Despertar intraoperatorio en TIVA

4ª Reunión del GATIV
Málaga, 20.05.2011

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Madrid

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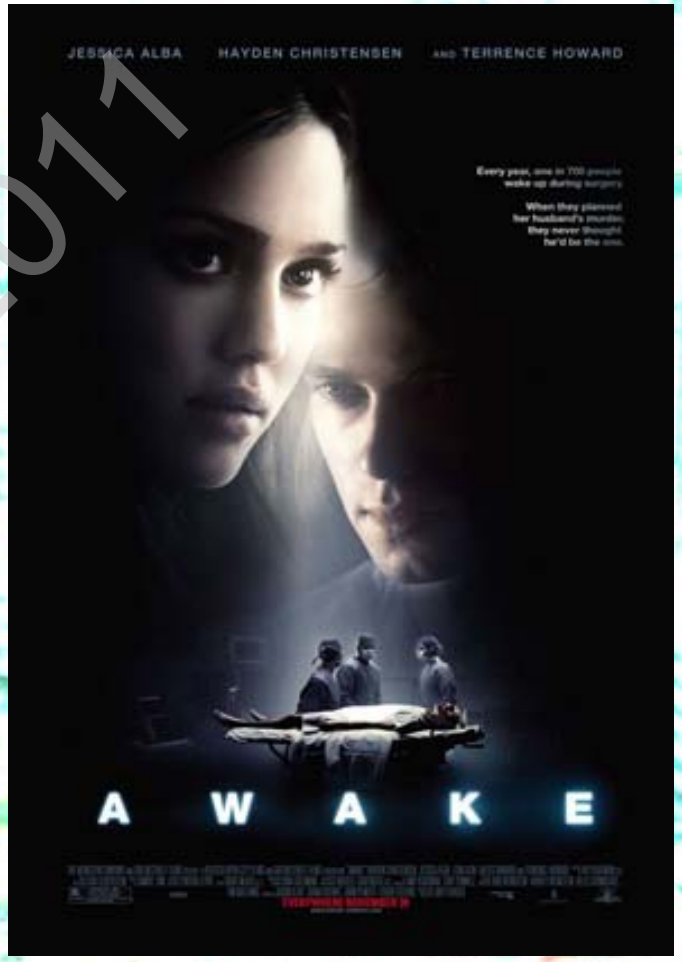
Preocupación de los pacientes "Despertar intraoperatorio" DIO

- Pre 1:2
- Post 1:4



Lennmarken C et al. Victims of awareness. Acta Anaesthesiol Scand. 2002;46:229-31

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Preocupación médica: “Cantidad”

- Primer caso con RNM en 1955
- “Planos anestésicos” del éter

Sandin RH, et al: Awareness during anaesthesia: A prospective case study. Lancet 1955;355:707,2000

Guedel 1957

Fase 1.- Analgesia:	•amnesia, analgesia y sedación completa. Respiración lenta y regular, reflejo de parpadeo. Demasiado superficial para la cirugía.
Fase 2.- Delirio (agitación):	•respiración irregular, actividad de los globos oculares, midriasis. Alto riesgo de actividad refleja de importancia clínica (vómito, arritmia, laringoespasmo).
Fase 3.- Anestesia quirúrgica:	•respiración con patrón variable, la actividad de los globos oculares va desapareciendo, miosis.
Fase 4.- Intoxicación:	•Parálisis respiratoria: no ventilación espontánea, midriasis arreactiva. Estado de sobredosis con alto riesgo de colapso cardiovascular.

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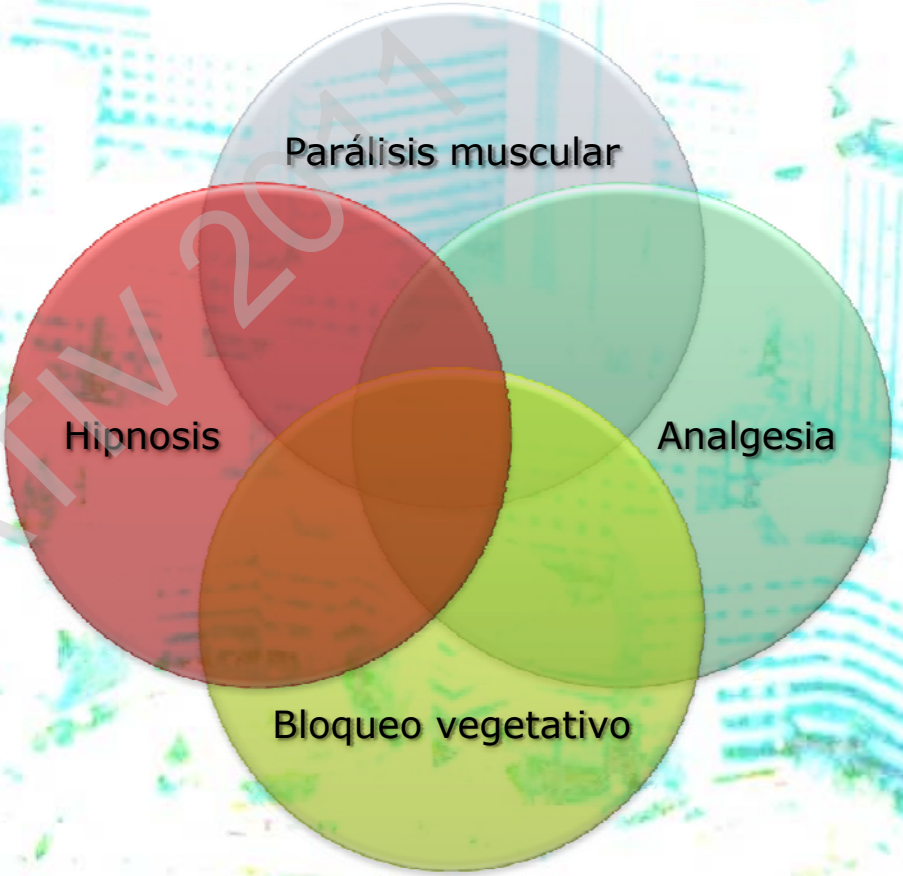
Preocupación médica: “Cualidad”



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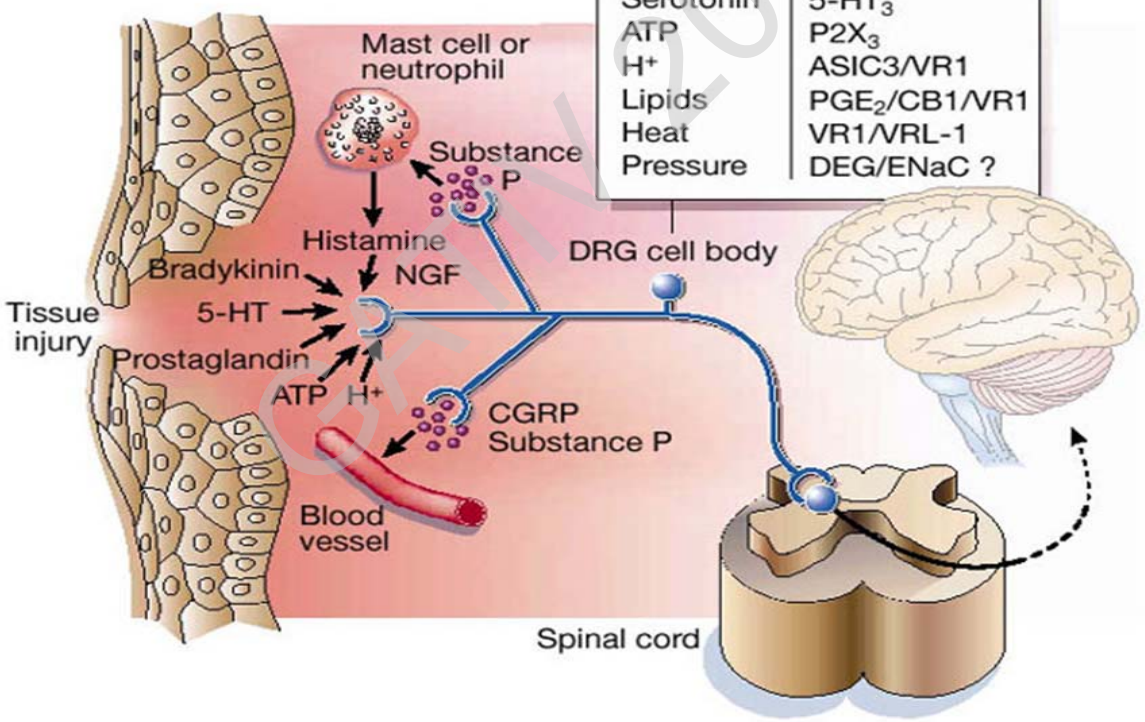
Kissin I. General anesthetic action: an obsolet notion? Anesth Analg 76:215-218, 1993

Nocicepción espinal: Asta posterior

Stimulus	Representative receptor
NGF	TrkA
Bradykinin	BK_2
Serotonin	$5\text{-}HT_3$
ATP	$P2X_3$
H^+	ASIC3/VR1
Lipids	PGE_2/CB1/VR1
Heat	VR1/VRL-1
Pressure	DEG/ENaC ?



