# THE STRESS-RESPONSE AND THE PLASMA CLEARANCE OF CORTICOSTEROID AND GLUCOSE IN A MARINE TELEOST, THE SEA RAVEN

M.M. Vijayan
EVS Environment Consultants
195 Pemberton Avenue
North Vancouver, B.C.
Canada V7P 2R4
Tel: 604-986-4331
Fax: 604-662-8548

T.W. Moon
Ottawa-Carleton Institute of Biology
Department of Biology
University of Ottawa
Ottawa, ON
Canada K1N 6N5

The objective of the study was to examine the physiological response to stress in a marine species with a sluggish life-style. The sea raven (*Hemitripterus americanus*), a marine benthic sit and wait predator with low metabolic activity was chosen as the candidate species for this study. The sea raven did not elevate catecholamine levels when handled for blood removal which facilitated repeated blood sampling without cannulation from the same fish. Plasma catecholamines, however, increased immediately after an acute stress (1 min of air exposure followed by 1 min of chasing), suggesting a higher threshold (degree of external stimulation) for catecholamine release in this species compared to salmonids. Plasma cortisol concentration increased significantly from the pre-stress levels only after 1 h and remained elevated 4 h post-stress after which the levels dropped to pre-stress levels between 4 and 24 h. The plasma cortisol levels post-stress in the sea raven showed a delayed response compared to salmonids. This delayed cortisol increase may not be due to altered plasma clearance as no change in the plasma disappearance or tissue uptake of cortisol derived radioactivity occurred with confinement stress in this species. Plasma glucose concentration increased significantly at 0.5 h post-stress and remained elevated even at 24 h, while lactate levels dropped between 4 and 24 h post-stress. Confinement stress did not alter the plasma disappearance or tissue uptake of radioactivity derived from glucose indicating a higher production of glucose during stress. Food-deprivation significantly increased the plasma disappearance and tissue uptake of both cortisol and glucose derived radioactivity suggesting that the nutritional state of the animal modifies cortisol and glucose turnover in the sea raven. The results indicate that the hormonal response to stress in the sea raven is different compared to salmonids and may be related to the animal's sluggish life-style and its exposure to stressors different from those affecting actively swimming fish such as the salmonids. This altered response to stress in the sea raven may also be an adaptation to prevent excess energy mobilization in a species with an inactive lifestyle and a low metabolic activity.

The authors gratefully acknowledge the help of the staff of the Huntsman Marine Sciences Centre, St. Andrews, New Brunswick, Canada in maintaining the experimental fish.



1