New Approaches for Handling Bats During a Survey for Emerging Zoonotic Pathogens in Georgia

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Background: In the last decades two of the largest outbreaks of emerging infection diseases, including the SARS and Ebola virus outbreaks, have implicated bats as their primary source. Potential routes for pathogens spillover from bats to humans are urine, feces, saliva, hunting and bat sampling and processing during fieldwork.

Objectives: The goal of the survey was to understand occurrence and distribution of various emerging high-consequence pathogens in Georgian bats. In order to mitigate the spread of contamination, avoid and minimize exposure, we decided to change biosafety issues for bat handling working environment, in second round of sampling.

Methods: NCDC conducted bat sampling in eight different regions of Georgia in June 2012 and May 2014. Collections were made without causing unreasonable disturbance to bat roosts. In 2012, we used injectable anesthetics and appropriate PPE for euthanasia and processing of bats. During the 2014 survey, bats were transported on dry ice to Lugar center, and euthanized utilizing a Carbon Dioxide (CO2) Euthanasia chamber built by Lugar Center engineers. All subsequent sample processing procedures were conducted utilizing BSL 2+ procedures in the laboratory.

Results: In total 221bats from 11 different species were collected. Samples included eight different tissues such as lung, kidney, spleen, liver, swabs, and ectoparasites. After investigation we found that, 113 of 221 bats (51%) were positive for at least one bacterial pathogen; 20% were Leptospira-positive and 51% Bartonella. Two bats showed positive on Brucella. Additionally, based on target gene sequence analysis, samples demonstrated 97- 99.0% identity with five different types of coronaviruses.

Conclusion: The euthanasia chamber provided us the capability to mitigate exterior contamination. While improving of biosafety risks in relation to sampling, we decreased the chance for spillover of above-mentioned pathogens in environment during the field works. Special recommendation was given to zoologists group who are working with rodents in the field. SOPs describing above demonstrated methods were developed and implemented, which will be in routine use for field works in Georgia.