The ERAS®* Society suggests brain monitoring technology for enhanced recovery protocols to avoid complications associated with too much or too little anesthesia. The society specified the following:

- **2013** Colorectal surgery¹
- **2013** Rectal/pelvic surgery²
- **2014** Gastrectomy³
- **2016** Gastrointestinal surgery⁴
- **2016** Bariatric surgery⁵
- **2016–17** Gynecologic oncology surgery⁶,⁷
- **2018** Esophagectomy⁸
- **2018** Newly revised colorectal surgery guidelines⁹

Processed electroencephalography (EEG) technology is also recommended when total intravenous anesthesia (TIVA) is used.¹⁰
COLORECTAL SURGERY\textsuperscript{1,9}

- TIVA can be considered for use on patients who are at risk for postoperative nausea and vomiting (PONV)
- Brain monitoring technology is proposed to help titrate anesthesia to reduce the risk of:
  - Intraoperative awareness
  - Postoperative delirium or cognitive dysfunction in the elderly
- “The use of BIS or newer burst suppression monitoring to avoid overdose of anaesthesia in the elderly may have a role in reducing the risk of postoperative delirium and postoperative cognitive dysfunction in this patient population”\textsuperscript{9}

RECTAL/PELVIC SURGERY\textsuperscript{2}

- “Induction and maintenance of anesthesia can be guided by the bispectral index (BIS) monitor, thereby avoiding deep levels of anesthesia (BIS < 30), particularly in the elderly.”

GASTRECTOMY\textsuperscript{3}

- Remifentanil and propofol TIVA should be used in patients who are at high risk for PONV.
- “Maintenance [of anesthesia] should be guided by the BIS [monitoring],” in part to avoid deep sedation, particularly in the elderly

GASTROINTESTINAL SURGERY\textsuperscript{4}

- Propofol TIVA is encouraged for patients with a higher risk of PONV.
- “Anaesthetic depth should be guided either maintaining an end tidal concentration of 0.7–1.3 MAC [minimum alveolar concentration] or BIS”\textsuperscript{”} index between 40 and 60” to:
  - Reduce the risk of intraoperative awareness
  - Support quicker emergence and recovery from anesthesia
  - Avoid deep anesthesia, particularly in elderly patients

BARIATRIC SURGERY\textsuperscript{5}

- “BIS monitoring of anaesthetic depth should be considered where ETAG [end tidal anesthetic gas] monitoring is not employed.”

GYNECOLOGIC ONCOLOGY SURGERY\textsuperscript{6,7}

- Reduce the risk of PONV by decreasing or avoiding volatile anesthesia and increasing the use of TIVA
- “Use of bispectral index (BIS) to guide anesthetic depth may allow reduction of anesthetic dose and hence facilitate rapid awakening.”\textsuperscript{6}

ESOPHAGECTOMY\textsuperscript{8}

- “Early extubation is facilitated by titrating depth of anesthesia with bispectral index (BIS) monitoring.”
**BIS™ monitoring-guided TIVA is associated with less anesthetic use, quicker cognitive recovery, and less risk of postoperative delirium**

Bispectral index monitoring technology during anesthesia promotes early postoperative recovery of cognitive function and reduces risk of acute delirium in elderly patients with colon carcinoma: a prospective controlled study using the attention network test


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**Figure:** Percent of elderly colon carcinoma surgery patients (N = 81) diagnosed with postoperative delirium using the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU). P<0.001.

Compared to routine care, using BIS™ monitoring technology to titrate propofol-based TIVA was associated with:

- Higher BIS™ Index values (51 versus 41; P<0.001)
- Less propofol and remifentanil use (P<0.001)
- Recovery to preoperative levels of alerting and orienting functions by day five (which continued to be impaired in the control group)
- Reduced risk of postoperative delirium (figure)


