Monitorage périopératoire de l'analgésie

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Lyon

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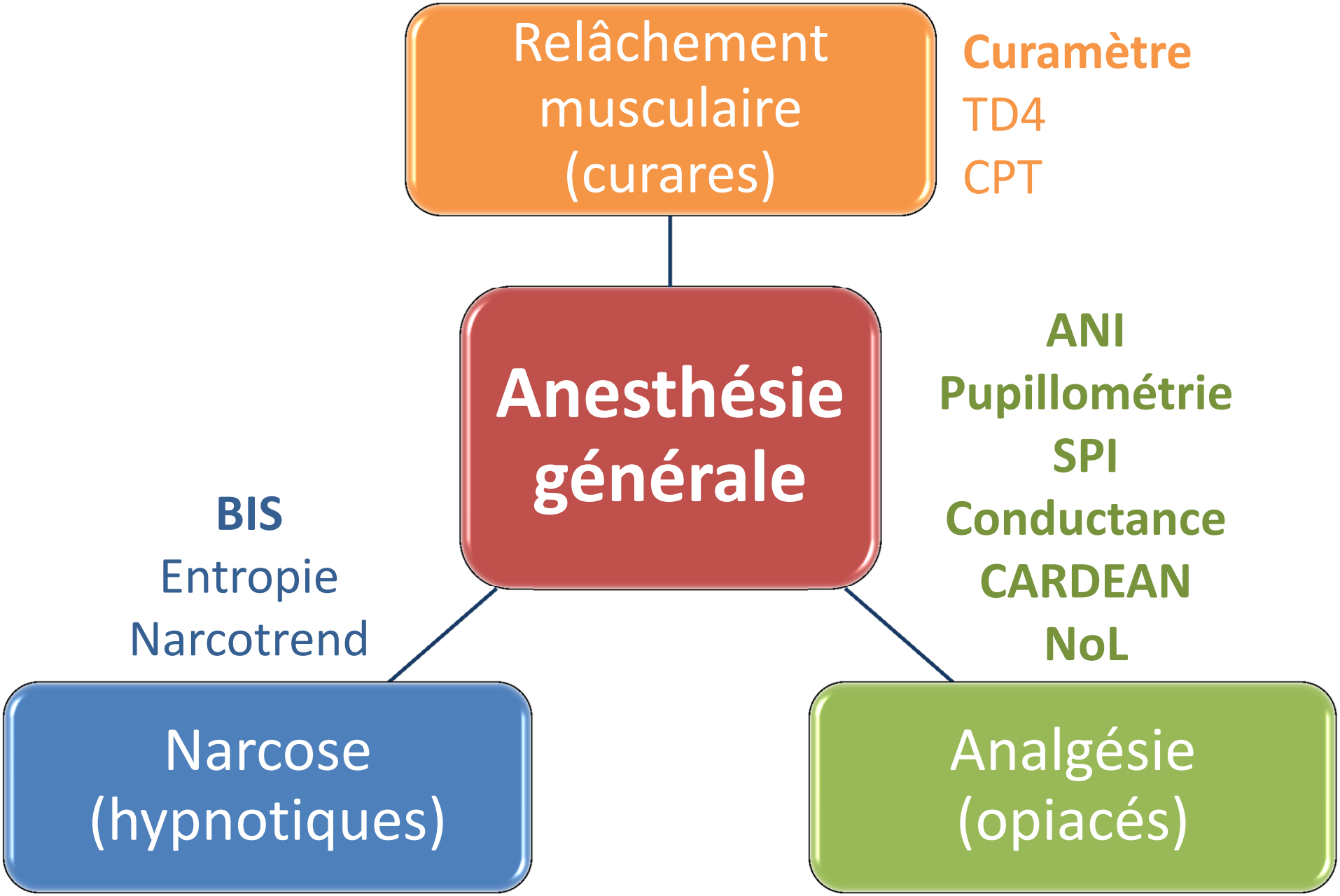
19 novembre 2015

