



G7 GERMANY Science 7 Dialogue

Antiviral Drugs: Increasing Preparedness for the Next Pandemic

One lesson learnt from the SARS-CoV-2 pandemic is that, in addition to prophylactic vaccines, effective antiviral drugs are needed. There are viruses, e.g. the Human Immunodeficiency Virus, against which effective vaccines could not be developed despite intensive research efforts. Moreover, some individuals cannot be vaccinated or display limited or only short-lasting immune protection after vaccination. Antiviral drugs are also important in case of the emergence of viral immune escape variants, which may attenuate the efficacy of existing vaccines or render antibody therapies ineffective.

Antiviral drugs should fulfil several criteria: ease of application, minimal chance of creating resistance and an acceptable safety profile. Wide availability, accessibility and affordability are also important to fill the gaps in the immediate response to viral infections that vaccines cannot cover. These drugs can target the virus or the host, thereby limiting virus replication in infected patients. This reduces the risk of severe disease, and can decrease the infectious period, thereby limiting the spread within the population.

Traditional antiviral drugs are designed for high efficacy against a distinct virus and closely related variants. However, which virus will cause a future pandemic cannot be predicted, and the discovery and development of specific antiviral drugs and vaccines take a long time. Therefore, in addition,

broad-spectrum antiviral drugs are needed for immediate response and pandemic preparedness. Broad-spectrum antiviral drugs are directed against not only one specific virus, but an entire virus group or possibly wider.

Several virus groups are considered particularly dangerous in terms of their pandemic potential. These include influenza as well as several viruses prioritised by the WHO for research and development.¹ Moreover, comprehensive surveillance and modern bioinformatics can be used for early detection and prediction of spillover risks of viruses into the human population. Based on this, the targeted development of antiviral drugs, both specific and broad-spectrum, is necessary and feasible. However, their development is particularly challenging and requires specific and coordinated action that can only be achieved if science, politics, industry and society collaborate at the national and international levels.

¹ World Health Organization, 2022. *Prioritizing diseases for research and development in emergency contexts*, <https://www.who.int/activities/prioritizing-diseases-for-research-and-development-in-emergency-contexts>.

Recommendations

We call on the G7 governments to provide the following leadership in order to increase preparedness for the next pandemic:²

(1) Foster the discovery and development of specific and broad-spectrum antiviral drugs.

- Implement and intensify long-term basic research into antiviral drugs and their development through adequate funding.
- Promote accessibility and harmonisation of existing compound libraries in academia and industry which contain the results of laboratory and computer-based screenings. It also allows for the screening of existing antiviral drugs against novel viruses.
- Improve the link between early detection of potentially pandemic viruses and the development of antiviral drugs. This includes fair and inclusive sample access, pre-agreed material transfer, and sufficient capacities for rapid sequencing.
- Ensure resources and enabling infrastructures for the continuous development of promising candidates into applicable drugs.
- Provide incentives for industry to participate in early joint antiviral drug development up to clinical phase I characterisation, even in case of uncertain economic benefit.
- Ensure sufficient capacities for the timely production and stockpiling of selected antiviral drug candidates with a detailed clinical phase I characterisation.

(2) Build adequate infrastructures for efficient clinical studies.

- Establish an international coordination body beyond national initiatives for safety and efficacy of clinical trials to avoid redundancy and to increase synergy regarding drug targets, harmonised set-up of and access to defined patient cohorts, and harmonisation of study protocols.
- Implement readily available and sustainably funded infrastructures for clinical trials, including, for example, medical personnel or patient care networks to reach patients in the hospital and especially in ambulatory settings.
- Coordinate the collection of new data and harmonise existing data, biosampling protocols and biobanks.
- Accelerate the regulatory review of clinical studies while maintaining high-quality standards, and prioritise approval processes for compounds according to urgency.

(3) Promote international coordination in the field of pandemic preparedness.

- Establish agile joint funding structures to support international collaborations in advanced clinical trials with large patient cohorts.
- Promote sustainable international networks which allow for the identification of viruses and risk assessment for targeted surveillance, also in animals.
- Ensure and commit to equitable access to drugs with proven safety and efficacy through quality assured manufacturing, licensing, distribution and pricing.
- Commit to the exchange of information regarding national pandemic action plans and pre-clinical and clinical drug development.

² In the context of pandemic preparedness, the One Health approach is of particular importance. The science academies of the G7 states address this topic in their statement on “The Need for a One Health Approach to Zoonotic Diseases and Antimicrobial Resistance” (2022).

Science7 Academies



Jeremy McNeil
The Royal Society
of Canada



INSTITUT DE FRANCE
Académie des sciences

Patrick Flandrin
Académie des sciences
France



Leopoldina
Nationale Akademie
der Wissenschaften

Gerald Haug
German National Academy
of Sciences Leopoldina



ACCADEMIA NAZIONALE
DEI LINCEI

Roberto Antonelli
Accademia Nazionale dei Lincei
Italy



Takaaki Kajita
Science Council
of Japan


THE
ROYAL
SOCIETY

Sir Adrian Smith
The Royal Society
United Kingdom



NATIONAL ACADEMY OF SCIENCES

Marcia McNutt
National Academy of Sciences
United States of America



The text of this work is licensed under the terms of the Creative Commons attribution License CC BY-ND 4.0.
The license is available at: <https://creativecommons.org/licenses/by-nd/4.0>

DOI: 10.26164/leopoldina_04_00532

31 May 2022