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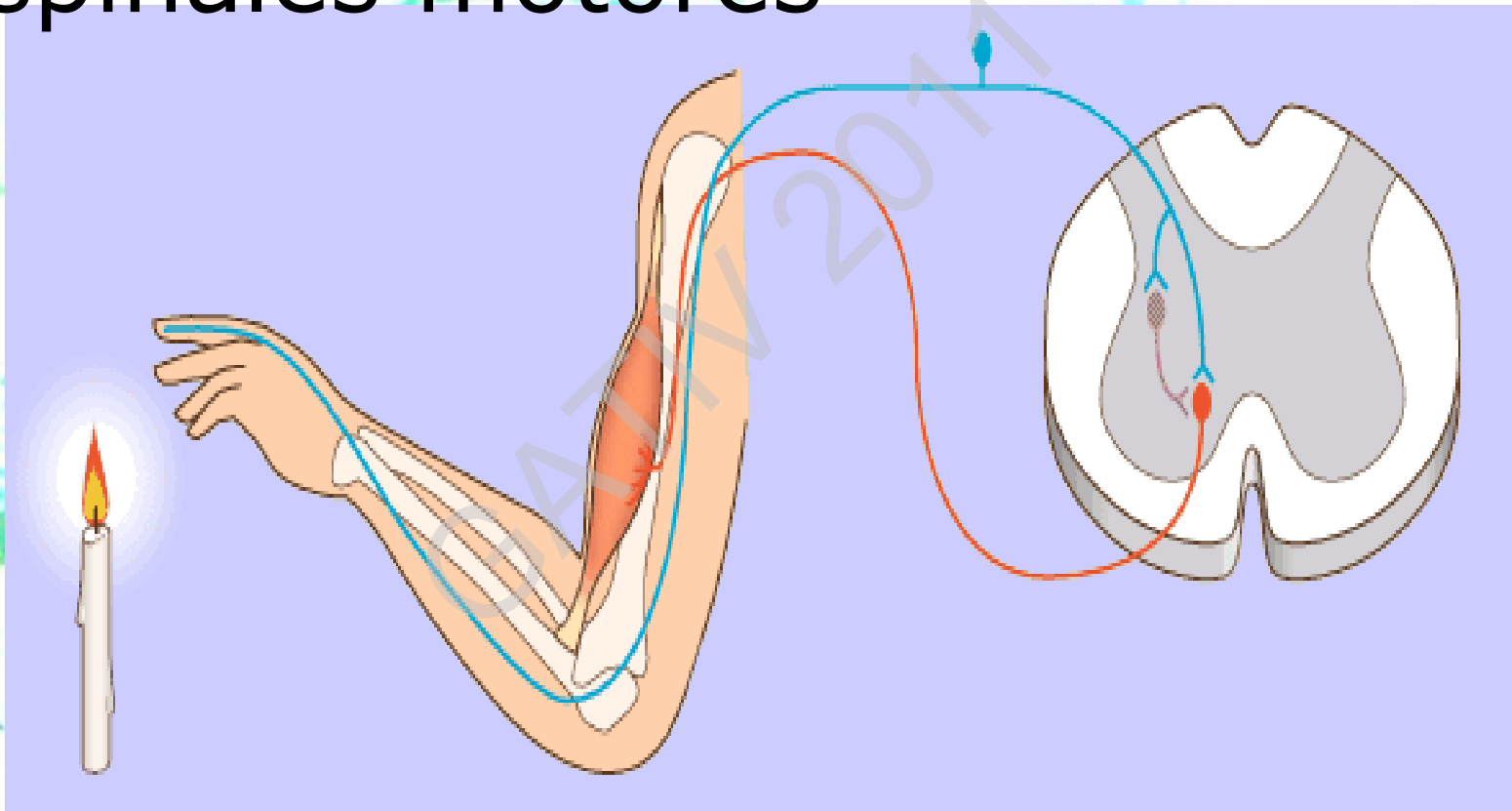
Nocicepción espinal: Reflejos espinales motores



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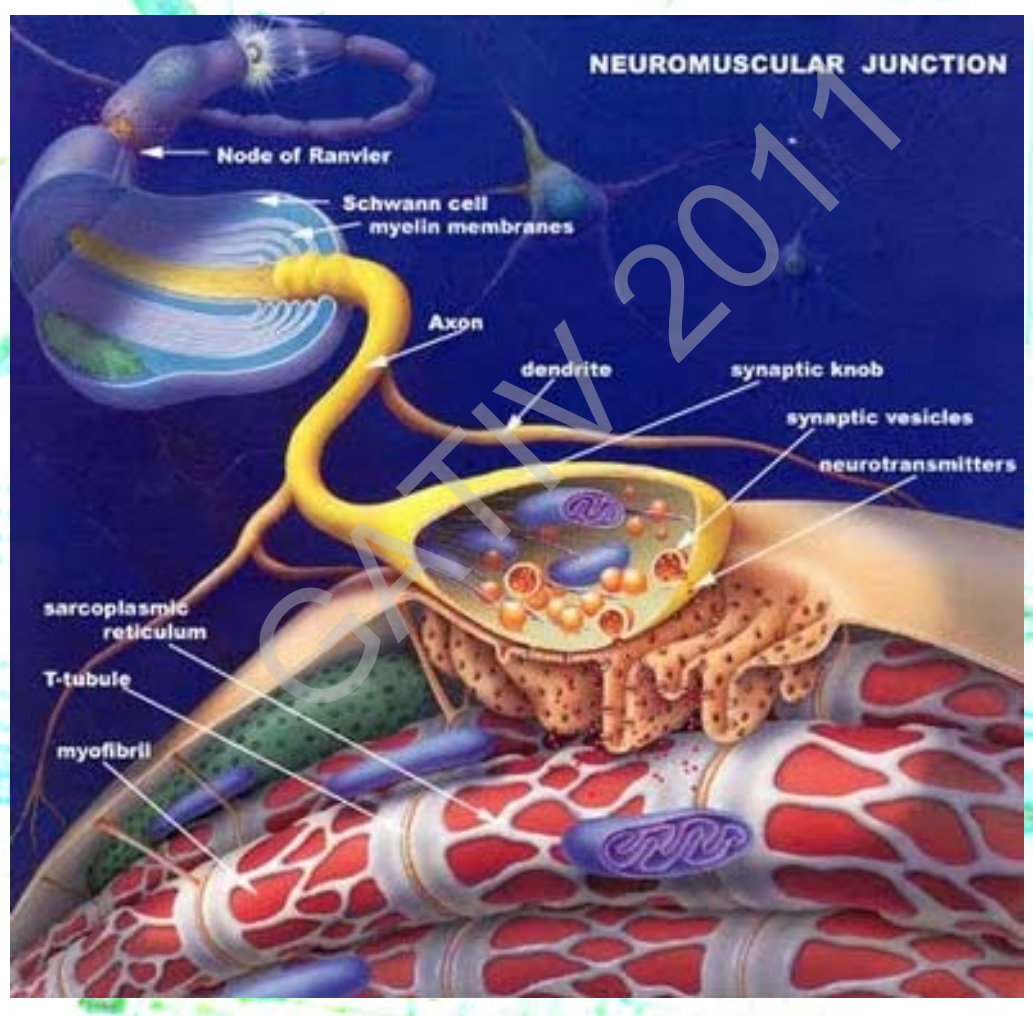
Garcia J et al. Anaesthetics Actions of Intrathecal Sevoflurane in Dogs. Br J Anaesth 2007:156: 46-51

RNM-Parálisis motora≠Analgesia



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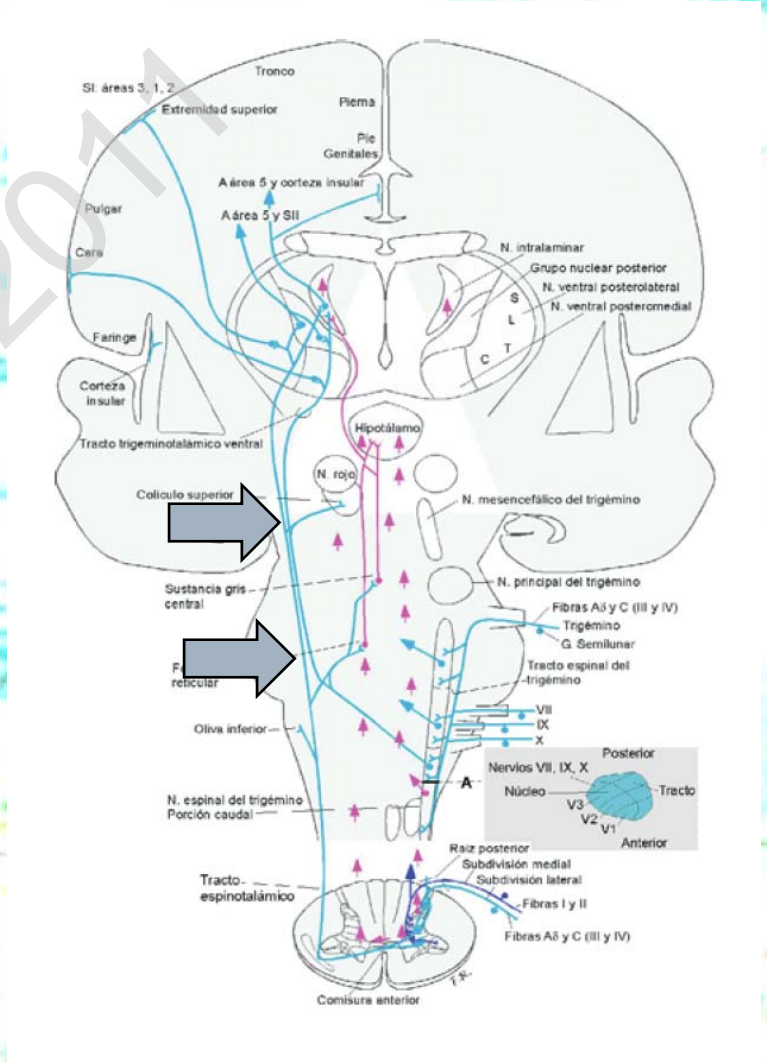
Reflejos vegetativos troncoencefálicos