UNIVERSITÉ DE LYON

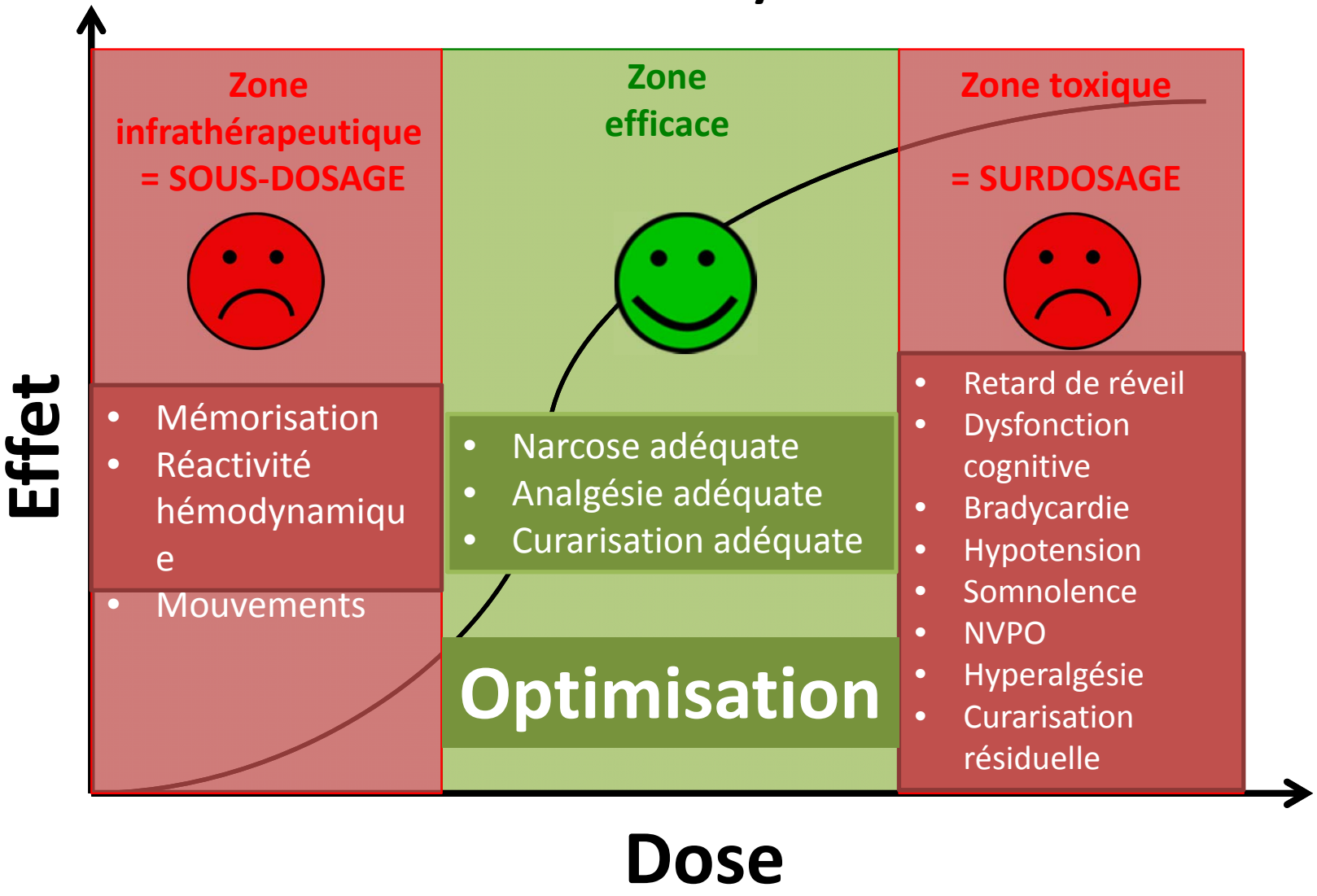
Liens d’intérêt

- Baxter
- B-Braun
- Gamida
- MDoloris Medical Systems
- Nordic Pharma
- Schering-Plough
- Sonosite
- Vygon


Relâchement musculaire (curares)
Curamètre
TD4
CPT
Anesthésie générale
ANI
Pupillométrie
SPI
Conductance
CARDEAN
NoL
BIS
Entropie
Narcotrend
Narcose (hypnotiques)
Analgésie (opiacés)

Pourquoi monitorer ?

