

G7 Science Academies' Statement 2015:

Infectious Diseases and Antimicrobial Resistance: Threats and Necessary Actions



Emerging infectious diseases and antimicrobial resistance seriously endanger individual and global health. A comprehensive strategy is needed to tackle health threats from infectious diseases – one that requires a much more visible political and public profile and a cross-sectoral approach, involving health, agriculture, development, economy and other policy areas. The G7 Academies of Sciences call for: (1) accelerating research and production of new antimicrobial agents, vaccines and diagnostics, (2) prioritising the research agenda to fill knowledge gaps for key diseases, (3) installing global surveillance programmes, (4) raising awareness in society, and (5) a coordinated rapid response in the face of major epidemics. Only then can the necessary resources be generated to ensure optimal prevention, diagnosis, and treatment for all.

The recent Ebola outbreak shows that emerging and re-emerging infectious diseases continue to pose a serious international threat despite major research advances in recent years. At the same time, there is an alarming global trend towards resistance to antimicrobial drugs. In our increasingly interconnected world, pathogens spread quickly and across borders, posing a growing threat to global health and prosperity.

The current situation is serious and untenable. There is a strong need for new classes of antimicrobials, vaccines, and diagnostics for infectious diseases. However, industry alone will not solve this problem because of a perceived low return of investment. Therefore, there is an urgent need to stimulate research and development for novel approaches to disease prevention and treatment.

The rise of resistance to antimicrobial agents and the resurgence of significant communicable diseases such as tuberculosis are putting at risk the achievements of modern medicine, the health of societies, and the realisation of the Millennium Development Goals. The underlying scientific basis of this resurgence is often well understood, and there has been considerable international work on antimicrobial resistance in the past year.¹ But international coordination is urgently needed to control outbreaks that stretch beyond geographic borders.

The statement signed by the G8 Science Ministers after discussion with the G8 Science Academies' Presidents in 2013 was a significant contribution to this issue.² However, much more

needs to be done to tackle the devastating human health problems caused by infectious diseases.

The G7 Academies have identified critical actions needed to address the immediate threats of infectious diseases. They emphasise the importance of international collaboration that integrates both the scientific community and industry.

The following actions are necessary:

1. Accelerate the discovery, registration and production of new antimicrobial agents, vaccines and diagnostics

- Identify and implement new sources of support, including public-private partnerships to enhance the likelihood that interventions will reach the proof-of-principle stage.
- Develop novel antimicrobials and vaccines for key diseases and evaluate ways to keep them in reserves until they are needed. Antibiotics that have not been previously released are less likely to encounter resistance from disease-causing organisms. Vaccines developed for novel diseases will be ready for efficacy testing during an epidemic. Establishing reserves for future use could create new business models for pharmaceutical companies.
- Develop attractive business models and other incentives to increase efforts in academia and revive commercial interest.
- Accelerate the development of diagnostics, vaccines and therapeutics to better meet the threat from highly dangerous pathogens.

2. Fill knowledge gaps and prioritise the research agenda

- Identify and fill the gaps in basic research and ensure that results from applied research are transformed into effective interventions (and thus survive the "valley of death").
- Identify microbes from diverse habitats as a source of new antimicrobial agents also on the basis of genetic inventories. In addition, identify and validate new biological targets and elucidate novel modes of action.
- Study and elucidate the ecological and evolutionary dynamics of microbial communities to prevent and understand mechanisms of resistance. This will require scaling up laboratory experiments to real-life situations as found in farms, hospitals and the community.
- Develop innovative strategies for prevention and rapid diagnosis of infection.

1 E.g. www.amr-review.org or www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_amr_jan2015.pdf.

2 G8 Science Ministers Statement, London, June 2013.

3. Conduct global infectious disease surveillance programmes

- Invest in and enhance global infectious disease surveillance of both humans and animals to improve timely prediction and rapid response to outbreaks.
- Harmonise national programmes and define global action plans for the surveillance of particularly threatening pathogens.
- Support implementation of the World Health Organization's Global Action Plans, e.g., the Plan on Antimicrobial Resistance.



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4. Organise and sustain joint efforts in society

- Commit to improving and sustaining health care systems in vulnerable populations accompanied with capacity building for health and health research at regional, national and international levels. Regulate the use of antibiotics in medicine and agriculture.
- Continue to develop tailored public outreach efforts for educating the public on the development of resistance, prevention and effective management of infections. Establishing such outreach activities will raise the public's awareness of health threats and the importance of innovation.
- Continue to increase support for global application of infection prevention and control programmes (such as vaccination, hygiene and sanitation), and ensure access for all – including high-risk groups such as migrant populations – in community care and hospital settings.