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Intraoperative Radiation Therapy Induces Immune Response Activity After Pancreatic Surgery

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Background : Pancreatic cancer has highly aggressive features, such as local recurrence that leads to significantly high morbidity and mortality and recurrence after successful tumour resection. Intraoperative radiation therapy (IORT), which delivers targeted radiation to a tumour bed, is known to reduce local recurrence by directly killing tumour cells and modifying the tumour microenvironment.

Methods : Among 30 patients diagnosed with pancreatic cancer, 17 patients received IORT immediately after surgical resection. We investigated changes in the immune response induced by IORT by analysing the peritoneal fluid (PF) and blood of patients with and without IORT treatment after pancreatic cancer surgery. Further, we treated three pancreatic cell lines with PF to observe proliferation and activity changes.

Results : Levels of cytokines involved in the PI3K/SMAD pathway were increased in the PF of IORT–treated patients. Moreover, IORT–treated PF inhibited the growth, migration, and invasiveness of pancreatic cancer cells. Changes in lymphocyte phenotype populations in the blood of IORT–treated patients indicated an increased immune response.

Conclusions : Based on the characterisation and quantification of immune cells in the blood and cytokine levels in the PF, IORT induced an anti–tumour effect by activating the immune response, which may prevent pancreatic cancer recurrence.

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