Pharmacodynamie



Monitorage analgésie

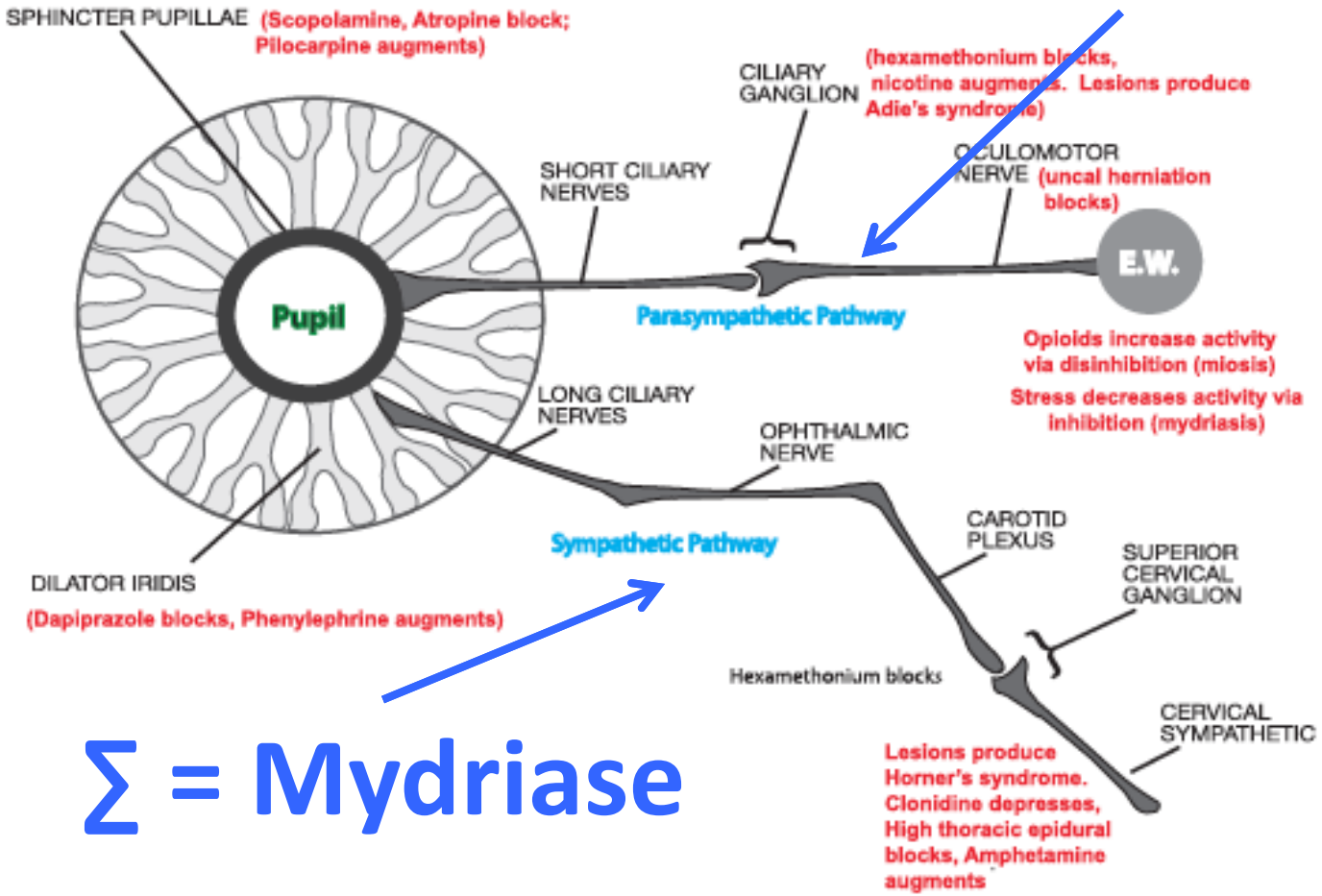
Balance nociception/antinociception

Pupillométrie

Larson MD et coll. Anesth Analg 2015;120:1242-53

Principe pupillométrie

Para∑ = Myosis



∑ = Mydriase

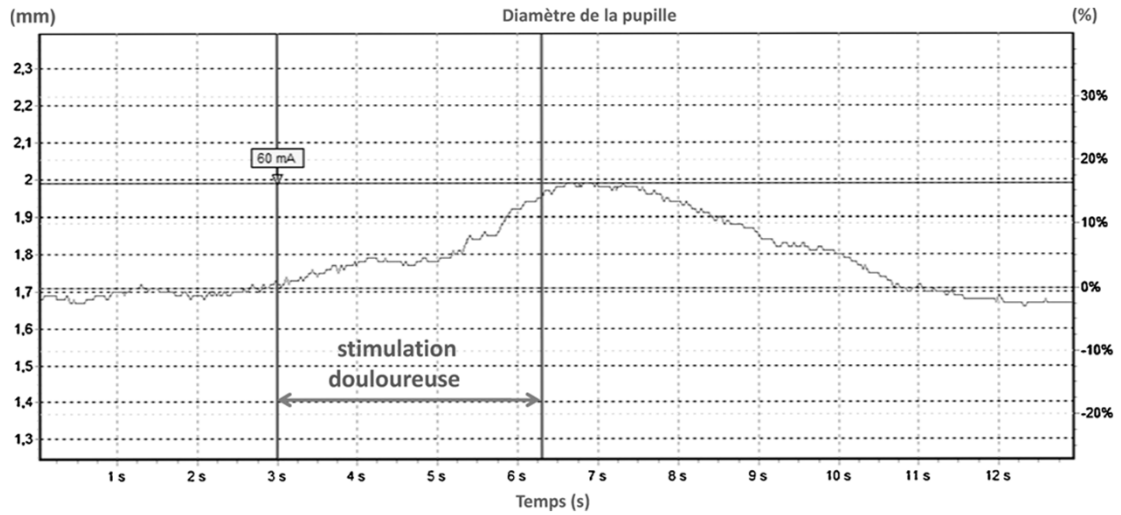
