BDR SEMINAR via Zoom

Jim Staples

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Friday, November 25, 2022

10:00-11:00

Meeting URL will be announced on the event day by e-mail.

※This seminar is open only to BDR members.

Mitochondrial metabolism in hibernation: Regulation and Implications

This seminar is a part of the QMIN project seminar series.

Summary

Suppressing metabolic rate and reducing body temperature allows many small hibernators to survive the cold temperatures and low food availability of winter. In 13-lined ground squirrels this metabolic suppression is regulated by an endogenous rhythm, and they will hibernate yearly even when held under constant, warm conditions. My research team has shown that, as ground squirrels enter hibernation, mitochondrial respiration is suppressed by up to four-fold, and during arousal this suppression is rapidly reversed. I will discuss some mechanisms that we feel are important in regulating this extreme metabolic plasticity, including post-translational modifications to key enzymes and altered metabolism of H2S. Reversibly suppressing mitochondrial metabolism likely conserves energy over the winter when food is scarce, but may be more important in regulating production of reactive oxygen species during arousal, when whole-animal metabolic rate and blow flow increases up to 100-fold. Recently we demonstrated that oxidative damage to tissues is generally lower during torpor than arousal. These differences cannot be explained by changes in antioxidant capacity, but do reflect lower mitochondrial rates of ROS production in the winter. This decrease in ROS production likely contributes to the superior ability of hibernator mitochondria to withstand anoxia followed by reoxygenation, and tissue to withstand ischemia/reperfusion injury.

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