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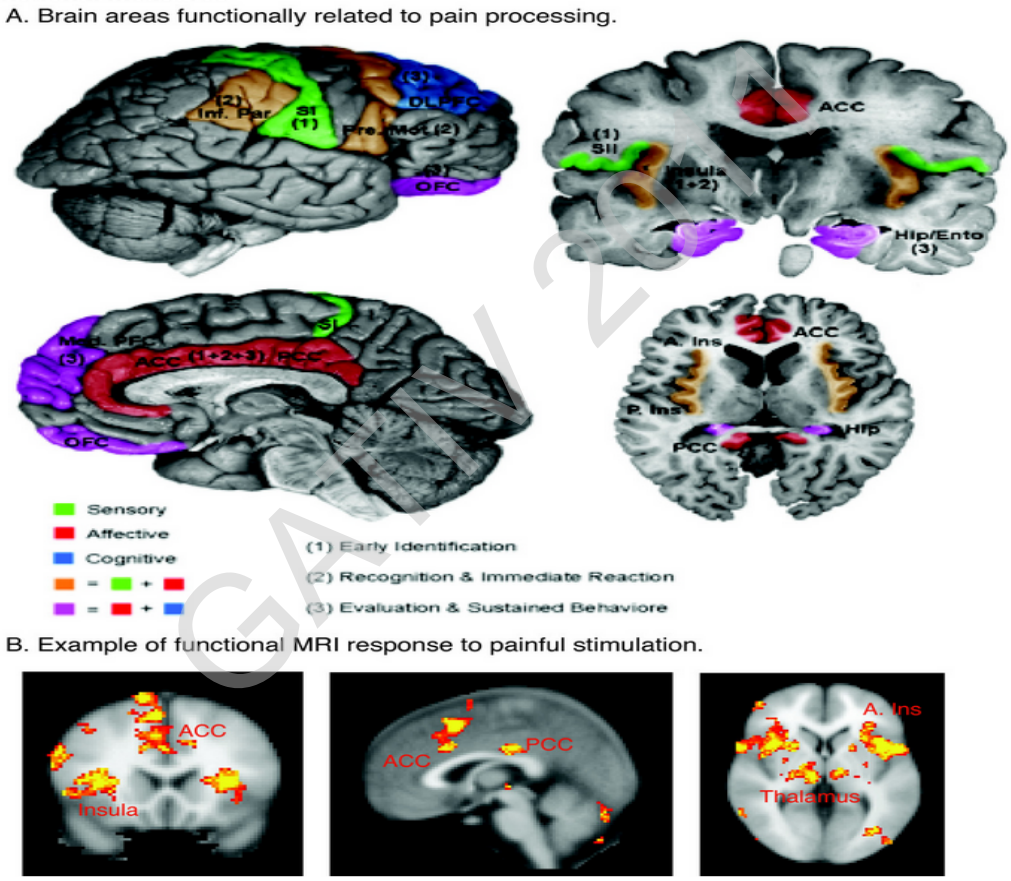
Nocicepción: Cortical



Reinoso-Barbero F et al. Effects of opiate microinjections in the nucleus of the solitary tract on the sleep-wakefulness cycle states in cats. Anesthesiology 1995; 82:144-152

Acciones corticales diferenciadas (Jones y Koniezko)

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Ghoneim MM et al: Learning and memory during general anesthesia, an update. Anesthesiology 87:387, 1997

Definición de DIO

Intraoperative Awareness Classification

Table 1. Michigan Awareness Classification Instrument
Class 0: No awareness
Class 1: Isolated auditory perceptions
Class 2: Tactile perceptions (e.g., surgical manipulation or endotracheal tube)
Class 3: Pain
Class 4: Paralysis (e.g., feeling one cannot move, speak, or breathe)
Class 5: Paralysis and pain

An additional designation of "D" for distress was also included for patient reports of fear, anxiety, suffocation, sense of doom, sense of impending death, etc.

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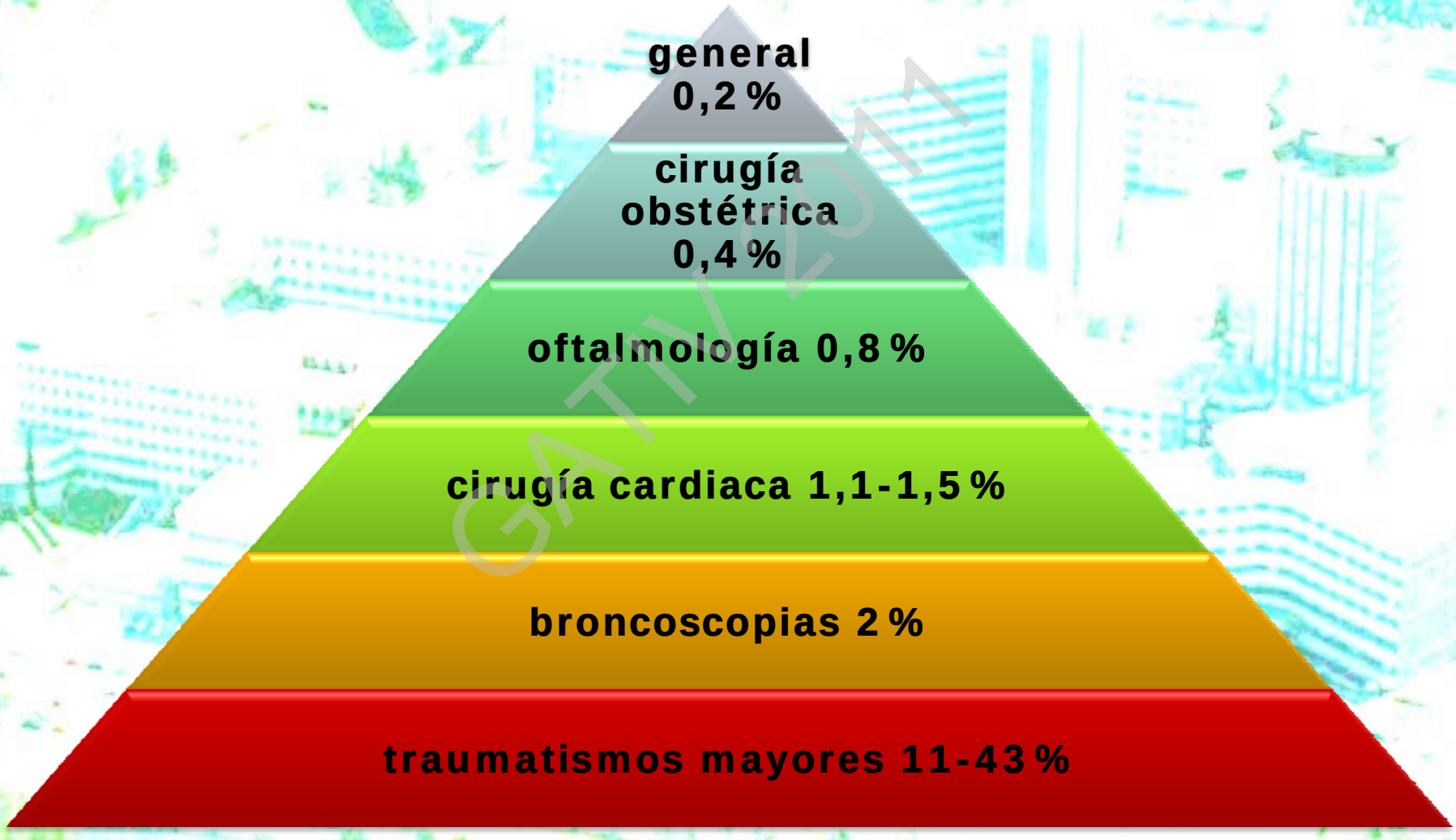
Incidencia de DIO



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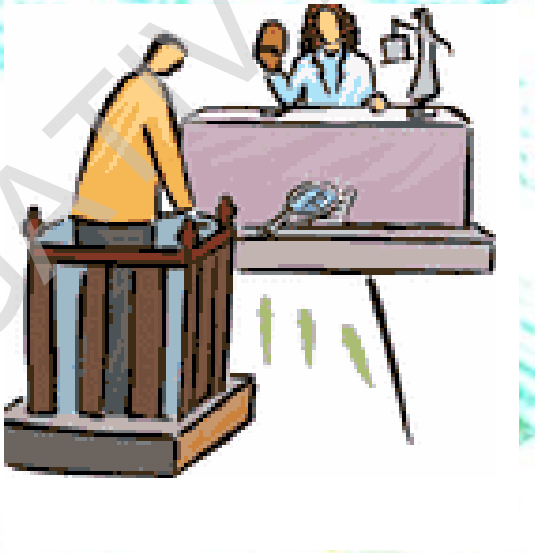
Reclamaciones médicolegales (2%)

