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Hypoxia modulation of endocrine and immune function in fish

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Hypoxia caused by eutrophication is the major pressing problems in aquatic ecosystems worldwide and as well as considerable economic losses to fisheries. These long standing problems will be exacerbate in the coming years due to global warming, particularly in developing countries where construction of waste treatment facilities lags well behind ever-increasing population demands. Hypoxia has been shown to be an endocrine disruptor and can impair reproduction and affect development of fish and higher vertebrates. Chronic exposure to hypoxia could impair reproduction and sexual development of fish through disruption of sex hormones and their receptors along the hypothalamic pituitary gonadal (HPG) axis. Recent studies showed that many endocrine disruptors may also cause transgenerational effects. Offspring of future generations are thus affected even though they themselves have not been directly exposed. Using the marine medaka (*Oryzias melastigma*) as a study model, this research aims to test the hypothesis that exposure to hypoxia can cause transgenerational effects in fish, and we further hypothesize that any observed transgenerational effects on immunomodulation, maternal complement components and also on modulation of steroidogenesis in HPG axis. Nearly 2000 fish were exposed to hypoxic (1.5 mg L^{-1}) and normoxic (6.0 mg L^{-1}) conditions for 30 days and eggs (F1 generation) were then collected and reared under hypoxic or normoxic conditions. For chronic exposure the fish was exposed for 250 days under hypoxia and analysed for immune associated parameters and steroidogenesis genes. Obtained result shows that majority of the immune related parameters and steroidogenesis genes in HPG axis are modulated. This study highlights the interesting findings from the F0/F1/F2 generations, with a focus on the changes in hypoxia-responsive mRNAs and protein in both steroidogenesis and immunomodulatory pathways.

Biography

Gopalakrishnan S has completed his PhD at the age of 27 years from Madras University in 2002 and worked as Research Associate in Institute for Ocean Management, Anna University (2003-2007) and did his Postdoctoral studies from State Key Laboratory of Marine Environmental Sciences, Xiamen University, Xiamen, China (2007-2010). He has done his second Post doctoral fellowship in School of Biological Science, Hong Kong University. In parallel he worked as a visiting scientist in Area of excellence, City University of Hong Kong (2010-2013). Currently he is working as a Post doctoral Fellow in Centre for Biosystems, Neuroscience and Nanotechnology City University of Hong Kong and as a visiting Scientist in Department of Biology and Chemistry, City University of Hong Kong. He has published more than 30 papers in reputed journals and has been serving as a constant reviewer in many reputed toxicology and immunology journals.

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Effect of foundation flexibility on seismic response of concrete gravity dams

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Investigation of the behavior of dams against seismic loads is a key factor for dam safety requirements. One of the most important problems in evaluation of seismic behavior of concrete gravity dams is dam-reservoir-foundation interaction. Hydrodynamic pressures generated due to seismic forces and Fluid-Structure-Soil Interaction (FSS); are inevitable. In this paper, the basic equation involved in the water-structure-foundation interaction and the effective factors are considered for concrete gravity dams. Dam-reservoir-foundation interaction has been investigated utilizing seismic analysis. 2-D dam-reservoir-foundation coupled system is analyzed using FEM via ANSYS code. Dam and foundation are assumed to be linear and elastic while reservoir water is considered acoustic, inviscid and incompressible. The dam and foundation have been idealized by considering linear, elastic and plane stress conditions. The modeling of reservoir has been carried out by fluid acoustic element and proper consideration of fluid boundary and initial conditions. The effect of foundation flexibility has been obtained by considering various dam-foundation rock interaction ratios i.e. modulus of elasticity of foundation to modulus of elasticity of dam. Results show that both foundation mass and flexibility have an outstanding impact on the behavior of dams and is necessary to consider their impact while simulating seismic response of concrete gravity dams.

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