The Effects of Anoxic Conditioning on Oxidative Stress in Mosquitoes in Increasing Overall Antioxidant Capacity, Lifespan, and Activity

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In insects, oxidative stress is a crucial factor in life expectancy, reproduction, and sexual selection. The preparation for and process of sterilization puts mosquitoes under many forms of oxidative stress such as freezing, ionizing radiation, and anoxia and hypoxia reperfusion (damage which occurs after a short period of lack of oxygen or too much oxygen). This extreme oxidative stress leads to less effective mating habits and shorter lifespans when released in the wild. This experiment tests the question: will an anoxic conditioning pretreatment increase overall antioxidant capacity and in effect extend the lifespan and activity of mosquitoes? Mosquitoes were exposed to low oxygen conditions for 10 minutes and immediately placed in a oxidative stress environment (experiment was run and tested with low temperatures as the oxidative stressor and run again with gamma irradiation as a stressor), then were then put back in normal conditions. In one trial, activity and lifespan were observed until most of the mosquitoes were dead. In the next, they were immediately killed and antioxidant levels were tested. From these trials it was seen that mosquitoes exposed to anoxic pretreatments were more active and lived longer on average than mosquitoes who did not receive treatment. It was also seen that overall antioxidant capacity was higher immediately after anoxic treatment than it was 14 days after, showing the boost in antioxidant capacity was, in fact, created by the anoxic pretreatment. In addition, the maintained high antioxidant levels after 14 days show the longevity.These results suggest an anoxic pretreatment is effective in reducing oxidative stress and boosting the antioxidant capacities of mosquitoes both in the short term and the long term.

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