

## **Heat shock-induced oxidative stress modulates growth-related gene expressions and redox status in coho salmon**

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Growth is regulated by the growth hormone/insulin-like growth factor (GH/IGF) axis in vertebrates. Little is known about the effect of severe stress on growth-related gene expressions in fish. We investigated the changes in mRNA expression of growth-related genes and redox status in several tissues of coho salmon *Oncorhynchus kisutch* in response to heat stress. The fish was exposed to heat stress (+11°C, 2 h). The mRNA expression was determined by real-time quantitative PCR using TaqMan probe. Several important biomarkers, such as superoxide dismutase, lipid peroxides, glutathione and Hsp, relevant to oxidative damage were also measured. Heat stress induced enhanced levels of superoxide dismutase and lipid peroxides in the plasma. The plasma glutathione level decreased at 2.5 h post stress. GH receptor mRNA levels in the pituitary, liver and muscle increased as well. Pituitary GH mRNA expression level increased 2.5 h post stress, however, returned to control levels at 17.5 and 48 h post stress. Hepatic IGF-I mRNA gradually decreased following heat stress treatment. These results support the possibility that oxidative stress due to heat shock affects redox status and modulates the growth-related gene expression in fish. Hence, manipulation of appropriate heat stress could control production and health in cultured fish.