Larson MD et coll. Anesth Analg 2015;120:1242-53

Limites

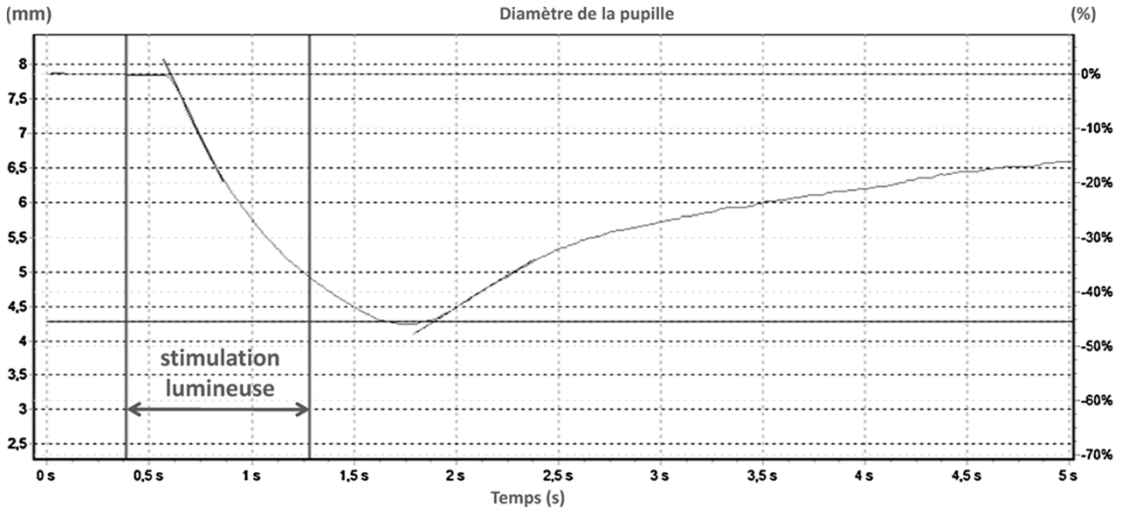
- Altérations SNA :
  - Médicamenteuses
  - Dysautonomie, âge avancé...
- Mesures intermittentes
- Stimulation
- Accès à la tête
- Lésions oculaires