Pacientes

- ASA I-II 68%
- Mujeres 77%
- Jóvenes < 60 años 89%

Cirugía electiva 87%



Técnica anestésica

- Opiáceos OD:2
- RNM OD:2,5
- TIVA: 3

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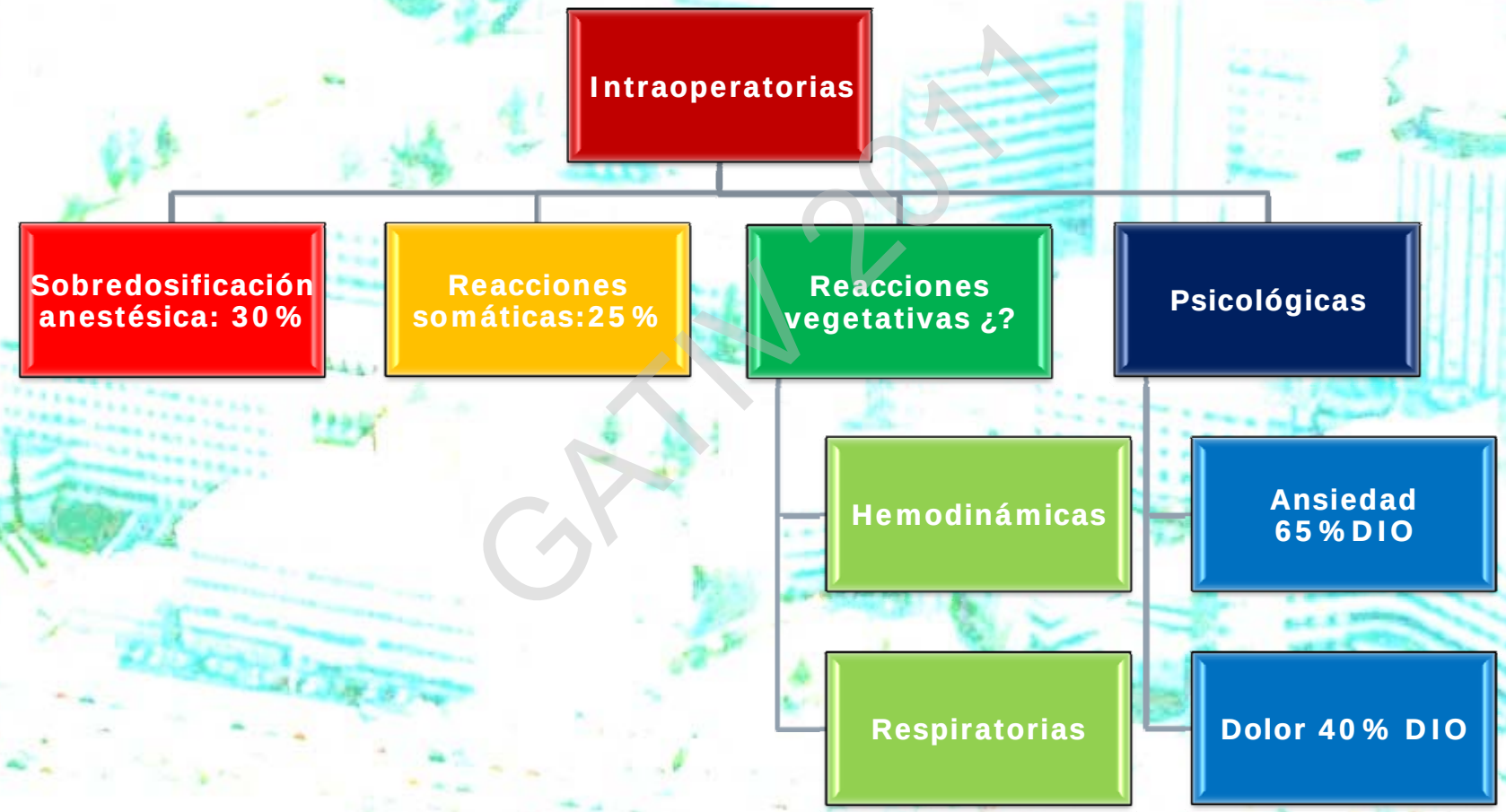
Consecuencias DIO

Consecuencias del DIO



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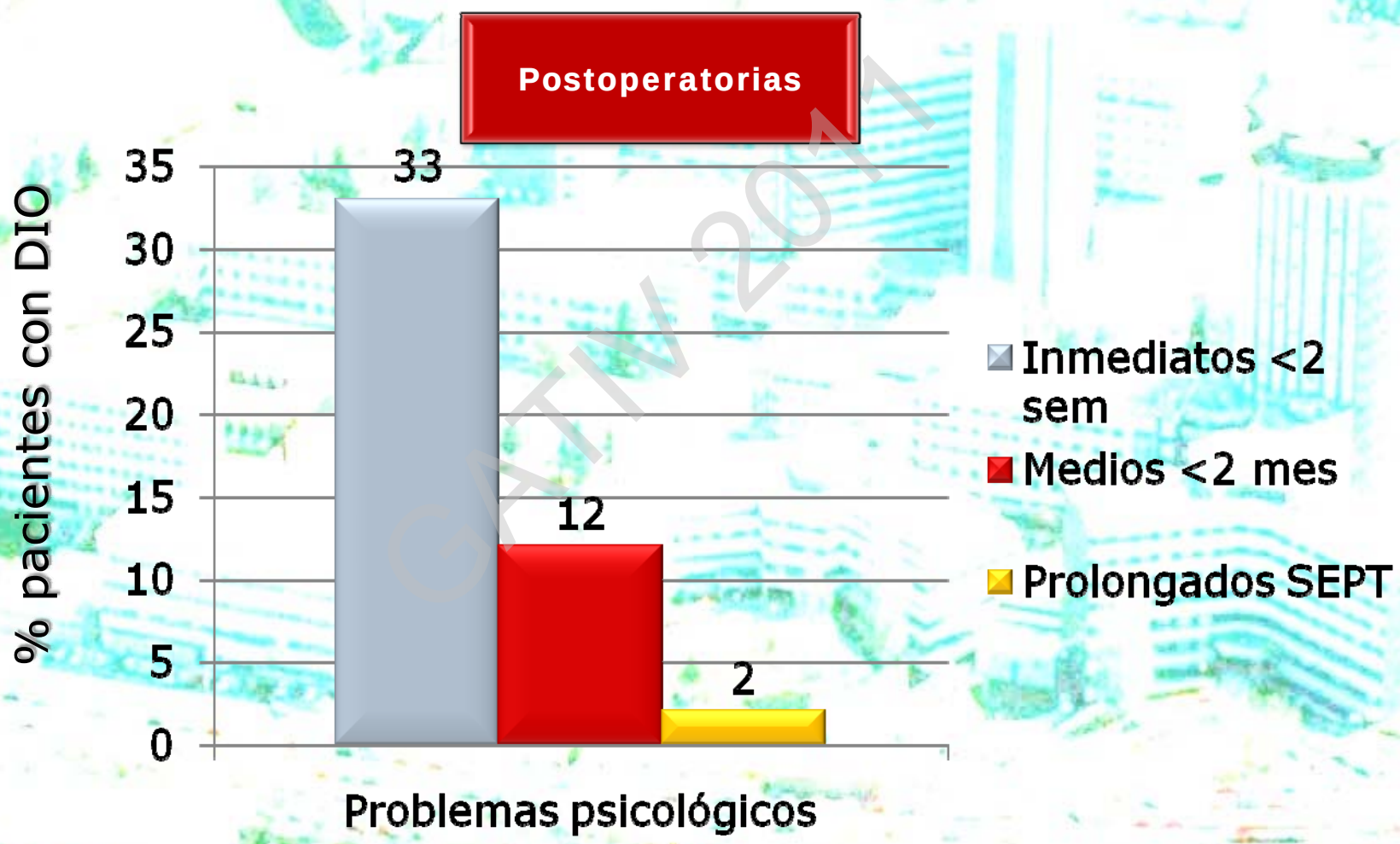
Consecuencias del DIO



