

# **THERMAL STRESS EFFECTS ON THE ADENYLATE ENERGY CHARGE IN TILAPIA AUREA**

---

Author: Kenneth Richard Kindle

Tilapia aurea (Steindachner) muscle tissue adenylate nucleotides and the adenylate energy charge (AEC) were monitored during laboratory induced hypoxia. Muscle and liver adenylates, AEC, plasma glucose, cortisol, and chloride were monitored during acute and chronic temperature stress.

ADP and AMP concentrations increase without a concomitant decrease in ATP in tilapia muscle tissue during hypoxia. This resulted in an increase in the total adenylate concentration and a significant drop in the AEC.

Muscle AEC is unaffected during acute cold water exposure but decreases significantly when tilapia are exposed to chronic, sublethal low temperature stress. The decrease in AEC is primarily the result of a decrease in ATP concentration.

Plasma glucose and cortisol increase when tilapia are exposed to 11-12°C for 60 minutes, 11 days, and a 5-week period. Incomplete compensation is evident in 5 week-acclimated fish since glucose and cortisol levels are intermediate between controls and acutely stressed fish. Acclimation to 35°C does not significantly affect plasma glucose and cortisol compared to controls (22°C). Plasma chloride is relatively unaffected by acute and chronic temperature stress. Apparently tilapia can effectively osmoregulate under a wide range of temperatures.

Liver tissue adenylates are not significantly affected when tilapia are subjected to a sudden drop in water temperature (22 to 11°C). Liver tissue adenylate concentrations and AEC are lower than muscle.

AEC is a useful indicator of chronic temperature stress in Tilapia aurea. Plasma glucose and cortisol are useful indicators of acute and chronic temperature stress.

*Masters Thesis  
Department of Biology  
The University of Texas at Arlington  
Arlington, Texas 76019*