

of a single intervention with prolonged effect is very attractive. The challenges are to compare the efficacy of different methods to reduce blood pressure, and to substantially improve patient selection within the hypertensive population. Furthermore, the idea that hypertension is the only or the best indication and endpoint for studies should be forgotten. Notably, in hypertension, renal denervation is a long-term investment, whereas in other indications, benefit and improvement in wellbeing of the patient could be realised in the short term. It is time to refine the focus of research in the renal denervation field.

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## Ensuring global access to COVID-19 vaccines

The current response to the coronavirus disease 2019 (COVID-19) pandemic involves aggressive implementation of suppression strategies, such as case identification, quarantine and isolation, contact tracing, and social distancing. However, models developed by the Imperial College COVID-19 Response Team suggest that “transmission will quickly rebound if interventions are relaxed”.<sup>1</sup> WHO warns of multiple simultaneous outbreaks of COVID-19 worldwide.<sup>2</sup> The development of COVID-19 vaccines that can be used globally is therefore a priority for ending the pandemic.

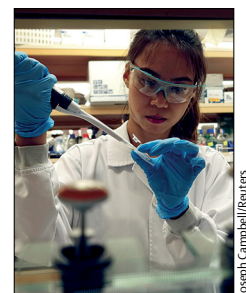
This vaccine effort should be guided by three imperatives: speed, manufacture and deployment at scale, and global access. In February, 2020, the World Bank and the Coalition for Epidemic Preparedness Innovations (CEPI), which funds development of epidemic vaccines, co-hosted a global consultation on these goals.<sup>3</sup> This consultation led to the launch of a COVID-19 Vaccine Development Taskforce that is now working on how to finance and manufacture vaccines for global access.

CEPI estimates that developing up to three vaccines in the next 12–18 months will require an investment of at least US\$2 billion.<sup>4</sup> This estimate includes phase 1 clinical trials of eight vaccine candidates, progression of up to six candidates through phase 2 and 3 trials, completion of regulatory and quality requirements for at least three

vaccines, and enhancing global manufacturing capacity for three vaccines. This estimate does not include the costs of manufacture or delivery. Progress has been rapid. A phase 1 trial of a vaccine candidate, supported by the US National Institutes of Health and CEPI, began on March 16, 2020,<sup>5</sup> and 2 days later a clinical trial began in China.<sup>6</sup> Clinical trials for other candidates will start soon.

Use of existing financing systems to support this work offers the benefits of speed and lower transaction costs than for new financing approaches. CEPI is supported by a World Bank financial intermediary fund that brings together public, philanthropic, and private funding to respond to global priorities.<sup>7</sup> Through this fund, CEPI can act as a global mechanism for funding vaccine development until vaccines can be licensed or used under emergency use provisions. Mobilising \$2 billion in funding will require funding from all sources. Given the enormous health, social, and economic consequences of COVID-19, there is a strong case for all governments to invest in vaccines.

In addition to direct government contributions, innovative finance mechanisms have been successful in raising funds for vaccines in the past and should be used to fund the development of COVID-19 vaccines.<sup>8,9</sup> The International Finance Facility for Immunisation



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(IFFIm) raises funds with vaccine bonds, which turn long-term contributions by donors into available cash.<sup>8</sup> IFFIm was created to support Gavi, the Vaccine Alliance, but could be used to finance CEPI's COVID-19 vaccine efforts. With advanced market commitments, donors make funding commitments to vaccine manufacturers and, in exchange, companies sign a legally binding commitment to provide the vaccines at a price affordable to low-income and middle-income countries. Gavi's board expressed support for the use of Gavi's IFFIm and advanced market commitments to improve COVID-19 vaccine development and access.<sup>10</sup>

The need for COVID-19 vaccines is global, although the need is differentially distributed within populations. Vaccines would likely be prioritised for health-care workers and people at greatest risk of severe illness and death. High-income countries must not monopolise the global supply of COVID-19 vaccines. This risk is real: during the 2009 influenza A/H1N1 pandemic, rich countries negotiated large advance orders for the vaccine, crowding out poor countries.<sup>11</sup> Such an outcome would result in a suboptimal allocation of an initially scarce resource.

A far better solution would be for governments to ensure there is a globally fair allocation system. With sufficient political will and public sector financing, such a system could be established using existing instruments and institutions. The rudiments of the system would require a global purchasing agent or agents, a substantial but limited-term advanced purchase commitment, and access through the system to financial instruments such as concessional loans or grants and indemnification from liability to offset the risks taken by participating private sector partners. Vaccines purchased through the system should be free at the point of care worldwide for prioritised populations, with national allocations determined through a fair and objective process.

On March 16, 2020, the G7 committed to supporting the launch of joint research projects for COVID-19 treatments and vaccines.<sup>12</sup> High-level dialogue is needed on ways to ensure complementarity of efforts and global access to COVID-19 vaccines. Investments should proceed in tandem to build national systems for delivery of potential vaccines—eg, using domestic financing and external financing from the World Bank Group's \$14 billion COVID-19 Fast Track Facility<sup>13</sup> and reallocations from the

Global Fund to Fight AIDS, Tuberculosis and Malaria, Gavi, and Global Financing Facility grants for service delivery.

GY, KKM, and MS have received research funding from Gavi, the Vaccine Alliance, and the Bill & Melinda Gates Foundation, both of which support epidemic and pandemic vaccine development and deployment. RH is Chief Executive Officer of the Coalition for Epidemic Preparedness Innovations (CEPI), which aims to mobilise \$2 billion for COVID-19 vaccine development. MP is Global Director and FZ is a Practice Manager, Health, Nutrition and Population, at the World Bank, which hosts a financial intermediary fund for CEPI. All authors are members of the COVID-19 Vaccine Development Taskforce. We declare no other competing interests.

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