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The Honorable Richard J. Durbin
United States Senate
711 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Durbin:

Thank you for your recent letter inquiring about Merck's efforts to research and develop vaccines and therapeutics to address the SARS-CoV-2 virus.

The COVID-19 pandemic is an unrivaled scientific and global health challenge and demands collaboration across the scientific community. As one of the very few companies that have continued to invest in both vaccines and anti-infective medicines, at Merck we know we have a special responsibility to apply our experience and expertise to help advance both vaccine and antiviral therapies as part of our overall SARS-CoV-2 pandemic response. We have been fully committed to developing an effective response to the pandemic since it was first recognized, and we know that success will require global collaboration among countries, companies, and other key stakeholders.

The SARS-CoV-2 pandemic has already had an unprecedented impact on humanity, both in terms of lives lost and broader societal impact. While we continue to confront these unparalleled challenges, we are also seeing momentum that is both a testament to scientific innovation and the people behind the initiatives to develop the effective vaccines and therapies that will be required to ultimately end the pandemic. The speed and breadth of these efforts has truly been astounding, as is the level of commitment across the industry.

Our long history of developing vital medicines and vaccines has shown us that durable scientific solutions take time, expertise, and experience to discover and deliver to the people and communities who so desperately need them. Our initial focus is on vaccine platforms that have proven records of both efficacy and safety and where Merck can apply its capabilities and experience in development, formulation, and manufacturing.

As part of the company's response to the SARS-CoV-2 pandemic, Merck is pursuing multiple efforts, including research across basic science, epidemiology, treatment, and prevention.

Today, we are advancing three programs – two vaccines and one antiviral medicine – with a strong sense of urgency and the necessary investment of effort and resources. Merck has already spent approximately $800 million on our SARS-CoV-2 development programs, and we anticipate spending more than $3.5 billion by the end of 2021 assuming continued unmet need. First, Merck has entered into a collaboration with the International AIDS Vaccine Institute (IAVI) to develop, test, manufacture, and distribute a potential vaccine against SARS-CoV-2 (now known as V590). IAVI is a nonprofit scientific research organization dedicated to addressing urgent, unmet global health challenges. This vaccine candidate uses the recombinant vesicular stomatitis virus (rVSV) technology that is the basis for Merck's Ebola Zaire virus vaccine, ERVEBO, which was the first rVSV vaccine approved for use in humans.

In addition, Merck has acquired Themis, a company focused on vaccines and immune-modulation therapies for infectious diseases and cancer. Themis had established a pipeline of vaccine candidates and immune-modulatory therapies developed using its innovative measles virus vector platform based on the vector originally developed by scientists at the Institut Pasteur, a world-leading European vaccine research institute, and licensed exclusively to Themis. In March, Themis joined a consortium led by the Institut Pasteur and supported by funding from the Coalition for Epidemic Preparedness Innovations (CEPI), to develop a vaccine candidate targeting SARS-CoV-2 for the prevention of COVID-19 (now known as V591).

Merck and Ridgeback Bio have entered into a research agreement to advance the development of novel antiviral candidate MK-4482. In preclinical studies, MK-4482 has demonstrated antiviral activity against SARS-CoV-2, the virus that causes COVID-19, as well as the coronaviruses responsible for MERS and SARS. MK-4482 is currently being evaluated in Phase II clinical trials, and we hope to initiate Phase III trials in the fourth quarter of 2020.

We believe the approaches we have selected are among the most promising, and we are pursuing a rigorous assessment of their safety and efficacy prior to administration to a broad population. Speed is important, but we will not compromise scientific efficacy, quality, and above all, safety, despite the sense of urgency we all feel.

Below we respond to the specific questions posed in your letter.

1. How do you reconcile the inconsistency between the projected timeline promoted by President Trump and the timeline projected by our officials at NIH, BARDA, and FDA for a COVID-19 vaccine candidate?