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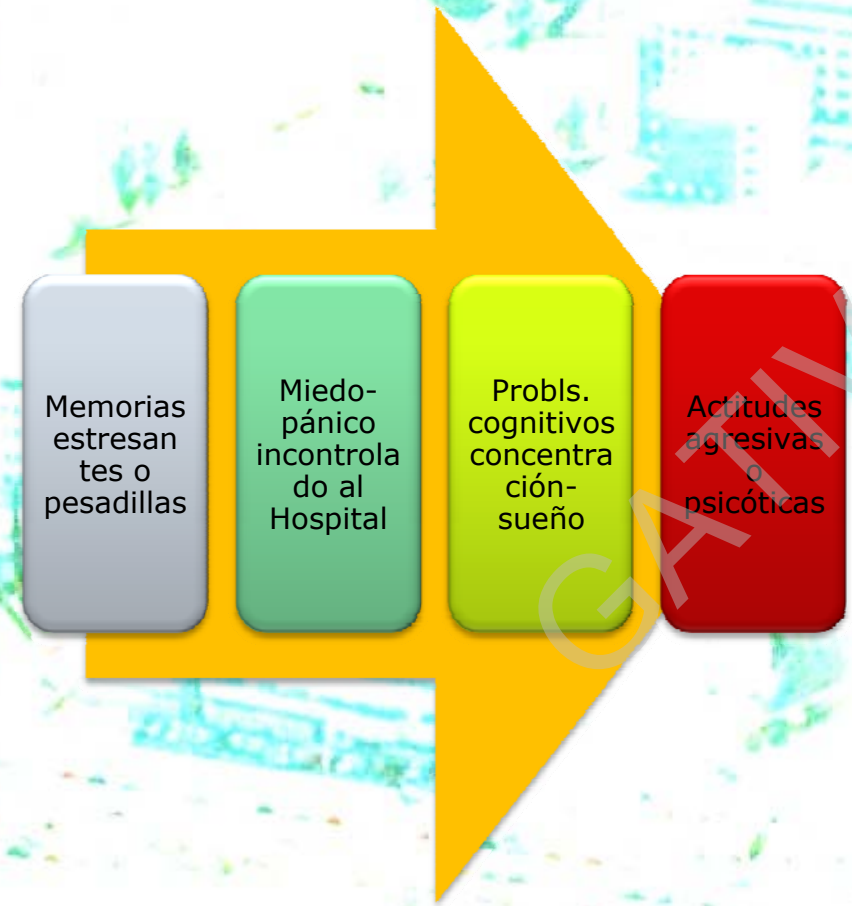
Síndr. Estrés Post-traumatico



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DIO en pediatría

Incidencia: 0.1-0.8%≥ adultos

Pocos efectos de estrés psiquiátrico

Encuesta a los anestesiólogos pediátricos europeos:

- 100% ET Sevo
- 27% 1 episodio de DIO
- 10% usaban BIS

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Blussé van Oud-Alblas HJ et al. Intraoperative awareness during paediatric anaesthesia. Br J Anaesth. 2009 Jan;102(1):104-10

Malviya S et al. The incidence of intraoperative awareness in children: childhood awareness and recall evaluation. Anesth Analg. 2009 Nov;109(5):1421-7

Engelhardt T et al. Awareness during pediatric anesthesia: what is the position of European pediatric anesthesiologists? Paediatr Anaesth. 2007 Nov;17(11):1066-70

DIO en pediatria-halogenados

Anaesthesia, 2007, **62**, pages 778–789

Intra-operative awareness in children: the value of an interview adapted to their cognitive abilities

U. Lopez,[1] W. Habre,[2] M. Laurençon,[1] G. Haller,[3] M. Van der Linden[4] and I. A. Iselin-Chaves[3]

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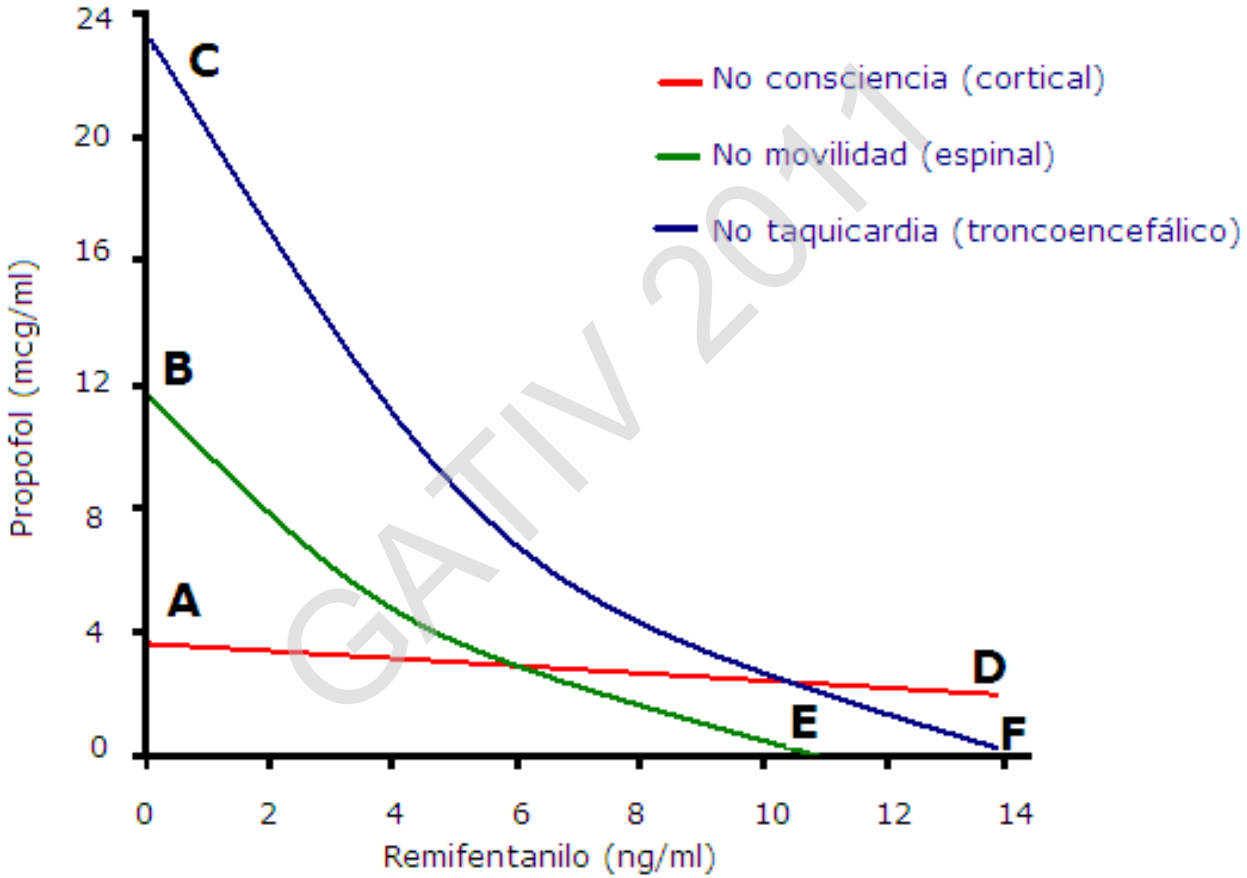
Table 3 Details of demographic, surgical and general anaesthesia data for children who experienced awareness.

	Demography						Anaesthesia								
Patient No.	Sex	Age; years	Weight; kg	Height; cm	ASA grade	Surgery	Duration of anaesthesia; min	Premedication	Induction	Maintenance	Nitrous oxide	NMB	LRA	Airways	Intra-operative complication
1	M	8.2	27	132	1	Orthopaedic surgery	95	Midazolam	Propofol	Isoflurane	Yes	Atracurium	None	ETT	None
2	F	10.8	40	152	1	Orthopaedic surgery	70	Midazolam	Propofol	Isoflurane	Yes	None	None	LMA	None
3	M	7.3	31.5	140	1	Orthopaedic surgery	115	Midazolam	Propofol	Isoflurane	Yes	Atracurium	None	ETT	Multiple intubations
4	M	9.5	32	132	1	Facial surgery	120	Midazolam	Propofol	Isoflurane	Yes	Atracurium	None	ETT	Multiple intubations
5	M	7.6	30	?	2	Plastic surgery	90	Midazolam	Propofol	Propofol + isoflurane	Yes	None	Yes	ETT	Multiple intubations
6	M	13.11	61	155	2	Orthopaedic surgery	145	Midazolam	Propofol	Desflurane	Yes	Atracurium	None	ETT	None
7	M	16.1	82.5	195	1	Orthopaedic surgery	90	Midazolam	Propofol	Propofol + isoflurane	Yes	None	None	LMA	Multiple attempts at laryngeal mask airway insertion
8	M	14.11	43	140	2	Orthopaedic >surgery	360	Midazolam	Propofol	Isoflurane	Yes	Atracurium	Yes	ETT	None
9	M	7.3	24	123	2	Urological surgery	55	Midazolam	Sevoflurane	Isoflurane	Yes	None	Yes	LMA	None
10	M	6.11	23.7	121	1	Orthopaedic surgery	50	Midazolam	Sevoflurane	Isoflurane	Yes	None	None	FM	None
11	F	8.10	27.4	128	1	Plastic surgery	60	None	Sevoflurane	Propofol + isoflurane	No	None	Yes	LMA	Multiple intubations

ASA, American Society of Anesthesiologists; ETT, tracheal intubation; FM, facial mask; LRA, locoregional anaesthesia; NMB, neuromuscular block.

