Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Cancer Cell

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Letter

Cancer Research after COVID-19: Where Do We Go from Here?

Lauren E. Colbert,[1] Ramez Kouzy,[1] Joseph Abi Jaoude,[1] Ethan B. Ludmir,[1] and Cullen M. Taniguchi[1,*]
[1]The University of Texas MD Anderson Cancer Center, Houston, TX, USA
*Correspondence: ctaniguchi@mdanderson.org
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Prior to the coronavirus disease 2019 (COVID-19) pandemic, cancer research was considered by most an essential part of society. However, as the growing severity of this illness became evident, thousands of cancer laboratories and clinical trials across the globe closed their doors in a matter of days (Joseph, 2020; Editorial, 2020; Service, 2020; Servick et al., 2020). This revealed a harsh reality that, in the context of COVID-19, cancer research was now, suddenly, "non-essential."

Academic institutions scrambled to wind down science in the clinic and lab in a responsible manner. Some institutions permitted the maintenance of the most irreplaceable cells or other time-sensitive experiments, while others opted to stop all experiments completely, including euthanizing entire colonies of mice. The closing of labs impacted clinical trials as well, since correlative studies could no longer be performed, forcing sponsors and institutional review boards (IRBs) around the world to justify why their trials should continue amidst a pandemic.

Shutting down an experimental laboratory or clinical trial platform carries massive consequences for the future of cancer science. Precious experimental reagents such as patient-derived xenografts or transgenic mice can take years to generate; in our case, it took almost 5 years to create advanced tools to study pancreatic cancer. We managed to save a few of them before shutting the lab down, but only at a more juvenile stage—analogous to using an early autosaved document after your computer crashes. While this means that we don't have to start from scratch, it will still take us about 2 years to get back to our pre-lockdown form. Our story is not unique: it simply reflects the reality for thousands of scientists across the globe.

Translational science, which depends on patient participation in clinical trials, has also been profoundly affected (Feuerstein, 2020). Amid the COVID-19 pandemic, many institutions and sponsors suspended clinical protocols entirely. In some exceptional cases, therapeutic trials that offer a life-saving therapy were allowed to continue, but without any of the valuable translational correlates that would inform future trials and patient selection (Ledford, 2020). Furthermore, some patients were being switched back to standard-of-care therapies to minimize the need for extra lab draws and follow-up visits, thus minimizing their potential exposure. IRBs across the United States have told trial sponsors to expect many protocol deviations and violations. The FDA has provided some initial guidance on how to report these forced protocol violations (FDA News Release, 2020), but the scope and impact of these potential deviations is unknown, particularly in the interpretation of trial results conducted during this period.

This shutdown of cancer research will not last forever. Thus, we should anticipate and mitigate future problems. One issue for research labs is that we investigators should and will continue paying our employees despite the closure of our physical labs. Although productivity is possible with remote work (Paterlini, 2020), most wet research labs simply cannot function very long without benchwork. When we recover from this crisis, many labs will spend their remaining funds to get back to where they were 1–2 years ago rather than making new discoveries. Grant extensions alone cannot solve this problem, because a large chunk of funds will have already been spent maintaining its employees away from the bench. Without more forward-thinking assistance, many researchers, especially junior scientists, may be forced to deviate from their career paths, leading to severe attrition in cancer research in the coming years.

Fortunately, there are some promising early solutions. Some institutions are offering to extend the tenure clock for faculty by a year, but longer extensions may be needed, particularly for translational and bench scientists. The clinical crisis of COVID-19 may also increase researchers' clinical responsibilities. Junior faculty who are parents, women, and minorities may be particularly targeted by these inequalities. Academic institutions could alleviate this by extending and augmenting startup funds, allowing flexibility for use of funds such as for cancelled travel or for personal, medical, or child care needs for trainees and staff, as well as by offering free editorial support (for grants and papers). Furthermore, IRBs should work with sponsors and clinics to enable remote consent and follow-up, as well as flexibility to continue protocols if they do not compromise patient or societal safety. In a welcome step, the NIH already has established a COVID-19 supplemental fund to assist such affected research and has afforded mechanisms to extend early-stage investigator status as well as significant flexibility in using grant money to pay for normally excluded expenses, such as nonrefundable travel expenses incurred due to conference cancellations (NIH, 2020).

If the newly passed federal CARES Act in the United States is any indication, large airlines and corporations will receive a record bailout of a half-trillion dollars to prevent a downturn in the economy. However, this financial rescue does not contain commensurate measures to sustain and then rebuild our scientific community. Funding agencies in China, Italy, the United Kingdom, and the United States are offering no-cost grant

extensions and extended grant deadlines, but much more needs to be done. Substantial increases to scientific funding must occur through fiscal year 2021 and beyond just to maintain the scientific advances made prior to this crisis. Moreover, any subsequent government bailouts must also include enough money to support all affected medical science that closed down to protect our society now.

We owe it to our patients, their families, and the world community to prioritize medical science and protect our vulnerable scientists who were once poised to develop advances that could cure cancer and other devastating illnesses. When COVID-19 has passed and recovery begins, we scientists and world citizens must advocate to the highest levels of government and academia to protect the significant advances and investments already made in cancer science. We must make science funding a top priority to prevent a devastating loss of innovation that could cost us a future breakthrough against a deadly cancer or the next pandemic. The first step is to not forget the scientists who sacrificed and to support them as they and our whole society recover to our pre-pandemic form.

REFERENCES

FDA News Release. (2020). Coronavirus (COVID-19) update: FDA issues guidance for conducting clinical trials, News release from the U.S. Food and Drug Administration https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-issues-guidance-conducting-clinical-trials, (accessed April 6, 2020).

Feuerstein, A. (2020). Amid coronavirus, disruptions to clinical trial, drug development accelerate. STAT https://www.statnews.com/2020/03/23/as-covid-19-spreads-disruptions-to-clinical-trial-and-drug-development-accelerate/, (accessed April 5, 2020).

Joseph, A. (2020). Coronavirus pandemic forces some research labs to shut down. STAT https://www.statnews.com/2020/03/14/coronavirus-pandemic-forces-research-labs-shut-down/, (accessed April 5, 2020).

Ledford, H. (2020). Coronavirus shuts down trials of drugs for multiple other diseases. Nature *580*, 15–16.

Editorial. (2020). Safeguard research in the time of COVID-19. Nat. Med. *26*, 443.

National Institutes of Health (NIH). (2020). Coronavirus Disease 2019 (COVID-19): information for NIH applicants and recipients of NIH funding. https://grants.nih.gov/policy/natural-disasters/corona-virus.htm, (accessed April 6, 2020).

Paterlini, M. (2020). Lockdown in Italy: personal stories of doing science during the COVID-19 quarantine. Nature. Published online April 2, 2020. https://doi.org/10.1038/d41586-020-01001-8.

Service, R.F. (2020). 'The disruption is enormous.' Coronavirus epidemic snarls science worldwide. Science https://www.sciencemag.org/news/2020/02/disruption-enormous-coronavirus-epidemic-snarls-science-worldwide, (accessed April 6, 2020).

Servick, K., Cho, A., Guglielmi, G., Vogel, G., and Couzin-Frankel, J. (2020). Updated: labs go quiet as researchers brace for long-term coronavirus disruptions. Science https://www.sciencemag.org/news/2020/03/updated-labs-go-quiet-researchers-brace-long-term-coronavirus-disruptions, (accessed April 2, 2020).