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First investigations on the stress protein response of Nile Tilapia (*Oreochromis niloticus* L.) to induced hypoxia

Poster

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Aquaculture has become the fastest growing food production sector world-wide according to FAO figures, among them the important cultured fish tilapia. The tilapias are cichlid fishes of Africa and the Levant, which have become dispersed throughout the warm countries of the world for fish farming. Tilapia aquaculture is and will continue to be important, especially for the developing countries in the tropics. More than one million tons of tilapia were produced world-wide in 2000. Tilapia are also valuable as an important experimental vertebrate model. Studies on the ecology and physiology of these fish are therefore of high scientific and economic interest. Environmental stresses, such as heat shock or hypoxia/anoxia may be commonly faced from many organisms in the aquatic environment. Stress protein (heat shock protein, hsp 70) is involved in protecting aquatic organisms from the action of temporary environmental stresses, such as hypoxia or anoxia, as they often appear in tilapia pond aquaculture in the tropics. However, only few studies have been carried out so far in the stress protein response of fish on anoxia or hypoxia. Furthermore, all these studies were only undertaken on the cellular level only. Therefore, to observe the response of Nile Tilapia (*Oreochromis niloticus*) to induced hypoxia, 16 fish of around 100 g body mass were used in this study in a warm-water recirculating system. The control group (n=8) was placed in aquaria and enjoyed a dissolved oxygen level of 7.5 mg l^{-1} for 10 days. The treated group (n=8) was placed in aquaria of the same volume, flow through and temperature for the same time period and was facing hypoxic conditions (dissolved oxygen level = 0.9 mg l^{-1}). Fish were sampled and hsp 70 levels were measured separately in the supernatant of the liver and gills of the fish with a standardised immunoassay. The hsp 70 level in the liver was highest during the presence of the stressor and differed significantly from the control group ($p < 0.05$), while the concentration of hsp 70 in the gill was again highest during the presence of the stressor, but differed significantly from the control group at $p < 0.01$. The stress protein response of tilapia can be interpreted as a sign of tolerance development against hypoxia and may play a role in survival under conditions of high diurnal dissolved oxygen variations in pond systems. The results should encourage further research in the kinetic of stress protein, since this might be vital to provide in-depth knowledge in stress physiology of fish.