Effect of Bacterial Quorum Sensing Molecule N-3-oxo-Dodecanoyl-L-Homoserine Lactone on Human Pancreatic Carcinoma Cells

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In spite of chemotherapeutic and surgical advances, pancreatic cancer continues to have a dismal prognosis. Metastasis due to tumor cell migration remains the most critical challenge in treating pancreatic cancer, and conventional chemotherapy is rarely curative. In the quest for more novel molecules to fight this disease, we tested the hypothesis that the Pseudomonas aeruginosa quorum sensing signal molecule N-3-oxo-dodecanoyl-L-homoserine lactone (O-DDHSL) would be cytotoxic to and reduce mobility of pancreatic carcinoma cells (Panc-1 and ASPC-1). Results showed a decrease in cell viability from apoptosis, diminished colony formation, and inhibition of migration of the evaluated pancreatic carcinoma cell lines. Also, cell viability decreased in the presence of O-DDHSL when cells were grown in matrigel basement membrane matrix. Message for cell motility genes cofilin and IQGAP-1 decreased upon exposure to O-DDHSL as analyzed by qRT-PCR. RhoC, a Rho-family GTPase involved in cell motility, increased in the presence of O-DDHSL, suggesting a compensatory response to decrease of endogenously elevated cofilin and IQGAP-1. In addition, O-DDHSL inhibited DNA Methyl Transferase-1 (DNMT-1), an enzyme responsible for DNA methylation. Our results indicate that O-DDHSL could be an effective and novel agent with multimodal function for essential molecular targeting in pancreatic cancer.

Awards Won:

Fourth Award of $500