Study on the Role of OCT4 in the Proliferation, Migration, Drug Sensitivity and Stemnessness Maintenance of Pancreatic Cancer Cells

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Abstract

Pancreatic cancer (PC) is recognized as one of the most aggressive malignancies globally, characterized by rapid progression, late diagnosis, and a generally poor prognosis. The role of cancer stem cells (CSCs) and the transcription factor OCT4 in the proliferation, invasion, drug resistance, and maintenance of stemness in PC cells are gaining increased attention. This study aimed to investigate the specific role of OCT4 in pancreatic CSCs (PCSCs) and its impact on the proliferation, migration, drug sensitivity, and stemness maintenance of PC cells, as well as to explore the underlying mechanisms. Our findings indicated that OCT4 and the PCSC marker CD133 were significantly overexpressed in PC tissues compared to normal pancreatic tissue ($P<0.05$). The expression of OCT4 in the BxPC-3 cell line was found to be inversely related to gemcitabine concentration, with si-OCT4 reducing and OV-OCT4 enhancing cell proliferation, invasion, and migration abilities. Additionally, OV-OCT4 was associated with a significant increase in PCSCs and activation of the PI3K/AKT /mTOR pathway, whereas si-OCT4 yielded opposite effects ($P<0.05$). The study concludes that OCT4 plays a crucial role in the biology of PCSCs, significantly influencing the proliferation, metastasis, and drug sensitivity of PC cells. High expression levels of OCT4 were linked to enhanced PCSCs activity and drug resistance in PC cells, highlighting OCT4 as a potential therapeutic target for intervention strategies in pancreatic cancer treatment.

Keywords

Pancreatic Cancer, OCT4, Cancer Stem Cells, Proliferation, Drug Sensitivity, Stemness