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Letter to the Editor

Disease X: availability bias, biotechnology and seeing beyond zoonotic risk



COVID-19 has centred pathogens with pandemic potential on the global epidemiological stage, especially those with zoonotic origins. In response, the World Health Organization has added COVID-19 to its list of priority diseases that pose the greatest risk to public health due to their epidemic potential and the insufficient availability of effective countermeasures.¹ 'Disease X' also features on this list, and represents the knowledge that a serious pandemic could be caused by an unknown Pathogen X. It is anticipated that Pathogen X will be a zoonosis, most likely an RNA virus, that emerges from an area where a convergence of risk factors induces sustained human-to-human transmission.² Previous examples of disease X include HIV, Severe acute respiratory syndrome (SARS), Zika, Ebola and now COVID-19.

The emergence and global impact of severe acute respiratory syndrome coronavirus 2, the pathogen responsible for COVID-19,³ intensifies this focus on tackling zoonoses, the human-mediated risk factors that drive them and the urgency of a coordinated and collaborative international response.^{4,5} Although vitally important to global public health, this approach fails to appreciate a concurrently evolving threat to pandemic preparedness: the progression and distribution of biotechnology.

Recent years have seen dramatic progress in biotechnological capabilities across animal, agricultural, ecological and human health sectors. Such advancements include 'gain of function' procedures in which pathogen characteristics, such as infectivity and virulence, are enhanced from their natural state through genetic engineering techniques. The challenging ethical implications of such research were demonstrated by modification of the H5N1 avian influenza genome that enabled airborne transmission between mammals, including humans.⁶ Simultaneously, progress in synthetic biology allows the revival of formerly eradicated pathogens⁷ and the creation of entirely novel organisms as yet unseen by nature.⁸ The release of such pathogens, through laboratory accidents or malicious acts of bioterrorism,⁹ could result in non-zoonotic Disease X with societal consequences far exceeding anything as yet produced by nature.

Major shortfalls exist in the international approach to biotechnology and its threat to global health security. Its accelerating development and broadening accessibility have not been matched with professional norms and governance mechanisms to manage the risks posed by engineered pathogens. The international community also lacks robust transparency measures to clarify the intentions and capabilities of bioscience research across the globe.¹⁰

The existential threat posed by emerging zoonotic pathogens must be urgently addressed. However, the zoonotic origins of COVID-19 must not distract us from the possibility of an engineered

pandemic pathogen. We must guard against the lures of availability bias, advocate for transparency and robust governance and foster a global One Health discussion on biotechnology as a likely cause of the next Disease X.

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