

Abstract

The Boston Urban Rat Study: Preliminary results on zoonosis and population structure of the synanthropic Norway rat (*Rattus norvegicus*).

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Rodent control is a complex and evolving science that requires the temporal and spatial integration of sectors (local government pest control, health departments, private pest control companies, city residents, etc.) and professions (veterinarians, ecologists, health care professionals, licensed pest control professionals, etc.) to understand and reduce public health risk. The Boston Urban Rat Study is a group of scientists at Tufts Cummings School of Veterinary Medicine, Boston University School of Public Health, University of Massachusetts Boston, Boston Children's Hospital, University of New Mexico, Kent State University, and Northern Arizona University that collaborate with the United States Department of Agriculture, the Center for Disease Control, the City of Boston's Inspectional Services Department, the Boston Public Health Commission, Ecologic Entomology, and residents of Boston to elucidate the role rats play in propagating diseases that impact humans. Since 2017, samples have been collected and analyzed from over 300 rats across the city. Application of population genetics tools reveals a high level of genetic structure among rat populations across trapping locations, with evidence of occasional dispersal, and will be used to better understand how diseases spread among urban rat populations. Multiple zoonotic pathogens have been detected among the rat population using conventional and real-time PCR including: Antimicrobial-resistant *Staphylococcus* spp. (8/63; 13%); Seoul hantavirus (57/247; 23%); influenza A virus (18/163; 11%); and leptospirosis (34/168; 20%). These findings have resulted in enhanced integrated pest management and targeted surveillance of rats for zoonotic pathogens among a vulnerable community of people experiencing homelessness who have increased exposure to rats. Future efforts will involve investigation and detailed characterization of rat-human interactions that may facilitate disease transmission among this population, as well as the investigation of associations between urban rat populations and rates of pediatric asthma. The Boston Urban Rat Study is a globally relevant example of how partnerships between multiple institutions and sectors including veterinary public health, universities, local and federal government, and community stakeholders can support One Health.