   We know from our unique experiences in vaccines and infectious diseases, including Ebola, that developing safe and effective medicines and vaccines in a global health emergency is a daunting challenge – a path that is never fast or easy – but we are fully committed to the effort. Recognizing the inherent challenges in developing and deploying a vaccine for a novel virus, we selected promising platforms based on established mechanisms and with desirable qualities such as the potential to be single-dose vaccines and to provide durable protection.

As has been the case with many diseases, we are optimistic that our industry's efforts will create new tools to address the pandemic and that the unprecedented collaboration among stakeholders we are seeing today will accelerate these efforts. The fact that the industry has been able to bring forward so many promising medicines and vaccines, so quickly, is a testament to the continued investments that we and others in the industry have made over time. This pandemic underscores the need for our company and our industry to continue to invest in research for the greatest health threats, which enables us to mobilize and redeploy efforts quickly in times such as these.

The development of a new vaccine is complex, time intensive, and carries no guarantees. It is estimated that only 6% of vaccine candidates get to the finish line and that is why only a small number of companies have continued to operate in this space.

Manufacturing and distributing a vaccine under normal circumstances is exceedingly complex, requiring hundreds of steps and thousands of complex tests, all validated to ensure that every single vial has the intended high quality and safety. Addressing this pandemic will require orders of magnitude more than what we as an industry currently provide and exceeding the existing global capacity.

In order to meet this need, we must all appreciate that the biopharmaceutical innovators are working at risk and accelerating their efforts by working in parallel as opposed to sequentially in the research and development process, which increases the risk and expense of these programs. In other words, we are making considerable investments in key elements such as manufacturing capacity before we typically would, before we know whether we even have a successful product – in many cases building and/or retooling factories before we have fully developed a process at a smaller scale. We are using our extensive vaccine and product development and production capabilities to help bring our vaccine and therapeutic candidates through development, licensure, and production scaleup as rapidly as possible.

Merck has a long track record of making our vaccines and medicines accessible wherever they are needed. The recent deployment of ERVEBO, our licensed vaccine for Zaire Ebola virus infection, is a case study in how we worked with the federal government – including BARDA, HHS, DARPA, with the support of other DOD assets – to accelerate development and availability of this emergency vaccine. We are committed to the same urgency for any vaccines or therapeutics we develop for SARS-CoV-2. We are already working to scale up manufacturing capacity at-risk to produce as much of our two candidate vaccines as fast as possible, targeting hundreds of millions of vaccine doses. We are also engaged with stakeholders – alongside industry peers and the federal government – to anticipate and inform national supply chain needs. Similar steps are being taken across industry. We believe the world will need multiple vaccines to meet the urgent need, recognizing that different vaccines candidates will have different profiles and will need to address the unique efficacy and safety requirements of diverse target populations.

To ensure that these vaccines reach people and communities across the United States, an unprecedented, robust, efficient distribution and immunization system will be required, and

the federal government – in close collaboration across multiple sectors – has an important role to play in meeting this need.

Timely and coordinated distribution of a vaccine is only part of the solution. The federal government also has an important role to play in harmonizing the execution of the vaccination program across multiple jurisdictions and increasing the confidence that the public has in SARS-CoV-2 vaccines. The CDC, as our most trustworthy public health agency, should play a lead role in this effort. Recent polls indicate that only half of Americans would be confident receiving a SARS-CoV-2 vaccine if available today. Building trust in the SARS-CoV-2 vaccine and trust in the delivery systems are necessary for an effective distribution and administration strategy. We recommend the federal government have a clear and coordinated national strategy to mitigate vaccine hesitancy. Working with partners, the federal government could increase vaccine confidence through public awareness campaigns, empowering health care providers, and engaging the media to ensure timely, clear, and accurate information is reaching all Americans.

2. Separate from your direct engagement with our federal health agencies (e.g. NIH, BARDA, FDA), have employees or representatives of the White House communicated with your company regarding your COVID-19 vaccine candidate? If so, please provide a copy of all such correspondence between employees or representatives of your company and the White House.
    a. Has your company received any political pressure or incentive, outside of your contract agreements, regarding your vaccine candidate?

