

# Effects of Perioperative Immunonutrition on Cell-mediated Immunity, T helper type 1 (Th1)/Th2 Differentiation, and Th17 Response after Pancreaticoduodenectomy

Suzuki D, Furukawa K, Kimura F, Shimizu H, Yoshidome H, Ohtsuka M, Kato A, Yoshitomi H, Miyazaki M  
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## Objective

This study was completed to investigate whether perioperative immunonutrition can influence cell-mediated immunity, T helper cell differentiation and response, and can reduce the rate of infectious complications after pancreaticoduodenectomy (PD).

## Methods

This was a prospective randomized clinical trial where 30 consecutive patients that met inclusion criteria were enrolled in one of the following three groups:

- A. Perioperative group received ORAL IMPACT<sup>®</sup> containing supplementary arginine, omega-3 fatty acids and nucleotides for 5 days before surgery and at least 7 days of enteral infusion via jejunostomy after surgery.
- B. Postoperative group received the same immunonutrition for at least 7 days after surgery.
- C. A second postoperative group received total parenteral nutrition (TPN) for at least 7 days after surgery.

Enteral feeding began 12-18 hours after PD at a 10 mL/hour rate and was progressed daily by an 20 mL/hour until 25 kcal/kg/day was reached. The three regimens were approximately isocaloric before and after surgery. PD included the Whipple procedure and a pylorus-preserving PD.

## Results

As per intention to treat analyses:

- **Cell-mediated immunity.** On POD 7, concanavalin A (Con A) or phytohemagglutinin (PHA)-stimulated lymphocyte proliferation was significantly higher in group A than other groups ( $p < 0.05$ ). On POD 14, natural killer (NK) cell activity was higher in group A than others ( $p < 0.05$ ).
- **Th1/Th2 differentiation.** On POD 3, mRNA expression levels of T-bet (transcription factor for Th1) and the ratio of T-bet/GATA-3 (transcription factor for Th2) were significantly higher for group A vs other groups ( $p < 0.05$ ). A hallmark cytokine for Th1 cells, IFN- $\gamma$ , helps to activate microbicidal activity, and was also found to be significantly higher in group A vs. others ( $p < 0.01$ ).
- **Th17 response.** On PODs 0,1 and 3, mRNA expression of ROR $\gamma$ t (transcription factor for Th17), and on PODs 3 and 7, mRNA expression of IL-17F were significantly higher in group A vs other groups ( $p < 0.05$ ). Plasma IL-6 levels peaked on POD 0 for all groups, and on PODs 1 and 2, IL-6 was significantly lower for group A than group C ( $p < 0.05$ ).
- **Infectious complications.** Defined as intra-abdominal abscess, bacteremia, cholangitis, colitis, pneumonia, superficial or deep wound infections and UTI, the rate of infectious complications in group A was significantly lower (10%) than in groups B (60%) or C (60%) ( $p < 0.05$ ). The duration of SIRS was significantly lower in group A (2.4 days) than in group C (3.6 days;  $p < 0.05$ ).
- **Compliance.** Group A drank more than 90% of the 1000 kcal ordered preoperatively. Overall, the full nutritional goal was reached in 80% of patients.

## Conclusion

Investigators suggest that the reduction in infectious complications may be due to the reduction in stress induced immunosuppression, correction of impaired Th1/Th2 balance and stimulation of Th17 response when perioperative immunonutrition is used with patients undergoing PD.

**Summary prepared by Nestlé Healthcare Nutrition. To view the study abstract, please use the following link:** <http://www.ncbi.nlm.nih.gov/pubmed/20227099>

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