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Superoxide radical production in response to environmental hypoxia in cultured shirimp

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Markers of oxidative stress in response to hypoxia and reoxygenation were assessed in Pacific white shrimp (Litopenaeus vannamei). Adult shrimp were either exposed to hypoxia (1 mg O2/L) for 6, 12, or 24 h followed by 1-h reoxygenation, or exposed to hypoxia for 24 h followed by 1- to 6-h reoxygenation. In all cases, shrimp maintained at constant normoxia were used as controls. Spectrophotometric techniques were applied to analyze lactate concentration, superoxide radical (O2[dot above]-) production, lipid peroxidation (TBARS), and antioxidant capacity status in muscle, hepatopancreas, and gill samples. Results indicate differences among tissues, even under control conditions. O2[dot above]- production and TBARS levels were higher in hepatopancreas than in gill or muscle. No effect of exposure to hypoxia was found. However, reoxygenation following exposure to hypoxia was found to affect the oxidative metabolism of muscle and hepatopancreas from cultured shrimp. Lactate concentration and O2[dot above]- production increased while antioxidant capacity decreased in hepatopancreas and muscle in the first hours of reoxygenation. This could translate into tissue damage, which may significantly jeopardize the commercial aquaculture product.

Palabras clave: Litopenaeus vannamei, Oxidative stress, Free radicals, Reactive oxygen species, Antioxidants, Aquaculture
Hypoxia