Workflow for multiple pathogen detection in a rat from an aircraft

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Rats are reservoirs for a variety of zoonotic pathogens like cowpox virus, Seoul orthohantavirus and Leptospira spp., which can cause serious diseases in humans. Additionally, non-zoonotic pathogens such as Rattus norvegicus polyomavirus 1 or rat hepacivirus were found in rats.

In April 2017, a passenger noticed the presence of a rat in an aircraft during flight. After landing, the rat was localized, euthanized and dissected. Various tissue samples were taken for different pathogen investigations. The animal was identified as a Black rat (Rattus rattus) by standard cytochrome b-PCR and sequencing.

This event was taken as occasion to establish a standard workflow for rodent-borne pathogen detection. Open-view methods were conducted, including cultivation and characterization of bacteria, high throughput sequencing, electron microscopy, microarray, and multiplex serology investigations. The pathogen-specific methods targeted 20 viral and eleven bacterial pathogens.

The cultivation experiments showed the presence of five bacterial and two fungal species. A methicillin-sensitive Staphylococcus aureus strain (MSSA-CC45) was detected by specific multiplex PCR and high throughput sequencing investigations revealed two picobirnaviruses.

A few zoonotic and non-zoonotic pathogens were detected but no evidence for other pathogens is presumably, as they would have been found with the workflow investigations, especially open view methods.

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