

Effects of Confinement and Transport Stress on Physiological Condition in Olive Flounder (*Paralichthys olivaceus*)

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Physiological responses (cortisol, glucose, lactic acid, osmolality and hematology) of olive flounder (*Paralichthys olivaceus*) to stressors associated with confinement and subsequent transport were investigated. Specimens were subjected to confinement stress for 3 h, prior to transport for 15 h. Two different size cohorts of the fish, large (839.6±162.7 g) and small (98.2±14.8 g), were used.

Experimental cohorts of the fish were divided into 3 groups for blood sampling: group A, sampled at the beginning of confinement and 3 h before transport (BT, -3 h), after confinement and at the beginning of transport (BT, 0 h), 3 h after transport had begun (AT, 3 h), and after 15 h transport (AT, 15 h); group B, sampled at BT, 0 h, at AT, 3 h, and at AT, 15 h; and, group C, sampled at AT, 3 h, and at AT, 15 h.

In the cohort of large fish, plasma cortisol levels of the A group were increased over time, from 4.2 ng/ml (BT, -3 h), to 92.0 ng/ml (BT, 0 h), 118.5 ng/ml (AT, 3 h) and 105.5 ng/ml (AT, 15 h). A similar pattern was evident in the B group, in which cortisol increased from 47.5 ng/ml (BT, 0 h) to 53.5 ng/ml (AT, 15 h); and, for the C group, in which cortisol increased from 43.5 ng/ml (AT, 3 h) to 71.5 ng/ml (AT, 15 h). Glucose

levels of the A group also were significantly increased, from 39.5 mg/dl (BT, -3 h), to 121.0 mg/dl (BT, 0 h), 298.0 mg/dl (AT, 3 h) and 260.5 mg/dl (AT, 15 h). Lactic acid levels increased markedly during transport, from less than 1 mmol/L (BT, 0 h) to 12.0 mmol/L (AT, 15 h). Plasma osmolality increased from 405.5 mOsm/kg (BT, -3 h, for group A) to values near 500 mOsm/kg subsequent to confinement and transport. In the small-size cohort, plasma cortisol, glucose, lactic acid and osmolality levels showed similar but less pronounced trends than those observed for the large-size cohort.

This research provides baseline data on cortisol, glucose, lactic acid, osmolality and hematological responses to confinement and transport, which should be useful to aquaculturists working with olive flounder and to scientists studying other flatfish species.

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