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ECOPHYSIOLOGICAL RESPONSES OF EUROPEAN SEA BASS *Dicentrarchus labrax* TO ELEVATED CARBON DIOXIDE AT DIFFERENT SALINITY GRADIENTS

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Salinity drift is a limiting factor for many marine organisms including diadromous and non-diadromous fish. The shift in the ambient salinity can alter overall fitness of fish. Ocean acidification is a recognized consequence of anthropogenic carbon dioxide (CO_2) emission in the atmosphere. Despite its

threat to marine ecosystems, little is presently known about the ability of fish to respond efficiently to this acidification either individually and/or with shifts in salinity gradients.

In the present study, we investigated the impact of ocean acidification on the performance of European sea bass (*Dicentrarchus labrax*) when progressively acclimated to normal seawater (32 ppt), brackishwater (10 ppt) and hyposaline water (2.5 ppt). Following acclimation to different salinities for two weeks, fish were exposed to present-day (control CO_2 , 400 µatm) and future (high CO_2, 1000 µatm) atmospheric CO_2 for 1, 3, 7 and 21 days. Results showed a transient but significant increase in the blood pH of exposed fish acclimated at 10 ppt (day 1) and 2.5 ppt (day 21) possibly due to an overshoot of the blood HCO_3- accumulation. Additionally, plasma [Na^+] of exposed fish reared at 10 ppt was significantly reduced at day 1 relative to control fish. Na^+ concentration of control fish was relatively higher at 10 ppt and lower at 2.5 ppt compared to 32 ppt control group at all sampling periods. We also found that an increase in Na^+/K^+-ATPase (NKA) higher when acclimated to lower expression of control fish was relatively salinities (10 ppt and 2.5 ppt) as compared to 32 ppt control group throughout the experiment. Meanwhile, a significant reduction of $Na^+/K^+/2Cl^-$ (NKCC) mRNA level of the exposed fish acclimated at 32 ppt (1-3 days) and 10 ppt (7-21 days) was noted. The reduced expression of NKCC could be an adaptive response to foster ion retention during hypercapnia in sea bass acclimated at lower salinities. Furthermore, Rhesus glycoproteins (Rhbg, Rhcg1 and Rhcg2) were upregulated in the fish acclimated at lower salinities. It suggests that environmental stressors, such as increased CO_2, may enhance ammonia excretion rate. Overall, the physiological and ion-osmoregulatory performance of juvenile sea bass are strongly affected by the two environmental stressors and the duration of the exposure.

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