ORAL PRESENTATION ABSTRACTS

Anna C. Doty, A. Dan Wilson, Lisa B. Forse, and Thomas S. Risch

Following White-nose Syndrome Development and Pd-infection Status in Cave-dwelling Tricolored Bats by E-nose Volatile Emissions Analysis

ABSTRACT:

Early detection of White-nose Syndrome (WNS) of bats within winter hibernacula is essential for applying effective and timely disease control measures. Recent evidence suggests that analysis of volatile organic compound (VOC) emissions from bats over time using electronic-nose (e-nose) devices has potential for monitoring Pd-infection status and WNS disease progress in individual cave bats following cave entry. An e-nose investigation of whole-body VOC emissions from Tricolored bats (*Perimyotis subflavus*), sampled noninvasively (without bat contact or handling) within 13 caves and 2 mines in Arkansas, showed that the majority of tricolored bats are relatively disease free when first entering caves, but acquire Pd-infections over time, often leading to WNS disease development at variable rates prior to the exiting of surviving bats from caves in the Spring. Healthy bats exhibited significantly different E-nose smellprint signatures than Pd-infected bats, both prior to and following disease and associated WNS symptom development. These differences in VOC emissions were indicative of Pd-induced pathophysiological changes in bat metabolic pathways associated with pathogenesis as it progressed from healthy to early and late WNS disease states. Further evidence from 3-dimensional Discriminant Factor Analysis (DFA) showed distinct clustering of bat data from individuals with different VOC profiles, indicative of differences in Pd-infection status and WNS symptom development. These data were confirmed by differences in VOC GC-retention times, peak numbers, peak areas, and VOC chemical identities, indicated in chromatograms from dual-column GC-analyses. We identified several (low molecular weight) quantitative VOC metabolic biomarkers as potential early indicators of Pd-infections, well prior to WNS symptom development. Healthy-bat quantitative VOC biomarkers significantly decreased in concentration or were completely absent within bat emissions as WNS disease progressed. The e-nose approach provides a new noninvasive tool for monitoring changes in bat physiological processes that occur during transitions from healthy to diseased states during winter hibernation periods.

AUTHORS: Anna C. Doty, Department of Biological Sciences, California State University, Sacramento, CA; **A. Dan Wilson**, Pathology Department, Center for Forest Genetics & Ecosystems Biology, Southern Research Station, USDA Forest Service, Stoneville, MS; **Lisa B. Forse**, Pathology Department, Center for Forest Genetics & Ecosystems Biology, Southern Research Station, USDA Forest Service, Stoneville, MS; **Thomas S. Risch**, Biology Department, Center for Computational and Integrative Biology, Rutgers University, Camden, NJ, USA**.**