Interacción farmacológica

Interacción farmacológica



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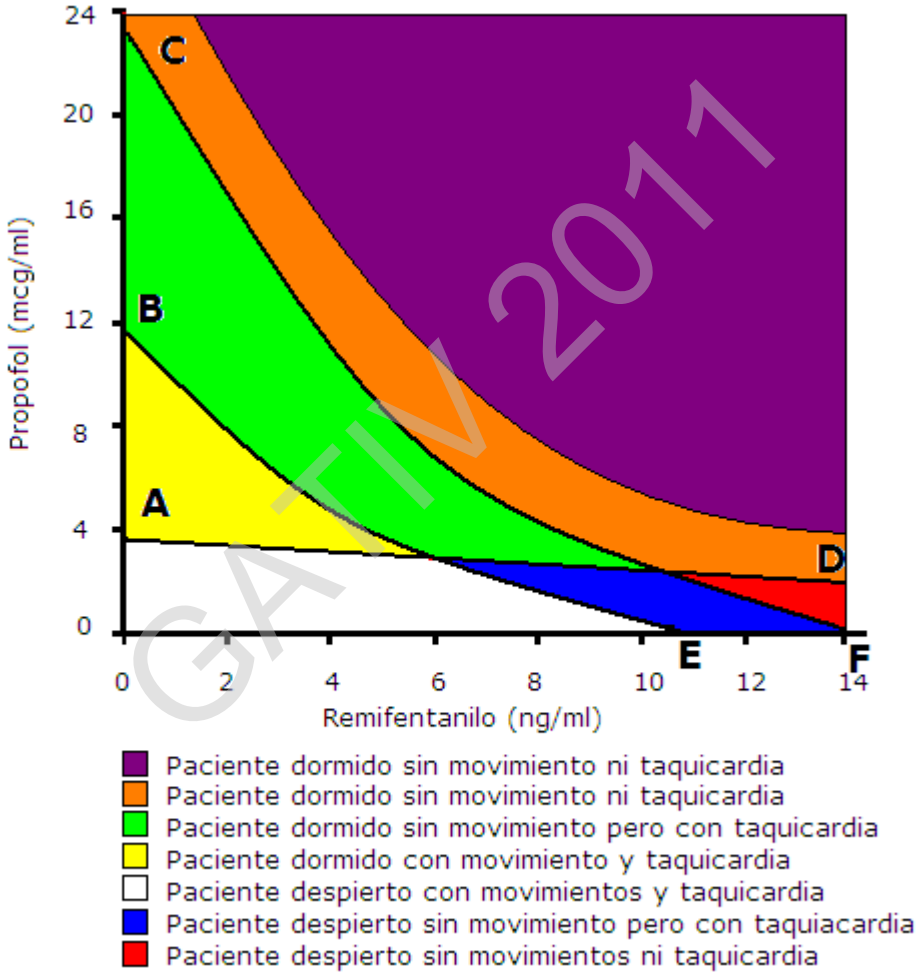
Kazama T, Ikeda K, Morita K. The pharmacodynamic interaction between propofol and fentanyl with respect to the suppression of somatic or hemodynamic responses to skin incision, peritoneum incision, and abdominal wall retraction. Anesthesiology 89:894-906, 1998

Interacción farmacológica



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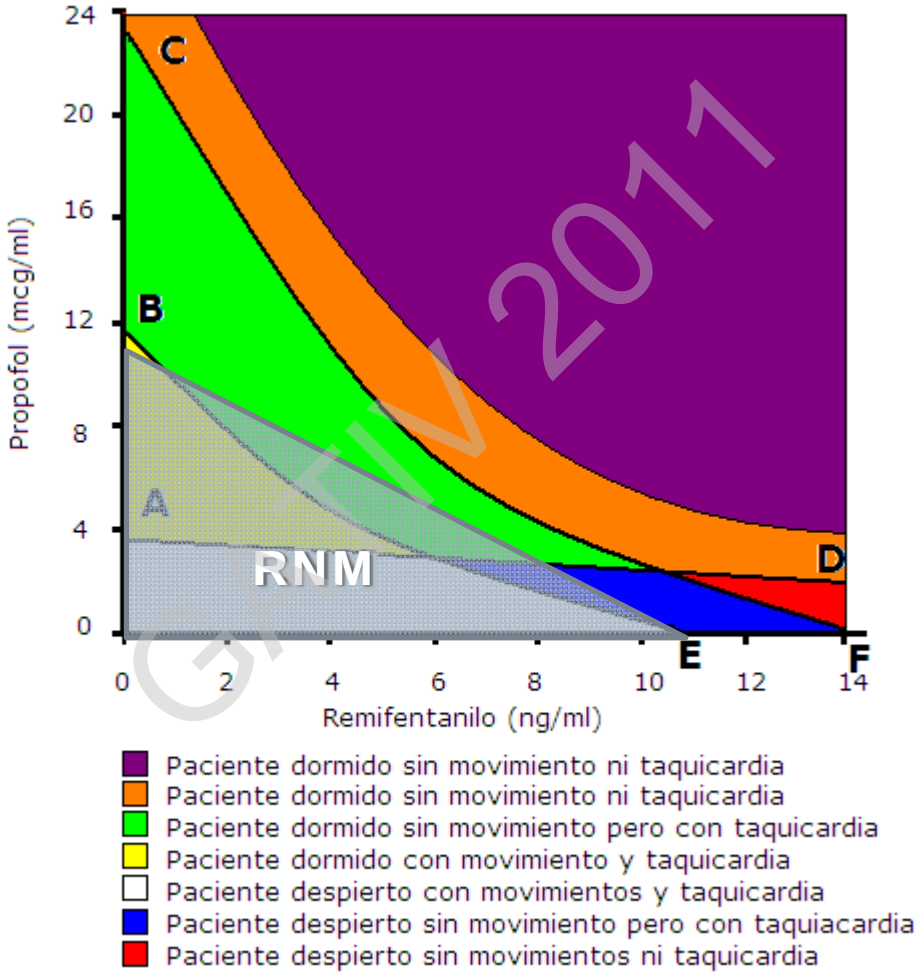
Interacción farmacológica: RNM



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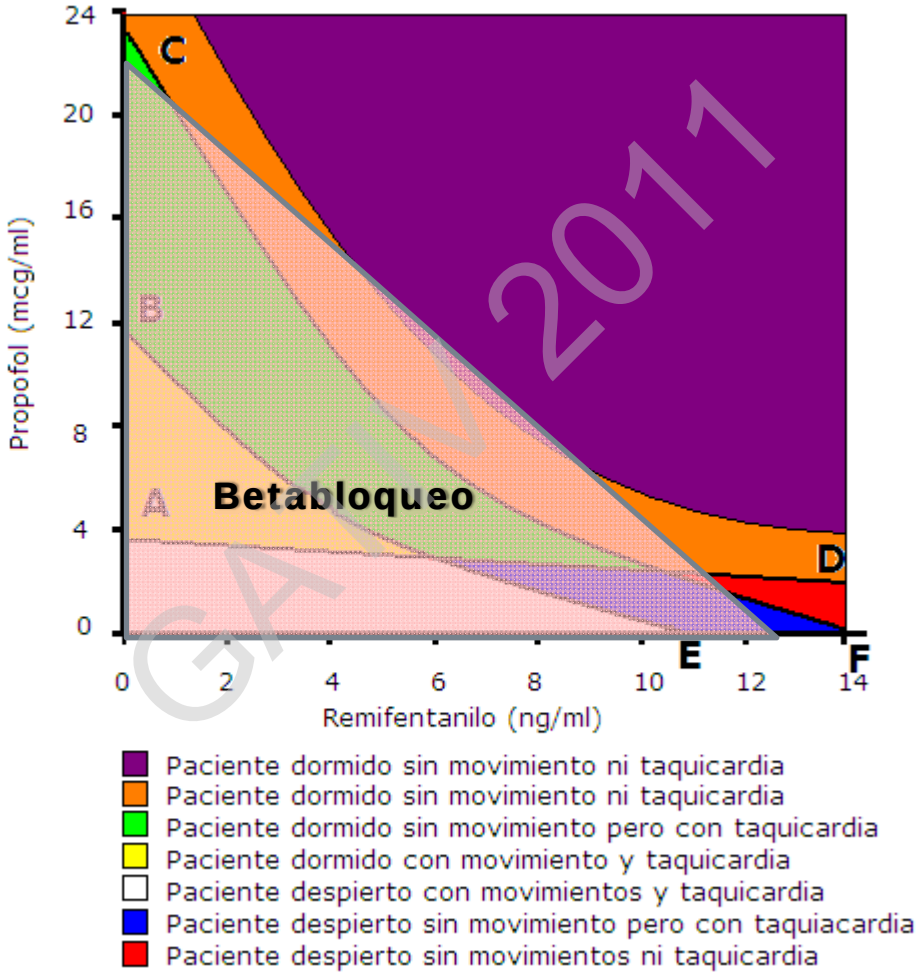
Sebel PS, Bowdle TA, Ghoneim MM, Rampil IJ, Padilla RE, Gan TJ, Domino KB. The incidence of awareness during anesthesia: a multicenter United States study. Anesth Analg. 2004;99:833-9

