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Temperature-dependent stress response in oysters, *Crassostrea virginica*: Pollution reduces temperature tolerance in oysters

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Abstract:

Combined effects of temperature and a toxic metal, cadmium (Cd), on energy metabolism were studied in a model marine bivalve, the eastern oyster *Crassostrea virginica*, acclimated at 20, 24 and 28 °C and exposed to 50 µg l⁻¹ of Cd. Both increasing temperature and Cd exposure led to a rise in standard metabolic rates, and combined stressors appeared to override the capability for aerobic energy production resulting in impaired stress tolerance. Oysters exposed to elevated temperature but not Cd showed no significant change in condition, survival rate and lipid peroxidation, whereas those exposed to both Cd and temperature stress suffered high mortality accompanied by low condition index and elevated lipid peroxidation. Furthermore, RNA/DNA ratios indicative of protein synthesis rate, and levels of glutathione, which is involved in metal detoxification, increased in Cd-exposed oysters at 20 °C but not at 28 °C. Implications of the synergism between elevated temperatures and cadmium stress on energy metabolism of oysters are discussed in the light of the potential effects of climate change on oyster populations in polluted areas.

Key-words: Oyster, temperature, cadmium, aerobic scope, lipid peroxidation, RNA/DNA ratios