Variations diamètre pupillaire

Réflexe de dilatation pupillaire (RDP)



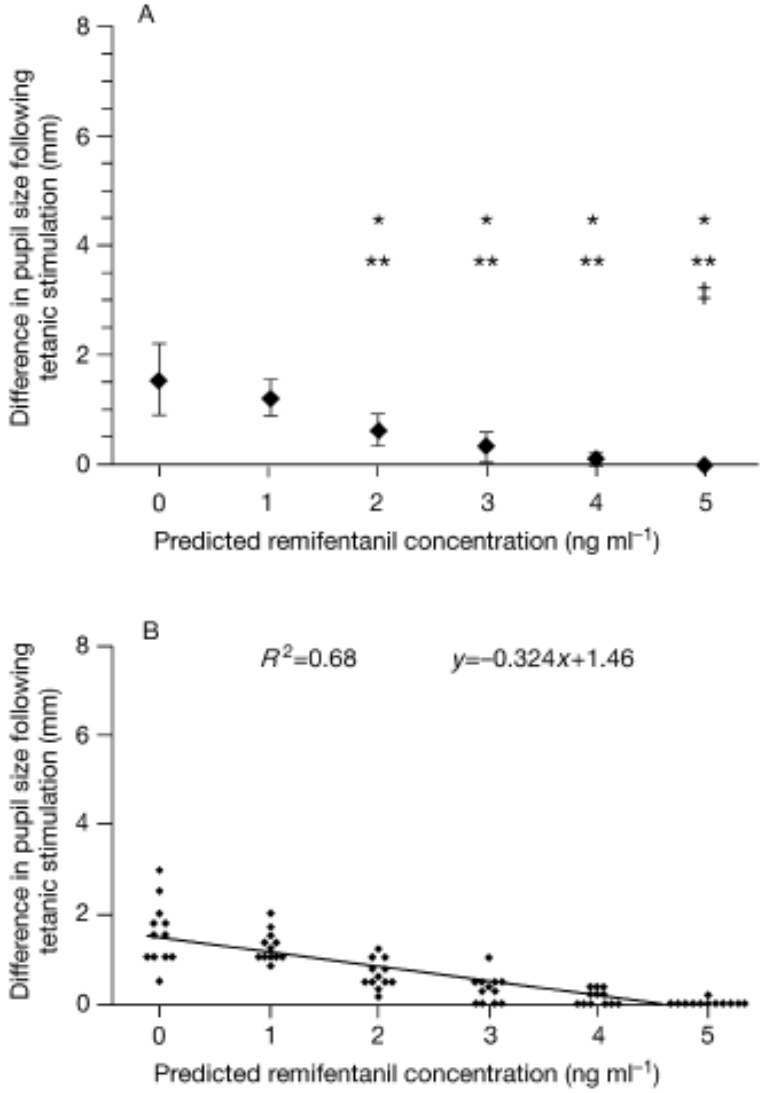
Réflexe photomoteur (RPM)