In early May 2020, employees from Merck Research Labs spoke with Joe Grogan, Director, White House Domestic Policy Council, to discuss the science of vaccine development and Merck's two SARS-CoV-2 vaccine candidates in development. Merck has not received any political pressure or incentive regarding our vaccine candidates.

3. In a recent interview with the Financial Times, FDA Commissioner Hahn stated, "it is up to the sponsor to apply for authorization or approval, and we make an adjudication of their application. If they do that before the end of Phase Three, we may find that appropriate."
    a. Is your company pursuing an application for approval or for emergency use authorization (EUA) of your COVID-19 vaccine candidate?
        i. If you are unable to answer by September 17, do you expect to have an answer to that question by October 1 or October 15?

Merck's vaccine research and development programs are still in the early stages. If our vaccine candidates meet the appropriate clinical and regulatory criteria, our intent is to seek FDA approval. It is not possible at this time to know whether our vaccine candidates will have the characteristics that would warrant an emergency use authorization (EUA), and we do not expect to have an answer to that question by October 15th given their current stage in development.

4. In a recent interview with Reuters, NIAID Director Dr. Tony Fauci stated that, "The one thing that you would not want to see with a vaccine is getting an EUA before you have a signal of efficacy. One of the potential dangers if you prematurely let a vaccine out is that it would make it difficult, if not impossible, for the other vaccines to enroll people in their trial."
    a. When did your vaccine candidate begin enrollment on its phase 3 trial in the United States?

Neither of Merck's SARS-CoV-2 vaccine candidates are in Phase III trials yet. Assuming our Phase I trials provide evidence of a safe and immunogenic vaccine candidate at a proper dose that can be manufactured in a large scale, we expect to start Phase III trials in early 2021.

    b. When did, or when do you project, your vaccine candidate to reach 30,000 enrolled patients in its phase 3 trial in the United States?

We project that it will take approximately two to three months to enroll 30,000 patients per study. This projected timeline is subject to variability based on a number of factors.

    c. When do you predict you will have a signal of efficacy from the phase 3 trial of your COVID-19 candidate in the United States?

Any signal of efficacy will be contingent on what the underlying level of SARS-CoV-2 prevalence is at the time the study is conducted, as well as the true vaccine efficacy. In general, a final study analysis is currently anticipated to occur six months after patient recruitment is concluded. For both of Merck's vaccine candidates, we anticipate a signal in the second half of 2021, but current estimates are contingent on a number of factors, which are subject to change. Data gleaned from current candidates in Phase III may also impact this timing.

    d. Will your company cut any corners in adherence to the research, development, submission, or regulatory review process required under the Federal Food, Drug, and Cosmetic Act or Public Health Service Act for your vaccine candidate?

Merck will not cut any corners in adherence to the research, development, submission, or regulatory review process required under the Federal Food, Drug, and Cosmetic Act or Public Health Service Act for our vaccine candidates.

    e. If the FDA issues an EUA for another COVID-19 vaccine candidate which is not your company's vaccine candidate, how would that impact your research, development, and approval process timeline?

Merck has designed its vaccine candidate clinical studies to be executed on a global basis, which minimizes the impact of the approval of any other vaccine candidates on the research process.

5. A recent New York Times report indicated that Trump Administration officials told congressional leaders that they could give emergency approval to a coronavirus vaccine before the end of phase 3 clinical trials in the U.S., perhaps as early as late September.
    a. Are you aware of this potential timing?

    Neither of Merck's SARS-CoV-2 vaccine candidates are in Phase III trials yet. Assuming our Phase I trials provide evidence of a safe and immunogenic vaccine candidate at a proper dose that can be manufactured in a large scale, we expect to start Phase III trials in early 2021.

    b. Would it be possible for the FDA to issue an EUA or approval based upon data from clinical trials in foreign countries? Do you support the inclusion of data from outside of the U.S. in the regulatory review of COVID-19 vaccines?

    Merck is committed to the study of a diverse patient population, including minorities, women and children, people of varying ages, and other characteristics, in our clinical trials in all regions of the world and in the U.S. Our company strives to obtain information among diverse populations, ensuring a thorough evaluation of the safety and efficacy of our medicines and vaccines. These efforts allow us to seek regulatory approvals throughout the world and thereby offer our medicines globally to patients who need them. Our SARS-CoV-2 clinical trials will be executed with this same commitment.

