OPINION

Here's how we restore productivity and vigor to the biomedical research workforce in the midst of COVID-19

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The first known case of the novel coronavirus (COVID-19) was reported in China in November 2019; in the United States, the first reported case was on January 22.* Essential stay-at-home mandates worldwide have helped mitigate the exponential growth in hospitalizations and death and have led to gradual reopenings in China, South Korea, several European countries, and parts of the United States. But clearly plenty of danger remains, as parts of the United States and a handful of other countries experience major spikes in the number of cases. The pandemic's public health impact continues to reverberate.

COVID-19 has been a major blow to biomedical research and its workforce. Institutions, including the NIH (Bethesda, MD campus pictured here), can aid biomedical researchers with safe return-to-work programs, appropriate testing for infection, and an infusion of stimulus funds. Image credit: Wikimedia Commons/National Institutes of Health.

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*https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html

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So too do the economic impacts, coupled with massive job losses. From the biomedical experimental "wet" laboratory research perspective, there has been a ramp-down, if not shutdown, of non–COVID-19–related research because of the need for social distancing measures that protect the research workforce (1). Clinical research has been similarly disrupted. Computational dry laboratory research is predictably less impacted because such research can be done remotely. For those carrying out wet laboratory work, be it graduate students, postdoctoral fellows, other learners, staff, or researchers, the bench is the computer and onsite experiments cannot be performed remotely.

Several analyses have documented the economic impact on unemployment, bankruptcy, and other sectors of the economy.[†] The US Department of Treasury has adopted initiatives to mitigate the impact of the pandemic, including payroll for the employees of the small business organizations and forgivable loans. The biomedical research enterprise has suffered economically as well.

Herein, we highlight the impact on biomedical research and present implementable solutions. Already, the economic, productivity, and wellness impacts of the COVID-19 pandemic on biomedical research and its workforce have been debilitating. Biomedical researchers need safe, urgent return-to-work programs, coupled with appropriate testing for infection, and an infusion of stimulus funds.

Taking a Toll

Initial implementation of research laboratory ramp-/shutdowns in the United States began in early March 2020 with the exception of COVID-19–related research. Although research teams can be involved in numerous offsite activities to stay productive, the level of productivity wanes with time for the investigators who are not involved in COVID-19–related research, particularly those involved in wet lab research.

NIH, the largest supporter of biomedical research in the United States, had a budget of $39 billion in 2019, including 26,344 R01 awards (the primary NIH grant mechanism that supports investigator-initiated research) totaling $12.8 billion (inclusive of indirect costs but excluding supplements) with an average of nearly $486,000 per award.[‡] Assuming 75% inefficiency in the use of these R01-dedicated funds as a result of halting of any new studies, which likely is an underestimate for the wet lab investigators given that all nonessential operations have been halted, this implies that nearly $185 million per week is not being used for the intended R01-supported efforts. This estimate becomes much higher if other important grant categories supported by NIH, such as career development and other awards, are included.

Two additional multiplier and critical factors deserve highlighting, aside from the economic implications: 1) the ability to make significant NIH-supported advances in the major research areas that impact human health and disease have essentially stopped, and 2) the well being health aspect of the biomedical research workforce that include "flourishing measures" such as happiness, mental and physical health, meaning and purpose, character, and social relationships (2) are also at risk.

Back Onsite

Given the negative economic and productivity impact of the COVID-19 pandemic on biomedical research, it is essential that we initiate safe return-to-work programs for the research workforce. This needs to be coupled with virus testing with social isolation and additional safe precautions, as testing is now becoming more available. For example, those who test negative for the virus can be permitted to return to work at the bench while wearing masks and maintaining a safe density of coworkers per laboratory with appropriate sanitary precautions. Work shifts can be incorporated to maximize the number of those returning to full activity.

In addition to the need to thoughtfully and proactively return the research workforce to work, it is important to consider extending NIH support of currently funded investigators to make up for the recent downtime.

As with other professions and workplaces, researchers will have to grapple with the availability, cost, and frequency of testing and contact tracing. However, reliable virus testing is now becoming widely available, including within many research institutions. Given the likely low prevalence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection [0.4% in nonhealthcare workers (3)] and, therefore, the low pretest probability of being a virus carrier (depending, importantly, on the location within the United States), the need and frequency for virus testing may be estimated and adjusted accordingly, provided that those with symptoms do not work onsite.