Larson MD et coll. Anesth Analg 2015;120:1242-53

Effet stimulation nociceptive

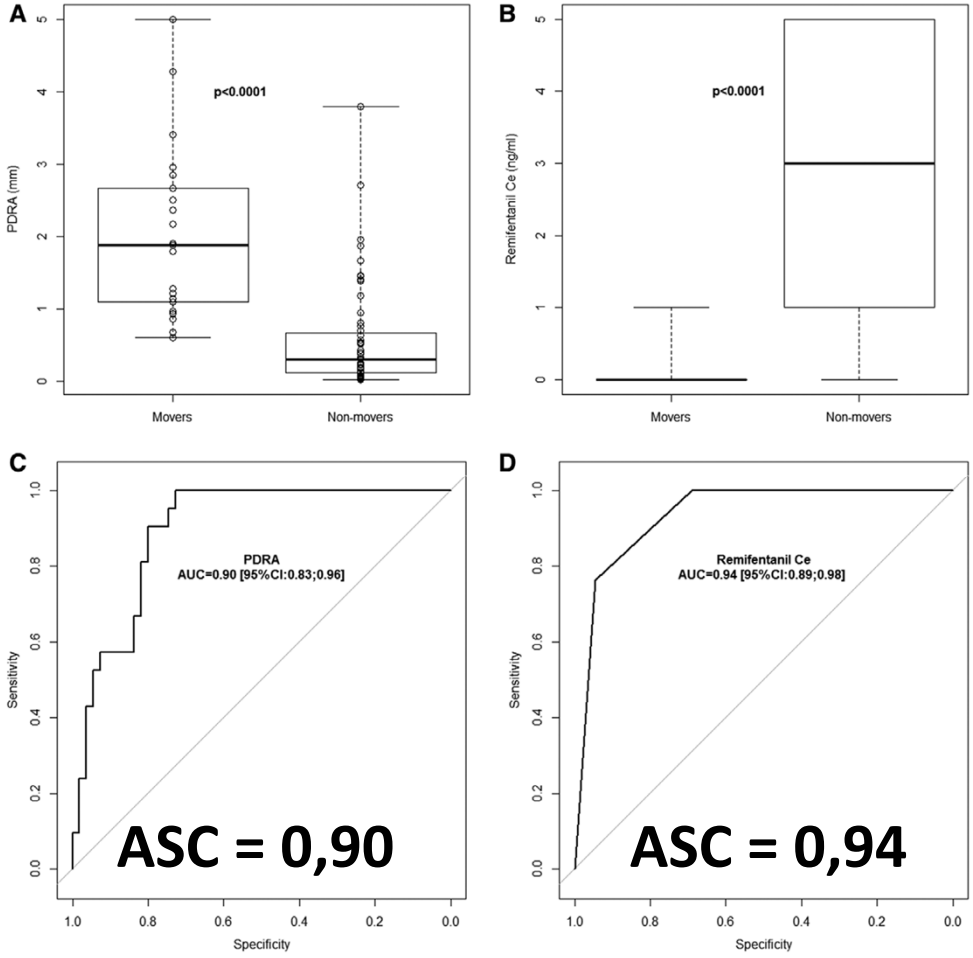
- 12 patients ASA I-II
- AIVOC :
  - propofol 3 mg/mL
  - rémifentanil C_e croissantes
- Stimulation tétanique ulnaire :
  - 100 Hz
  - 60 mA
  - 10 s