6. The FDA recently announced a convening of the Vaccine and Related Biological Products Advisory Committee on October 22. Does your company plan to present or directly participate in this event?

    Paula Annunziato, MD, VP and TA Head, Vaccine Clinical Research in Merck Research Labs currently serves as the Industry Representative on the Vaccine and Related Biological Products Advisory Committee at FDA. In that role, she participates in discussions in the public sessions but does not vote. If there are closed sessions, she does not participate in those. She has been invited to the meeting on October 22nd and has submitted her conflict of interest statement to the FDA. Merck has no plans to present or directly participate in the event, beyond Dr. Annunziato's participation outlined here.

7. Are you concerned that the perception within certain populations of cutting corners or having political interference in the approval process will reduce vaccine uptake? If so, how can HHS bolster public confidence in the approval process?

    Having an effective vaccine is only half the solution, and while most people do believe in vaccination, in recent years, there has been a troubling increase in hesitancy to be vaccinated. Currently, there is significant hesitancy related to a SARS-CoV-2 vaccine – recent surveys consistently show that only about half of Americans would get a SARS-CoV-2 vaccine if it were available today. This hesitancy was particularly noted in some populations disproportionately impacted by the pandemic. Many of these concerns were regarding the safety and efficacy of vaccines generally and were rooted in misinformation. Further, we

have also seen the erosion of trust in governments and health care workers who will be conducting vaccination programs. Trust in SARS-CoV-2 vaccines and the immunization system that delivers them is paramount. A lack of trust can undermine response efforts and leave people unvaccinated and unprotected, thereby allowing this virus to continue to spread in communities around the world. We have seen this same dynamic have dire consequences with measles outbreaks around the country over the last several years.

To mitigate these concerns and build confidence in vaccines through the dissemination of timely, clear, and accurate information, we recommend the following actions:

- Conduct public awareness campaigns: Education, including public awareness campaigns tailored and culturally relevant to individual communities, is a key element of any vaccination effort. Public education should reinforce that relevant safety measures are being followed and that accelerating development of SARS-CoV-2 vaccines does not compromise safety.
- Engage the media: Social and traditional media will need to play an active role in ensuring accurate information reaches all populations and in preventing the spread of misinformation.
- Engage and empower trust in providers: It will be critical that individuals can access health care providers they trust, to receive accurate information about vaccination and to have access to receiving a vaccine. Providers must be trained and equipped to address questions about vaccines with patience, compassion, cultural relevance, and at the appropriate level of health literacy for each patient. This is especially true across our ethnically and racially diverse communities in the U.S., which have been disproportionately impacted by the pandemic.

Equitable access also requires that vaccines be delivered to all communities and available in a manner accessible to community members. To prepare for this, we recommend the following actions:

- Ensure distribution and points of vaccination that create the greatest access for communities and individuals and reach the "last mile": Across the country, individuals and communities access their health care through a variety of settings and many are under-served by our current health care system and infrastructure. In order to ensure the rapid distribution of and equitable access to SARS-CoV-2 vaccines, the federal government, working alongside state and local governments, will need to ensure that vaccines are available and administered in a variety of settings and points of vaccination. State and local public health systems should have the resources and flexibility needed to build upon the existing immunization infrastructure and tailor vaccination efforts to meet their community needs and address barriers to access (e.g., drive through clinics are a barrier for individuals without cars). Across the country, currently 64 state and large metropolitan programs coordinate with CDC on vaccine systems, delivery, and infrastructure. This system ensures vaccination with Advisory Committee on Immunization Practices (ACIP) recommended vaccines across the life-course and will serve as a strong platform from which to scale-up for SARS-CoV-2 vaccination. Provided with enough resources, these experienced professionals will effectively balance

the delivery and recovery of routine vaccination with preparing for and ultimately delivering SARS-CoV-2 vaccines.

