THE EFFESTS OF METACAIN ANESTHESIA ON COD BLOOD PARAMETERS

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DELOVANJE ANESTEZIJE METAKAINOM NA PARAMETER KRVI BAKALARA

Abstract

Anesthetics are commonly used in aquaculture to immobilize fish before handling in order to minimize stress responses that may influence fish quality negatively. However, anesthetics may actually trigger secondary stress responses by affecting blood respiratory properties and disturbing acid-base and electrolyte balance. In this respect we can monitor possible stress responses caused by anesthesia by measuring key blood parameters. In the present investigation we have studied the effect of metacain anesthesia on these blood parameters in Atlantic cod (*Gadus morhua*).

In total, 6 fish with an average length of 45 cm and weight of 1 kg were used in this study. The fish were kept in 2 m^3 tank with air saturated running sea water (34 ppt, 8.5°C) at natural light conditions (November 2010, Bergen, Norway) and fed with commercial cod feed. The test fish were anesthetized with metacain (1g/10L diluted in sea water) until fully immobilized prior to blood sampling from ductus cuvieri. These fish recovered after blood sampling. The control fish were killed with a sharp blow to the head and blood was sampled immediately after by cardiac puncture. Ice-cold syringes with Heparin lithium salt were used for blood sampling from both groups. The following parameters were measured: pH, Hct, Hb, mLO_2/gHb, Glu, Lac and plasma ions (Na^+, K^+, Li^+, Mg^{2+}, Ca^{2+}, Cl^-, F^-, Br^-, NO_3^-, PO_4^{3-} and SO_4^{2-}) for both groups.

The blood parameters were measured at 15°C and 100% air saturation after being equilibrated for 20 min. Oxygen carrying capacity was measured using a modified Tucker chamber technique. The other blood parameters were analyzed by standard techniques (pH electrode/meter, photometer, hematocrit centrifuges) as well as using i-STAT hand-held analyzer (used cartridges CG4+ and CHEM8+).

The results show a significant acidification of the blood from metacain anesthetized fish compared to control fish. This pH decrease is partly caused by the acidity of meta-

cain itself since there were no significant changes in Lac, which probably is due to the equilibration of blood with air for 20 minutes. This effect may cause arterial desaturation and reduced metabolic scope. Hct, Hb, mLO_2/gHb, Glu and Lac showed no significant differences between the two groups except for a larger variability of these parameters (higher standard deviation) for the metacain anesthetized fish. However, there was a significant increase in plasma Na^+ cations, which could be a direct effect of metacain on the Na-K-transport mechanism in gills leading to an ion imbalance.

In conclusion, the acidification caused by metacain itself, during anesthesia, appears to be the most serious problem for the fish during anesthesia and precaution should be taken in order to avoid metabolic stress until full recovery.