Barvais L et coll. Br J Anaesth 2003;91:347-52

Prédiction mouvement

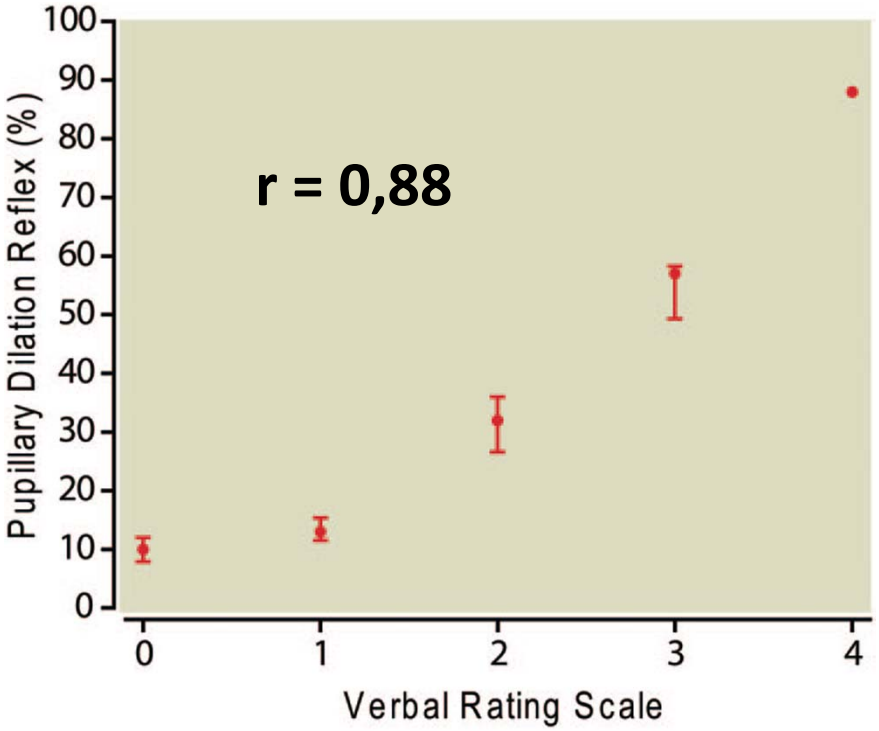
- 80 patientes (aspiration)
- AIVOC :
  - propofol 4 mg/mL
  - rémi C_e croissantes
- Stimulation tétanique :
  - 100 Hz
  - 60 mA
  - 5 s

