

Free Radical Metabolism in the Gut of a Hibernating Lizard

Welker, A.F.^{1,2,3}; Souza, S.C.R.²; Hermes-Lima, M.¹

¹IB-UnB, Brasília, DF-Brazil; ²IB-USP, São Paulo, SP-Brazil; ³UFG, Catalão, GO-Brazil

The alterations in free radical metabolism during hibernation have been analyzed in most animal groups. However, few works have correlated oxidative stress with antioxidant defenses in non-mammalian hibernation. We assessed the effects of 2-month hibernation and arousal (2 and 40 days) in the intestine of lizards *Tupinambis merianae*. The effect of 20-day fasting was also investigated in 40-day active animals. Both hibernation and fasting caused a drop in GST and total-GPX activities (by 1.5-1.6 fold), which returned to normal levels in 40-day arousal. Catalase and GR activities followed this pattern (significance was not reached). Se-GPX and G6PDH activities were unchanged in response to hibernation, arousal and fasting. The concentration of eq-GSH diminished during hibernation and fasting (by ~1.6), indicating that “*no food, no GSH synthesis*”. Levels of lipid peroxides decreased during 2-month dormancy (but not in 20-day starved animals), bouncing back within 48-h arousal. GSSG levels also decreased in hibernation (by 2.5 fold) and remained unchanged during arousal. TBARS remained unchanged (throughout the cycle of hibernation, arousal and fasting), whereas carbonyl protein increased 1.4-fold during dormancy. The GSSG/eq-GSH ratio dropped 33% during hibernation – this ratio was kept low during arousal and rose significantly after 20-day fasting. Fasting also caused an elevation in Mn-SOD activity. These data show that the antioxidant system in the gut of lizards remains efficient and largely avoid oxidative stress during hibernation and arousal, despite the drop of some antioxidant parameters. However, since fasting causes increases in GSSG/eq-GSH and Mn-SOD, it indicates an imbalance between ROS production and antioxidant capacity. This suggests a major difference in free radical metabolism between hibernation and fasting.

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