Return-to-work programs will need to include research support units such as research cores, veterinary care, and staff to maintain operation of the research facilities. Some states, such as New Jersey, which has experienced the second greatest number of deaths in the United States at the time of this writing, have recognized the importance of researchers via Governor executive orders. For example, in a March 21, 2020 statement, NJ referred to researchers as "examples of employees who need to be physically present at their work site in order to perform their duties."[§] It would be helpful to consider forming a combined Centers for Disease Control and Prevention (CDC)-NIH task force to make recommendations pertaining to research workforce return to work, virus testing, and contact tracing,

[†]https://www.richmondfed.org/publications/research/coronavirus#fcf95461f4e84b8085eef4d39128e9a0

[‡]https://exporter.nih.gov/ExPORTER_Catalog.aspx

[§]https://nj.gov/infobank/eo/056murphy/pdf/EO-107.pdf although a policy within NIH may be sufficient and emulated nationally depending on testing capacity and local variables.

Stimulus Funding

In addition to the need to thoughtfully and proactively return the research workforce to work, it is important to consider extending NIH support of currently funded investigators to make up for the recent downtime. Although reviewers can be instructed to make allowances for decreased productivity when currently funded grants are evaluated for competitive renewal, there is unavoidable subjectivity of study section review panels. For NIH grants, additional support is most warranted at a minimum for active R01 grantees and individuals with career development awards and fellowships. A case can also be made for additional categories such as the R15 mechanism, which supports researchers at institutions that have not been major recipients of NIH funding.

Given the trillions of dollars already invested by the federal government to offset the impact on job loss, healthcare costs, and the halting of the economy, a strong case can be made that additional NIH support would buttress existing grants, helping to boost and restart the postpandemic research recovery engine and its main driver, the research workforce. Using NIH as an example, we recommend that the government institute grant extensions for at least 4 months, particularly for wet laboratory and other halted research that cannot be carried out remotely. Importantly, such extensions need to be additional new funds provided to NIH, as well as the National Science Foundation and others, that are part of the overall recovery federal investment program in research. Four months—likely the minimum required— is based on the months of March through July, when research ramp-/shutdowns at many research institutions began (1), with July and August projecting a 50% to 75% onsite research return to work as is currently being initiated at many institutions.

Unfortunately for many investigators, the impact will be more than 4 months because experiments and their related reagents were under development months before the near-abrupt cessation of wet laboratory activities. Hence, several national organizations, and a group of senators,[¶] have already called for $26 billion in funding support in the next stimulus round to address the challenges that the scientific research workforce has encountered owing to the research ramp-/shutdown. Such stimulus support will have an invigorating effect, including reversing layoffs and furloughs and enhancing the well being of the research workforce, aside from reigniting the path for discovery.

At a Senate Health Education Labor and Pensions Committee meeting on May 7, NIH Director Francis Collins estimated that roughly $10 billion of NIH-funded research would "disappear because of the way in which this virus has affected everybody requiring this kind of distancing and sending people home."[#] Notably, NIH has been highly proactive in providing utmost flexibility to applicants and recipients of NIH funding.[||] Furthermore, NIH has allowed investigators (and their institutions) to continue to pay salaries from the grants for their research team who have not been able to work,[**] which has been an enormous help. But the researchers are likely to need much more help. Steps such as those noted here are a good start.

¶https://www.aau.edu/sites/default/files/AAU-Files/Key-Issues/Federal-Budget/CV4-Research-Relief%5B3%5D.pdf

#https://www.help.senate.gov/hearings/shark-tank-new-tests-for-covid-19

||https://grants.nih.gov/policy/natural-disasters/corona-virus.htm

**https://grants.nih.gov/grants/guide/notice-files/NOT-OD-20-086.html

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2 T. J. VanderWeele, E. McNeely, H. K. Koh, Reimagining health-flourishing. *JAMA* **321**, 1667–1668 (2019).

3 Barrett ES *et al.*. Prevalence of SARS-CoV-2 infection in previously undiagnosed health care workers at the onset of the U.S. COVID-19 epidemic. *medRxiv* 2020.01.24.20018697 (2020). doi: https://doi.org/10.1101/2020.01.24.20018697