

INFOGRAPHICS IN ANESTHESIOLOGY

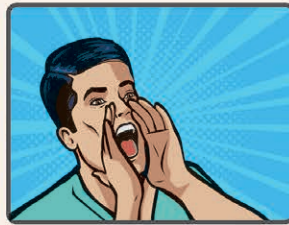
Complex Information for Anesthesiologists Presented Quickly and Clearly

MULTI-DIMENSIONAL ANESTHESIA

The Effects of Sevoflurane or Propofol with Remifentanyl

Kuizenga *et al.*¹ studied 36 subjects, using sevoflurane or propofol +/- remifentanyl, measuring 3 endpoints and the Patient State Index*

Calling by Name



Shake & Shout



Tetanic Stimulus



Remifentanyl and Response

Propofol

With low-dose propofol (<2.5 ug/ml), remifentanyl reduces response rate from 50% to <1%, when increased from 0 to 4 ng/ml.

Remifentanyl and Patient State Index

With propofol, remifentanyl has little effect on the Patient State Index when increased from 0 to 4 ng/ml.

Patient State Index and Response

With propofol, most respond at a Patient State Index of 60, few at 30; remifentanyl reduces the response.

Sevoflurane

With low-dose sevoflurane (<1.5%), remifentanyl reduces response rate, with diminishing returns above 2 ng/ml.

With sevoflurane, remifentanyl has no effect on the Patient State Index.

With sevoflurane, most **do not** respond at a Patient State Index of 60, almost none at 30; remifentanyl reduces this further.

*The Patient State Index (Masimo, USA) is a quantitative measure of anesthetic drug effect using processed EEG-derived indices.



These multidimensional interactions demonstrate the interplay between two hypnotics and one opioid; more research is needed to scale this understanding to include medications such as dexmedetomidine, ketamine, and lidocaine.²

EEG, electroencephalography.

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1. Kuizenga MH, Colin PJ, Reytjens KMEM, Touw DJ, Nalbat H, Knotnerus FH, Vereecke HEM, Struys MMRF: Population pharmacodynamics of propofol and sevoflurane in healthy volunteers using a clinical score and the Patient State Index: A crossover study. *ANESTHESIOLOGY* 2019; 131:1223–38
2. Sleight JW: The art of general anesthesia: Juggling in a multidimensional space. *ANESTHESIOLOGY* 2019; 131:1199–201