The Effect of an Elevated pCO2 Level on the Protein Expression of the Pacific Oyster Crassostrea gigas

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The purpose of this experiment was to determine the effects of elevated pCO2 on the protein expression on the Pacific Oyster Crassostrea gigas. Recently, the rise in anthropogenic CO2 has contributed to a decrease in pH and the availability of CO3-2 ions in the ocean. Consequently, this has prevented bivalves from forming their shells, leading to significant economic changes. It was hypothesized that an elevated pCO2 level will increase the protein expression values of ten highly connected proteins. After being exposed to a pCO2 level of 400 (control) and 1200 µatm for two weeks, four oysters from each level of the independent variable were dissected into their posterior gill lamellae, prepared for protein analysis, and calculated using the normal spectral abundance factor and INGENUITY. The comparison of the values of the protein expression for the pCO2 level of 400 µtm to the values for 1200 µtm show that the increase in pCO2 increased protein expression in the proteins: Q86VP6, Q20655, Q9WUB3, Q60631, Q9NZW5, and O43390, and decreased protein expression in Q5F4450, P48601, Q9PU58, and P00523. The effect of an elevated pCO2 level was statistically significant for all of the ten proteins. The research hypothesis was partially supported in this experiment and it was believed that while being exposed to these conditions, the transcription and translation and oxidative metabolism proteins were affected due to the heightened demand of energy. For continued study, the effects of an elevated pCO2 level on other marine organisms and other types of oysters could be studied.

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