Rodents are reservoirs for life-threatening disease, finds new study

September 26 2022

Credit: Unsplash/CC0 Public Domain

Fungal diseases in the human population are on the rise, so it is important for health authorities to understand where these pathogens come from. A new study has searched for fungi in the lung tissues of

small mammals and found fungal pathogens that cause diseases in humans. This suggests that these rodents can serve as reservoirs, agents of dispersal, and incubators of emerging fungal pathogens.

Fungal diseases in the human population are on the rise, so it is important for health authorities to understand where these pathogens come from. A new study, published in *Frontiers in Fungal Biology*, has revealed that small mammals could act as a reservoir for these fungal infections.

"Our analysis, which specifically focused on lung pathogens that cause disease in humans, detected a wide range of fungi in the lung tissues of small mammals," said Paris Salazar-Hamm, first author of this research, of the University of New Mexico.

"We found that many of the rodents we sampled from areas in the Southwestern US were harboring the type of fungi that can cause lung infections in humans, such as the fungus that leads to Valley Fever, a disease that typically causes flu-like symptoms and can be life threatening."

Animal to human jump

Over the last four decades there has been an increase in reports of novel human pathogens. Like the virus Covid-19, host jumps have also allowed fungi to evolve and diversify. In some cases, this could increase their virulence and in turn have an impact on humans.

"We wanted to understand if the fungal spores of respiratory pathogens reside in soils because they feed on dead and decaying plant matter, or if they are instead living within small animals and their spores are released into the soil after the rodents die," explained Salazar-Hamm.

Using next-generation sequencing, a method that allows a quick assessment of the wide-ranging species of fungi, the researchers analyzed fungal DNA in rodent lung tissues from museum specimens.

"We detected the fungus *Coccidioides*, the cause of Valley Fever, in the lung tissues of animals from Kern County, California, and Cochise and Maricopa Counties in Arizona, areas that have high rates of this disease," reported Salazar-Hamm.

"In addition, we detected sequences from *Coccidioides* in animals from Catron, Sierra, and Socorro Counties in New Mexico, which is the first time this pathogen has been detected in the environment in this region."

"This is the first big study using next-generation sequencing to assess the fungi in the lungs of small mammals. Our results support the hypothesis that rodents could be a breeding ground for respiratory fungal pathogens ," she continued.

Monitoring the spread

The findings from this study hopes to inform health officials where there is potential for disease to be acquired locally.

"Current forecasts of the distribution of *Coccidioides*, based on climate and soil conditions, predict that Valley fever will expand substantially northward and eastward over the next century as a result of climate change impacting environmental conditions. Our results will inform these modeling efforts by adding valuable information about animals as reservoirs for pathogens," explained Salazar-Hamm.

Future studies hope to examine the health of the host animals and how this may impact the spread or virulence of the diseases.

"We were not able to assess the health of the mammalian hosts from which the lung tissues were acquired. Despite the presence of pathogens, it was impossible to say conclusively that there was disease," said Salazar-Hamm.

"It would be interesting to further explore the impact of the fungi on the mammals. That effort would require more detailed information about the general health of the animal in question."

More information: Paris S. Salazar-Hamm et al, Breathing can be dangerous: Opportunistic fungal pathogens and the diverse community of the small mammal lung mycobiome, *Frontiers in Fungal Biology* (2022). DOI: 10.3389/ffunb.2022.996574

Provided by Frontiers