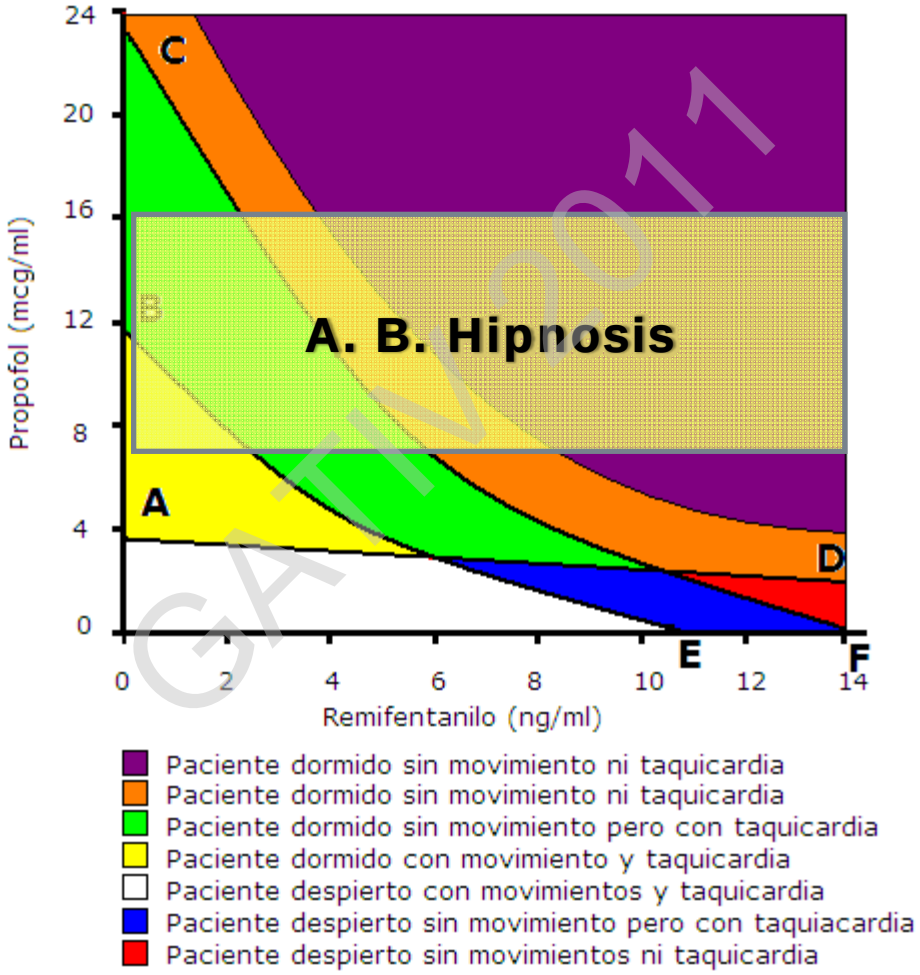
Interacción farmacológica: Betabloqeantes, otros



GAIV 2011

Johansen JW: Esmolol promotes electroencephalographic burst supprission during propofol/alfentanil anesthesia. Anesth Analg 93:1526, 2002

Interacción farmacológica:Propofol



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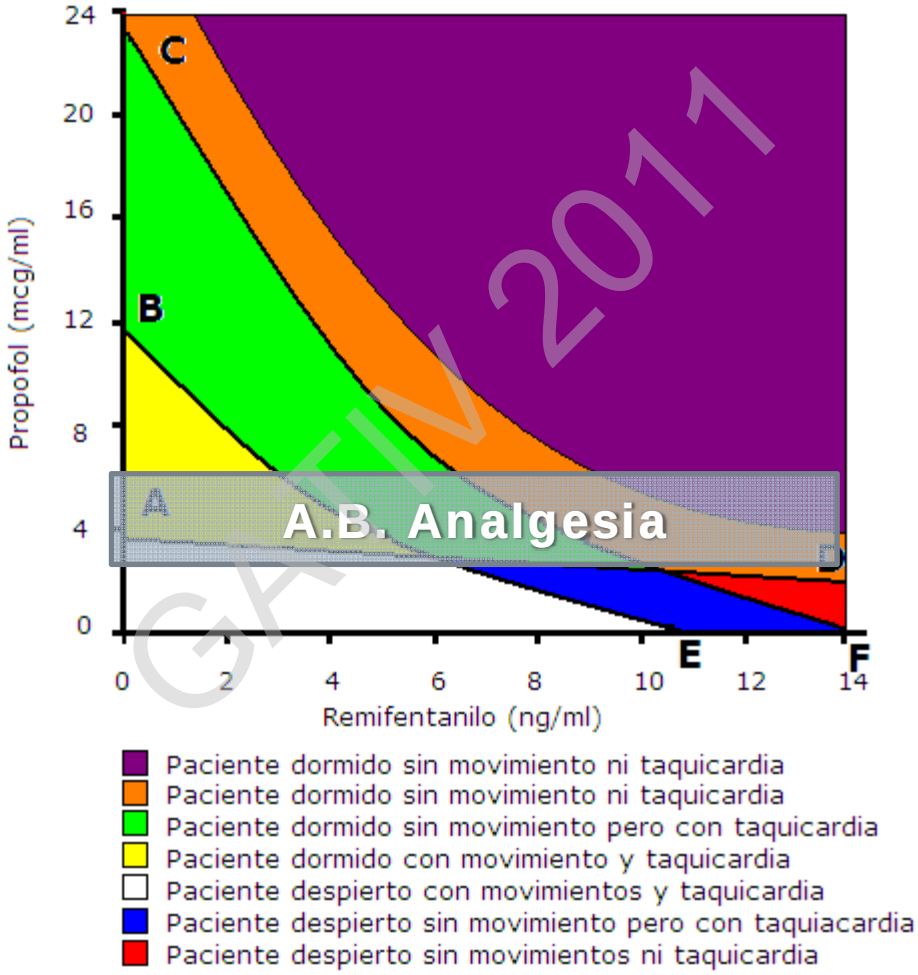
Interacción farmacológica:Opiáceos



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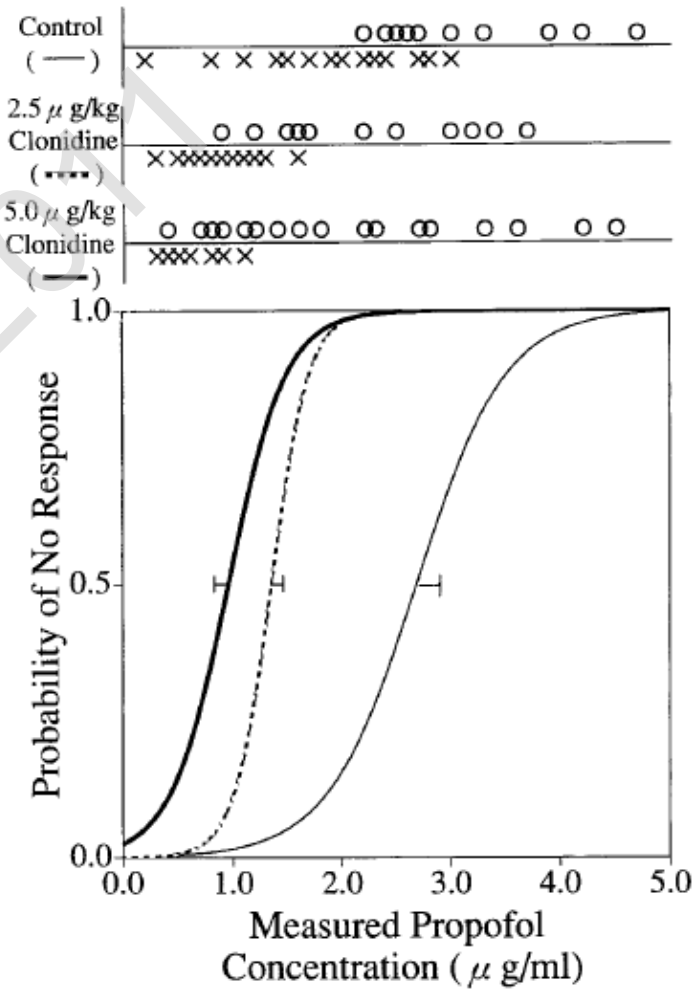
Interacción farmacológica:Individuo

ANESTHESIA & ANALGESIA

The Interaction Between Propofol and Clonidine for Loss of Consciousness

Hideyuki Higuchi, MD*, Yushi Adachi, MD†, Albert Dahan, MD, PhD‡, Erik Olofsen, MSc‡, Shinya Arimura, MD*, Tomohisa Mori, MD*, and Tetsuo Satoh, MD†

*Department of Anesthesia, Self Defense Force Central Hospital, Tokyo; Departments of Anesthesiology, †National Defense Medical College, Saitama, Japan; and ‡Leiden University Medical Center, Leiden, The Netherlands



