The interactive effect of hypercapnic hypoxia and bacterial infection on oxygen consumption and protein synthesis in the Pacific whiteleg shrimp, *Litopenaeus vannamei*.

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Estuarine species frequently encounter areas of low oxygen (hypoxia) and high carbon dioxide (hypercapnia). Exposure to hypoxia and hypercapnia triggers a broad assortment of behavioral, physiological, biochemical and genetic responses in marine organisms. In combination, hypercapnic hypoxia (HH) is also known to impact disease resistance in crustaceans causing, for example, an increase in the rate of lethal infection from bacterial pathogens in shrimp. Inhibited immune function is particularly problematic for estuarine species, as anthropogenically altered coastal systems frequently exhibit higher than normal pathogen loads. With high concentrations of environmental bacteria, decreased immune resistance and the ability to travel over large distances, crustaceans become ideal vectors for disease transmission (via consumption or physical interaction), thereby posing a serious risk to human health. Moreover, both hypoxia and bacterial infection independently cause a reduction in the rate of oxygen consumption in the Pacific whiteleg shrimp, *Litopenaeus vannamei,* and Atlantic blue crab, *Callinectes sapidus.* This metabolic depression could have serious consequences to the animal by reducing growth rates, reproductive efforts, and swimming and/or migratory behaviors. The interactive effects of hypoxia and infection, which are largely unknown, could be even more severe, potentially leading to widespread mortality events. Here we examine the singular and combined effects of HH and bacterial infection (*Vibrio campbellii*) on whole-animal oxygen consumption rates (MO_2) and tissue-specific (muscle, hepatopancreas, gill) protein synthesis rates of juvenile *L. vannamei*. We use closed-system respirometry to determine resting MO_2, whereas protein synthesis rates are measured by calculating the rate of tissue incorporation of a radiolabelled amino acid ([^{3}H] phenylalanine). We hypothesize that MO_2 and protein synthesis rates (particularly in muscle) will be lowest in shrimp exposed mutually to HH and *V. campbellii*. Our forthcoming results may better enable us to stop the spread of human disease by marine organisms and prevent decreased growth rates and survival in many economically important fisheries.

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