Animal models in response to COVID-19 and highly pathogenic avian influenza

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We are living in an era of outbreaks and pandemics, as witnessed by COVID-19 and the most recent threat of highly pathogenic avian influenza outbreak in wildlife as well as in livestock. Outbreaks and pandemics are usually caused by zoonotic viruses and we cannot yet predict, which ones - among the numerous viruses found in wildlife reservoirs - will emerge as causative agents of the next outbreak. We do know that a key process in disease emergence is the jump between animal species and this cross-species transmission involves virus evolution and changes in the characteristics of the given pathogen. To better understand these processes and key mechanisms of cross-species transmission and spillover, we need to study these viruses not only in cell culture models but in animal models. A rapid response to a new pathogen also includes the development and testing of vaccines and drugs, for which animal models are critical. In this presentation I will discuss the different animal models used for COVID-19 research and their limitations, and also discuss the overall research response to the crisis and lessons that should be learned. I will also discuss the animal models for avian influenza research, the vast knowledge on pathogen evolution in mammalian hosts and how that knowledge should be used in preparedness and response to the current outbreak.