

Vive the vole!

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A northern redbacked vole from the study's field site in Alaska. Credit: Greg Dart, Alaska Star News

The gathering of data for research involving an animal usually involves invasive procedures or death for the experimental animals. But critical data may now be collected through a nonlethal procedure, according to a new paper for the forthcoming issue of *Physiological and Biochemical Zoology*.

In the paper “Dual-Energy X-Ray Absorbtiometry (DXA) Can Accurately and Non-Destructively Measure the Body Composition of Small, Free-Living Rodents,” Kalb Stevenson and Dr. Ian G. van Tets reveal that they have discovered that they can take a wide range of

measurements accurately with a portable DXA device.

These body composition measurements in small rodents—water, protein, minerals, lean, and fat—are critical for dietary and environmental research. Previous measurements taken in the field, though not lethal, relied on length and body mass calculations, which are often inaccurate; methods used on laboratory animals are often lethal, precluding longitudinal research. Differing methods used in fieldwork and in the laboratory limited scientific collaboration. Legal and/or ethical barriers against invasive research on endangered species further hampered crucial studies. “We needed a way to accurately and consistently measure the body condition of small mammals recaptured at different times of the year and could not do so using traditional means” said Dr. van Tets “so we decided to test whether DXA analysis could solve this problem”.

In their NSF-funded study of the northern redbacked vole (*Clethrionomys rutilus*), Stevenson and van Tets took a broad set of measurements accurately by employing DXA, using X-rays and mathematical formulas to noninvasively measure body content. Even transponder tags used to track the rodents in the wild did not interfere with their measurement of fat mass, lean mass, bone mineral content, bone mineral density, and fat-free mass.

“DXA worked better than we expected” Stevenson said “The measurements were consistent with those obtained via chemical (proximate) analysis and required nothing more than the machine itself, a laptop, and a power source. As subjects are not harmed, we can use this technology to track changes in individual animals over time and already have DXA-based projects underway studying the effects of season and/or hibernation on the body composition of animals as diverse as voles, ground squirrels, and black bears.”

Portable DXA devices provide the opportunity for quick measurements

in the field and the ability to take measurements over time, allowing researchers to account for environmental factors. And, finally, field researchers and laboratory researchers will be able to collaborate using comparable data, allowing an increased degree of scientific rigor in comparative physiological studies.

Source: University of Chicago

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