Health, zoonotic pathogens and parasites

The occurrence of Seoul orthohantavirus in wild and captive rats in Europe

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Norway rats (*Rattus norvegicus*) and black rats (*Rattus rattus*) are synanthropic rodents, and reservoirs for a cocktail of zoonotic pathogens, including Seoul orthohantavirus (SEOV). First described in Korea, SEOV is now known to have a global distribution. In humans, SEOV infection can cause hemorrhagic fever with renal syndrome (HFRS), with a case fatality rate of more than 1%. The virus can be transmitted through inhalation of aerosolized particles or through bites. Although parts of Asia have reported high SEOV prevalence in wild rats, with human infections being common, only a few studies in the Netherlands, UK and Belgium have reported SEOV detections.

Here, we aimed to assess the current status of SEOV in Germany and the Netherlands by screening wild and captive rats for SEOV RNA and reactive antibodies. More than 1,500 wild, pet, lab and breeder rats sampled from 2013-2021 were screened. Although reactive antibodies were detected in seven individuals, no RNA was detected in any of these animals. However, we identified three human SEOV infection clusters in Germany (2019-2021), with patients being admitted to intensive care. In all three outbreaks, the patients had recently purchased pet fancy rats. Investigation of these rats, and rats from the breeders who had sold these rats, revealed SEOV RNA and reactive antibodies at high prevalence. Full genome sequences (S, M and L segments) revealed nearly identical sequences between the patients and their pet rats. Virus sequences from all three outbreaks clustered closely together, suggesting a common source of infection. These sequences were also very similar to those found in rats and patients in other European countries. Together, these findings suggest that SEOV is rare in wild rats from Europe, but is present in private breeding facilities. The trade of fancy rats in Europe likely facilitates the spread of SEOV and outbreaks in pet owners in Europe. Although we found little evidence of SEOV in wild rats, spill-over from captive breeding may allow the virus to enter native populations, while pet trade may facilitate the spread to new areas.