- Support and enhance existing tracking systems in the form of Immunization Information Systems (IIS): In the distribution and post-distribution phases, it will be critical to continue to track vaccination. Should boosters be needed, knowing which individuals have received which vaccine(s) is imperative. Such tracking will also support pharmacovigilance systems to monitor the safety of vaccines.

Finally, the system must be prepared to manage multiple vaccines.

- Vaccines at different phases: We must think about vaccine access through both a breakthrough and an incremental innovation lens. The first vaccine to market will be transformational in terms of changing the way we fight this disease. However, it may not be the best or final vaccine to market and will likely not be produced at a scale to meet the full global demand, or even prioritized demand. The world should want and will need multiple vaccines in the market over the course of time because they will likely have different indications, routes of administration, dosing, efficacy, and cold chain requirements that will serve to improve access and uptake.
- Vaccines for different populations: Novel vaccines will have different characteristics and may vary in the degree to which they can be used in certain populations and settings. Dosing regimens, storage requirements, and contra-indications are a few of the characteristics that will need to be considered when developing guidelines for use of these vaccines. Technical advisory groups such as the ACIP play a critical role in developing policies and normative guidance for deployment of SARS-CoV-2 vaccines – to ensure that all vaccines doses can be deployed to maximize their public health impact.
- Education and training: In order to effectively manage multiple SARS-CoV-2 vaccines in response to the pandemic, training for health care providers on how to manage and administer these vaccines and how to communicate clear and accurate information to the public to foster confidence and uptake will be critical. A robust communications strategy will be important for providers, patients, and the public at large.

We also cannot lose sight of the importance of routine vaccination across the life-course. The current pandemic has only further emphasized the value of vaccination in preventing illnesses. We know that it is better to prevent an illness rather than treat it. We are now living a stark example of that principle. As we look forward to a time when new vaccines and treatments are widely available, we must do more now to ensure the adequate funding of prevention and immunization infrastructure in our health system more broadly. As this pandemic has shown very clearly, these are critical for health protection but also for national and economic security.

Currently, there is a general underinvestment in routine immunization systems. These programs are working hard to deliver routine immunizations in very challenging circumstances now and at the same time will need to mobilize for mass vaccination programs once SARS-CoV-2 vaccines are available. Strengthening these systems and making them

more resilient now will be critical to getting vaccines to the people who need them. We must think about access and delivery of vaccines with the same ingenuity that we are applying to the development of vaccines, including strengthening mechanisms for global cooperation, designing innovative local vaccination campaigns, and identifying creative solutions to enable the needed health system capability on the ground.

8. Has federal funding contributed to the discovery, research, development, or production scaling of your vaccine candidate? If so, please provide a list of all such federal funding disaggregated by the specific patent and/or stage of the vaccine development process.
    a. If any patent related to your vaccine candidate is held by the federal government, please list the patent(s) and provide a copy of the licensing agreement.
    b. If any patent related to your vaccine candidate is held by the federal government, please explain how your company plans to make the benefit of the invention "available to the public on reasonable terms," as required by 35 USC 201.

    For the rVSV candidate vaccine being developed in collaboration with IAVI (V590), Merck has signed an agreement with the Biomedical Advanced Research and Development Authority (BARDA), part of the office of the Assistant Secretary for Preparedness and Response within the U.S. Department of Health and Human Services, to provide funding support for this effort.

    In total, BARDA provided funding for our COVID-19 efforts in the amount of $38 million, which goes towards our work on the rVSV platform (approximately $27 million) and our collaboration with the Institute for Systems Biology (ISB) to study patients with COVID-19 ($11 million). At this time, Merck has not signed any agreements for government funding toward work on the vaccine candidate acquired from Themis (V591) and partnered with the Institut Pasteur.

    No patents or patent applications related to vaccine candidates V590 or V591 are currently owned or licensed by the federal government.

We appreciate your interest in our SARS-CoV-2 vaccine research and development programs and we hope this information is helpful to you. If you have any additional questions, please feel free to contact Robert Filippone, Vice President, Federal Policy and Government Relations at (202) 508-4559 or robert.filippone@merck.com.

Very truly yours,