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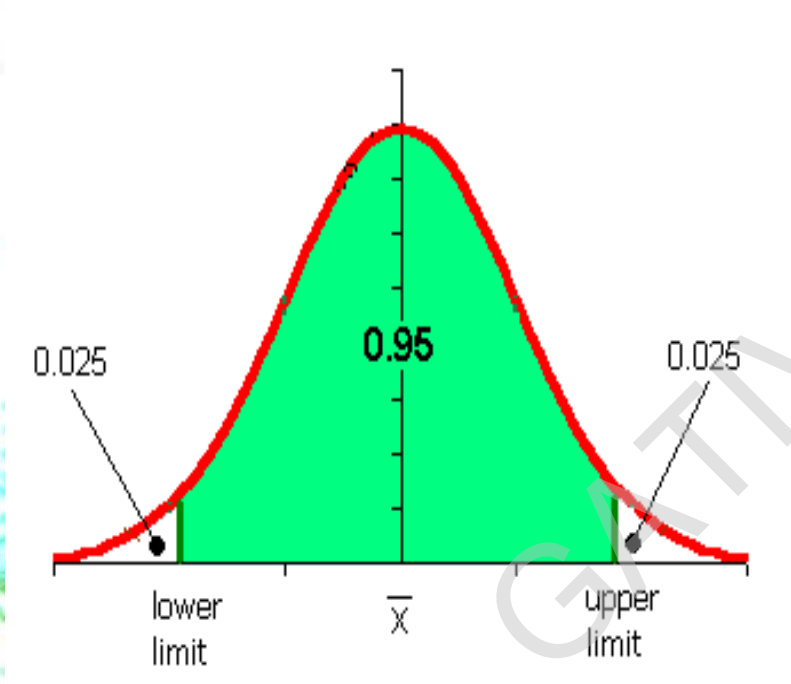
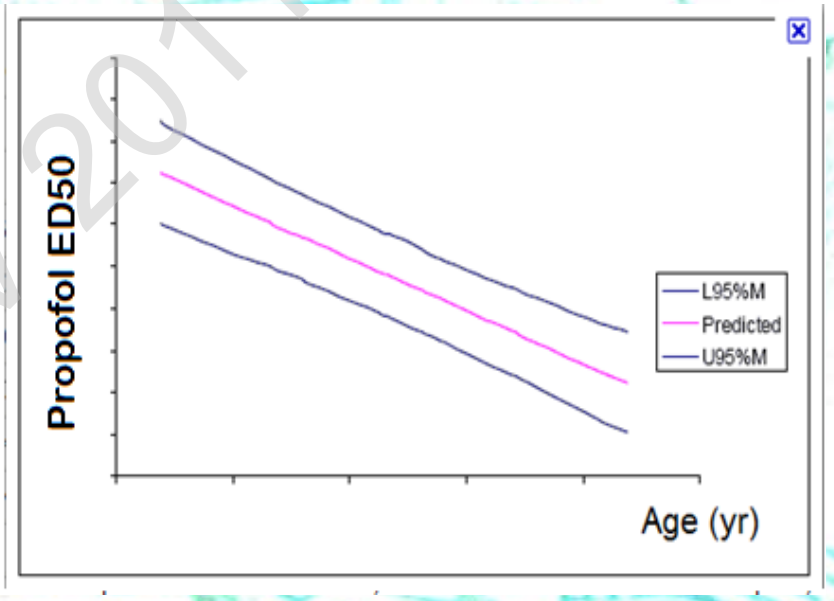
Variabilidad interindividual





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Prevención del DIO

Target Controlled Infusion

Técnica anestésica

- Evitar RNM
- “Balance” componentes

Monitor de hipnosis EEG

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Prevención del DIO

Monitor de hipnosis BIS

Reduce 5 veces la incidencia

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The Lancet, Volume 363, Issue 9423, Pages 1757 - 1763, 29 May 2004
doi:10.1016/S0140-6736(04)16300-9 Cite or Link Using DOI

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Bispectral index monitoring to prevent awareness during anaesthesia: the B-Aware randomised controlled trial

Dr PS Myles MBBS a b c d, K Leslie MBBS e f, J McNeil MBBS c d, A Forbes PhD c d, MTV Chan MBBS g, for the B-Aware trial group

Participatin members listed at end of paper

BIS en encefalopatías

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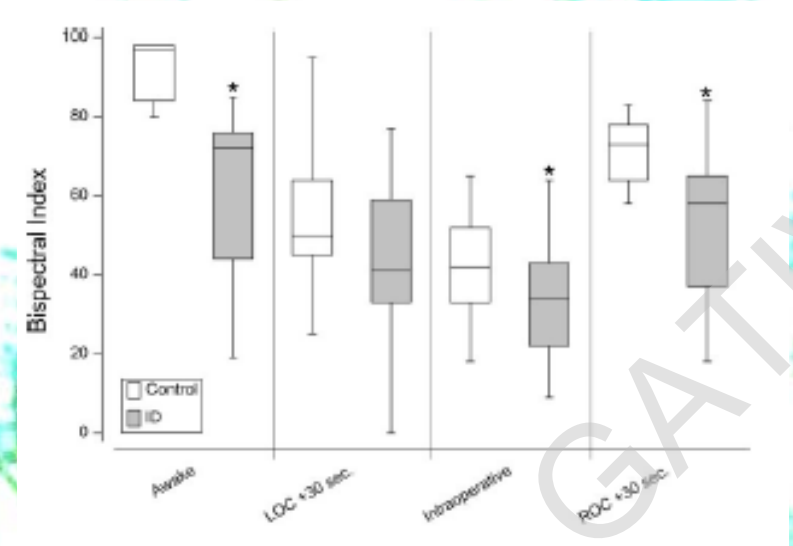
Ponnudurai RN et al. A prospective study of bispectral index scoring in mentally retarded patients receiving general anesthesia. J Clin Anesth. 2010 Sep;22(6):432-6

Valkenburg AJ et al. Extremely low preanesthetic BIS values in two children with West syndrome and lissencephaly. Paediatr Anaesth. 2008 May;18(5):446-8

Lower Bispectral Index Values in Children Who Are Intellectually Disabled

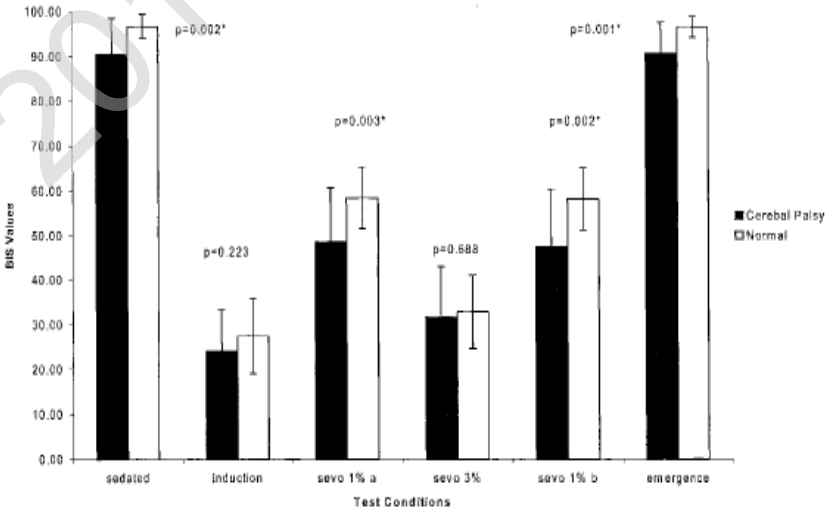
(Anesth Analg 2002;102:1428–33)



Bispectral Index Monitoring: A Comparison Between Normal Children and Children with Quadriplegic Cerebral Palsy

Dinesh K. Choudhry, MD, FRCA, and B. Randall Brenn, MD
Department of Anesthesiology and Critical Care, Alfred I. duPont Hospital for Children, Wilmington, Delaware

(Anesth Analg 2002;95:1582–5)



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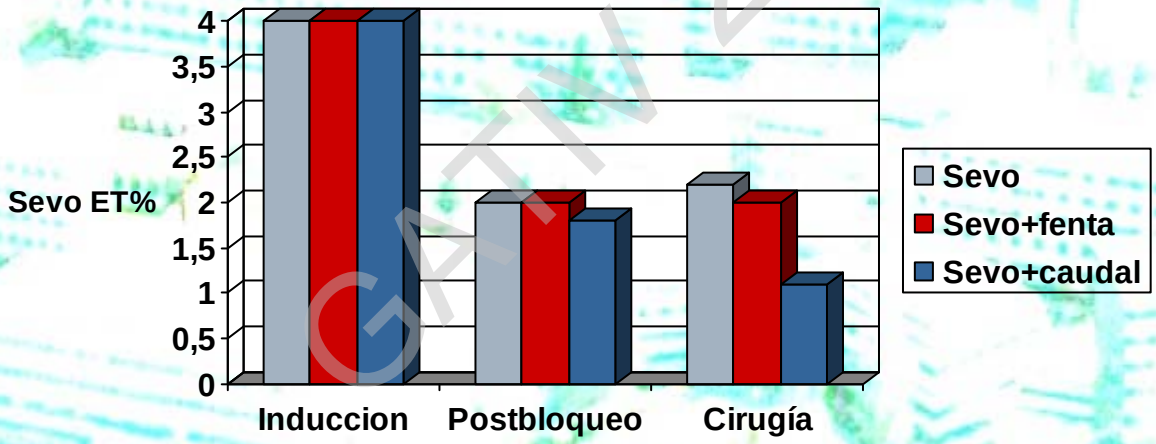
BIS en anestesia combinada

Epidural disminuye BIS 5 ptos

Epidural disminuye hipnóticos para BIS-50



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Davidson AJ et al. The effects of caudal local anesthesia blockade on the Bispectral Index during general anesthesia in children. Paediatr Anaesth. 2006 Aug;16(8):828-33

Reinoso-Barbero F et al. The effect of epidural bupivacaine on maintenance requirements of sevoflurane evaluated by bispectral index in children. Eur J Anaesthesiol. 2006 Jun;23(6):460-4.

Kim SH et al. Effect of caudal block on sevoflurane requirement for lower limb surgery in children with cerebral palsy. Paediatr Anaesth. 2011 Apr;21(4):394-8

Tratamiento del DIO

Intraoperatorio

- Profundizar anestesia
- Benzodiacepinas

Postoperatorio

- Aceptación
- Apoyo psicológico

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Conclusiones

- El DIO es una complicación infrecuente 1:500 anestesias
- El DIO grave produce secuelas psicológicas permantentes 1:10000 anestesias
- El DIO puede ser prevenido con una técnica anestésica de calidad

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