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The isolated and combined influences of ammonia and nitrite on phenoloxidase system of white shrimp (*Litopenaeus vannamei*)

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Aquatic animals would naturally or anthropogenically face environmental stress leading to many physiological disturbances, including interference in immune response. The shrimp *Litopenaeus vannamei* is an economically important species worldwide. Intensive farming with recirculating system is the common aquaculture practices nowadays that easily result in elevation of the levels of nitrogenous wastes, especially ammonia and nitrite. Since diseases outbreak would cause serious economic loss in aquaculture industry, the immunity of aquaculture species is the main research sector. This study aimed to investigate the potential threat of isolated and combined exposure to ammonia and nitrite to innate immunity of white shrimp through study on transcriptional and enzymatic responses of phenoloxidase (PO) system in hemocytes. The results revealed that not only the expression levels of pro-activating system related genes, *proPO1*, *proPO2*, proPO activating enzyme 1 (PPAE1), PPAE2, prophenoloxidase-activating factor (PPAF) and serine proteinase (SP) in hemolytic but also PO activity in plasma and hemocytes were significantly decreased in white shrimp exposed to isolated and combined stress of ammonia and nitrite. These findings suggested that rising waterborne ammonia and nitrite individually or simultaneously may cause disruption of the molecular and enzymatic responses of PO system. However, combined treatment was presumed to cause greater hemocytes injury which resulted in reduction of total hemocyte count since hemolymph ammonia and nitrite levels raised concurrently. Accordingly, elevated ambient nitrogenous wastes influenced the PO system which may make white shrimp more susceptible to pathogen infection. This study provided useful information for further field monitoring studies and may be helpful in identifying the impact of these stressors before severely harmful effects occur.

Biography

He is an Associate Professor for National Sun Yat Sun University. As an Associate Professor, he is a recipient of many awards and grants for his valuable contributions and discoveries in major area of research. His research interests, as an Associate Professor lie in Aquaculture Physiology, especially Molecular Stress Responses he is credited with many publications in national and international journals. He is committed to highest standards of excellence and it proves through his authorship of many books.

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