available for the benefit of public health.

The development of mRNA COVID-19 vaccines during the pandemic was a monumental scientific success, they write. The substantial role

played by public funding should help justify greater efforts by governments to assure equitable and affordable access to this life-saving vaccine in the U.S. and globally.

In a linked editorial, Victor Roy at Yale School of Medicine agrees that the mRNA COVID-19 vaccines have been a remarkable achievement.

However, he says their development "also serves as a cautionary tale of a system in which the risks of pursuing innovation were socialized, while the lion's share of rewards became privatized to corporate shareholders."

He points out that, since their launch, Moderna and Pfizer have accumulated more than $100bn in global revenues from sales of COVID-19 vaccines—more than 20 times the World Health Organization's biennial budget in 2020–21.

He therefore suggests an alternate innovation strategy that includes directionality, conditionality, and public options.

"Instead of maximizing value for corporate shareholders, these alternatives would enable governments to translate public investments more fully in the service of public health—a fundamental priority as we examine our response to this pandemic and prepare for the next," he concludes.

More information: US Public Investment in development of mRNA covid-19 vaccines: retrospective cohort study, *The BMJ* (2023). DOI: 10.1136/bmj-2022-073747

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