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Sonic hedgehog signaling pathway promotes pancreatic cancer pain via nerve growth factor

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Many pancreatic cancer (PC) patients suffer from abdominal pain and back pain. However, the cause of pain associated with PC is largely unclear. In this study, we tested the potential influence of the sonic hedgehog (sHH) signaling pathway on PC pain. Substance P (SP) and calcitonin gene-related peptide (CGRP) expression was measured in cultured PC cells and dorsal root ganglions (DRGs) by real-time PCR, western blotting analysis and ELISA. Small interfering RNA transfection and plasmid constructs were used to regulate the expression of sHH in the AsPc-1 and Panc-1 cell lines. Pain-related behavior was observed in an orthotopic tumor model in nude mice. In this study, the results showed that sHH increased the expression of SP and CGRP in DRGs in a concentration and time-dependent manner. Additionally, sHH secretion from PC cells could activate sHH signaling pathway and in turn, increase the expression of nerve growth factor (NGF), P75 and TrkA in DRGs. Furthermore, sHH signaling pathway and NGF/NGF receptor contributed to pain factors and pain behavior. Our results demonstrate that PC pain originates from sHH signaling pathway, and NGF mediates the pain mechanism via regulating SP and CGRP.

Recent Publications

1. Ma J, Xue M and Shen X (2019) Resveratrol inhibits the growth of tumor cells under chronic stress via the ADR-2-HIF-1α axis. Oncol Rep 41(2):1051-1058.
2. Li W, Liu H and Ma J (2018) Hyperglycemia aggravates microenvironment hypoxia and promotes the metastatic ability of pancreatic cancer. Comput Struct Biotechnol J 16:479-487.
3. Jiang Z, Zhou C, Ma Q and Ma J (2018) Inhibiting YAP expression suppresses pancreatic cancer progression by disrupting tumor-stromal interactions. J Exp Clin Cancer Res 37(1):69.
4. Zhou C, Qian W, Ma J, Ma Q and Li X (2018) Resveratrol enhances the chemotherapeutic response and reverses the stemness induced by gemcitabine in pancreatic cancer cells via targeting SREBP1. Cell Prolif 52(1):e12514.

Biography

Jiguang Ma has completed her PhD from Xi'an Jiaotong University. She has published more than 30 papers in reputed journals. Currently, she works in the Department of Anesthesia, First Affiliated Hospital, Xi'an Jiaotong University, Xi'an, and China.

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