ENHANCED RECOVERY PROTOCOLS (ERPs): IMMUNONUTRITION & CARBOHYDRATE LOADING

Complementary Protocols for Major Elective Surgery

PREOPERATIVE IMMUNONUTRITION

ORAL:
2 cartons/day for 5 days

OR

TUBE FED:
1 UltraPak®/ day* for 5 days

Regular diet as appropriate

CARBOHYDRATE LOADING** (as part of ERPs)

Clear Liquid Beverage

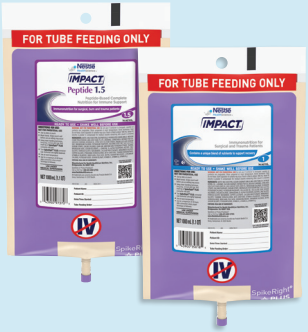
100 grams carbohydrate	50 grams carbohydrate
12 hours before surgery	2–3 hours before surgery

and/or

POSTOPERATIVE IMMUNONUTRITION

ORAL:
2 cartons/day for 5 days

OR



TUBE FED:
1 UltraPak®/ day* for 5 days

Resume regular diet as appropriate

Immunonutrition and Carbohydrate Loading are complementary practices.
Society recommendations include perioperative immunonutrition and preoperative carbohydrate loading.[1]

**Initiate IMPACT® tube feeding and advance to ≥1000 calories/day to meet nutritional needs for 5 days. Also available in open system.*
***No recommendation can be given for the use of carbohydrate loading in patients with diabetes.[2]*
These are suggested guidelines based on clinical references and should not be construed as a substitute for medical advice or existing facility protocols.

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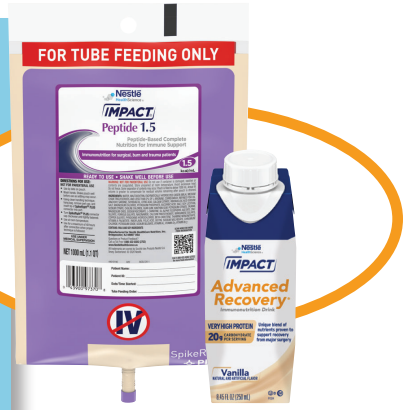
IMPACT® Formulas and Enhanced Recovery Protocols (ERPs)

1 PRE-OPERATIVE

- Preadmission counseling
- **Fluid and carbohydrate loading**
- No prolonged fasting
- No/selective bowel preparation
- Antibiotic prophylaxis
- Thromboprophylaxis
- No premedication



2 INTRA-OPERATIVE

- Short-acting anesthetic agents
- Mid-thoracic epidural anesthetic/analgesia
- No drains
- Avoidance of salt and water overload
- Maintenance of normothermia (body warmer/warm intravenous fluids)

3 POST-OPERATIVE

- Mid-thoracic epidural anesthesia/ analgesia
- No nasogastric tubes
- Prevention of nausea and vomiting
- Avoidance of salt and water overload
- Early removal of catheter
- **Early oral/enteral nutrition**
- Non-opioid oral analgesia/NSAIDs
- Early mobilization
- Stimulation of gut motility
- Audit of compliance and outcomes

ERPs may have 20+ types of interventions across multiple functions.

ERPs that include IMPACT Advanced Recovery® drink have shown:

- ✔ Reductions in length of stay (LOS)[3-5]
- ✔ Reductions in 90-day readmissions[4]
- ✔ Reductions in infection rates[5,6]
- ✔ Reductions in postoperative CRP values[3,5]
- ✔ Improved diet advancement[4]
- ✔ Improved time to flatus/bowel movements[4]

These are suggested guidelines based on clinical references and should not be construed as a substitute for medical advice or existing facility protocols.

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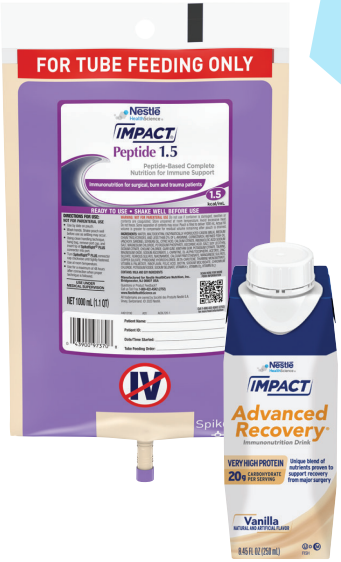
IMPACT® Formulas Improve Patient Outcomes and Support Cost Savings

	IMPACT® Formulas	Carbohydrate Loading[7,8]
Reductions in preoperative thirst, hunger and anxiety		✔
Studied as part of an ERP bundle of protocols with improved clinical outcomes[3-6]	✔	✔
Two RCT meta-analyses show a 51% reduction in risk of infectious complications after major elective surgery[9,10]	✔	
RCT meta-analysis shows 2-3 day reduction in LOS after major elective surgery[10]	✔	
Studied to incrementally support hospital cost savings[11,12]	✔	



Immunonutrition with IMPACT® Formulas

- Proven to reduce infectious complications when compared to isonitrogenous, isocaloric standard nutrition.[9,12]
- Improved clinical outcomes associated with use of immunonutrition **(arginine, omega-3 fatty acids from fish oil, and nucleotides)**, do not require the adoption of ERPs[9,10,13], but may be enhanced by them[3-6]

Carbohydrate Loading

- Shown to improve clinical outcomes when an ERP bundle[14] of protocols are in place[15]
- Limited clinical benefit as a separate intervention[16]
- No difference in length of stay (LOS) when compared to water or placebo[17]

USE UNDER MEDICAL SUPERVISION

References:

1. Wischmeyer PE et al. *Anesth Analg* 2018; 126(6):1883-1895. **2.** Gustafsson UO et al. *World J Surg* 2019; 43:659–695. **3.** Alito Aprelino M and de Aguilar-Nascimento JE. *Nutrition Journal* 2016;15:34. **4.** Majumder A et al. *J Am Coll Surg* 2016;222:1106-1115. **5.** Goncalves TJM et al. *JPEN* 2020; on-line first. **6.** Hamilton-Reeves JM et al. *Eur Urol* 2016;69(3):389-392. **7.** Canbay O et al. *Int Urol Nephrol* 2014; 46(7): 1329-33. **8.** Ljungqvist O. *JPEN* 2012; 36(4): 389-98. **9.** Adiamah A et al. *Ann Surg* 2019;270:247–256. **10.** Drover JW et al. *J Am Coll Surg* 2011;212(3):385-399. **11.** Banerjee S et al. *Nutr* 2017; 42: 106-13. **12.** Mauskopf JA et al. *World J Surg Onc* 2012: 1-7. **13.** Marano L et al. *Ann Surg Oncol* 2013;20(12):3912-3918. **14.** Lassen K et al. *Clin Nutr* 2012;31:817-830. **15.** Zhuang CL et al. *Dis Colon Rectum* 2013;56(5):667-678. **16.** Smith MD et al. *Cochrane Database Review* 2014. **17.** Amer MA et al. *Br J Surg.* 2017 Feb;104(3):187-197.

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