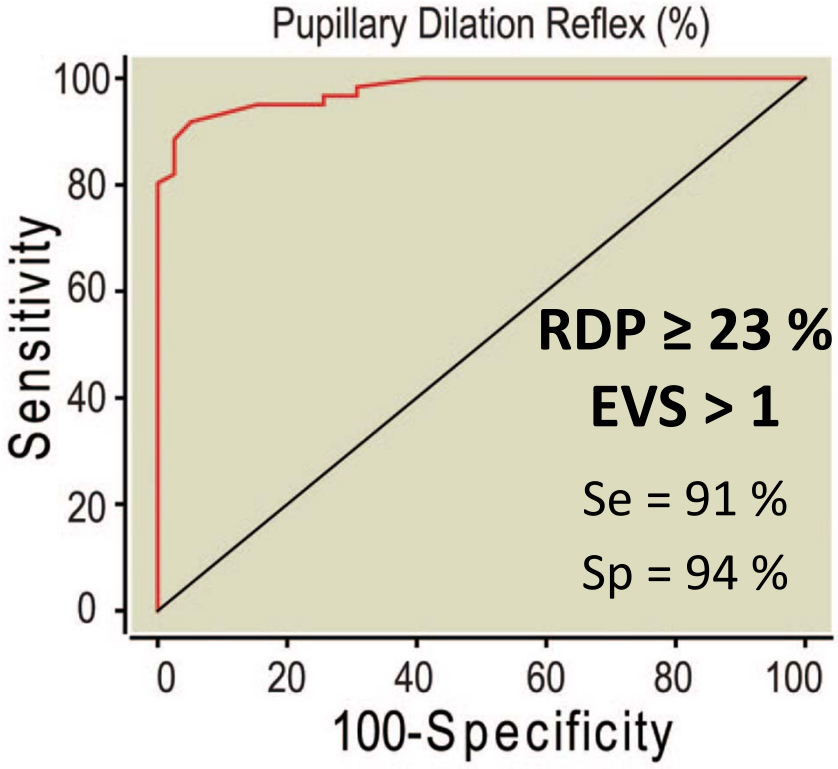


Guglielminotti J et coll. Anesthesiology 2015;122:985-93

Détection DPO immédiate

100 patients
EVS et RDP en SSPI

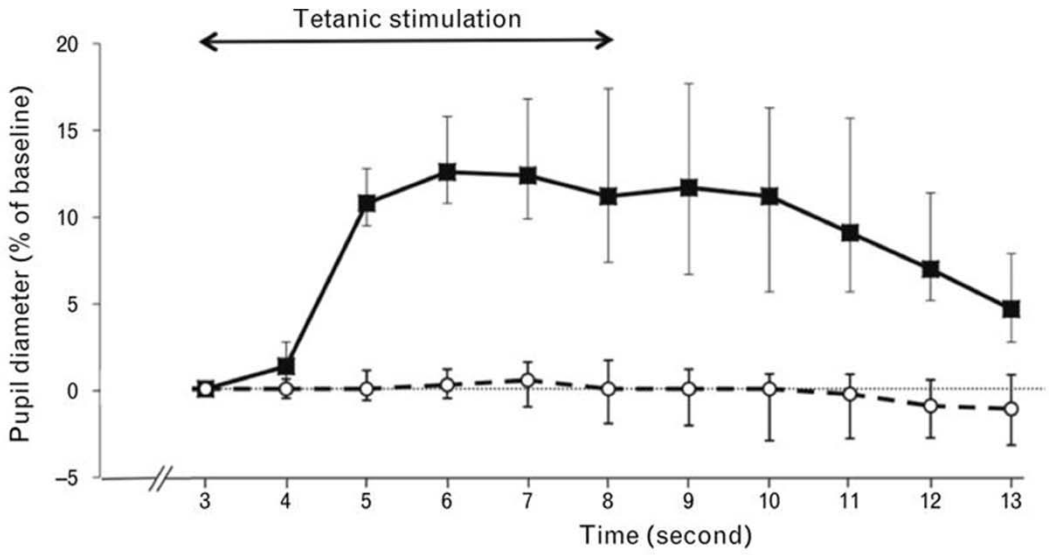




Aissou M et coll. Anesthesiology 2012;116:1006-12

Détection efficacité ALR

- 24 patients adultes
- Chirurgie distale membre inférieur
- AG + bloc poplité

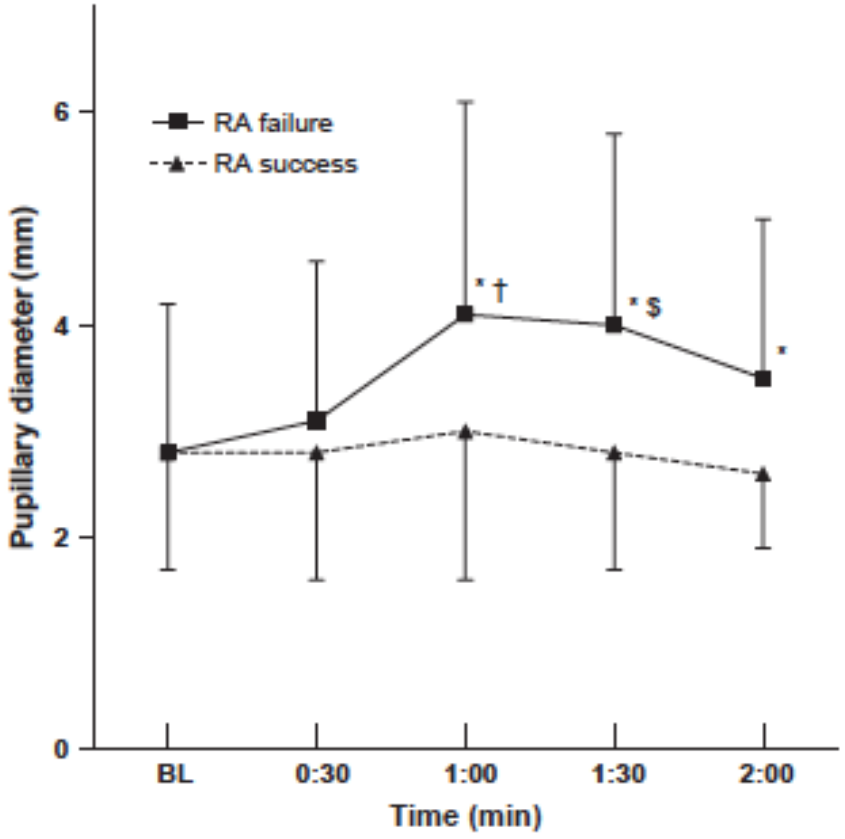


Time course of pupil diameter changes induced by tetanic stimulation of blocked (white circles) and non-blocked territories of the popliteal sciatic nerve (black squares). Pupil diameters [median (IQR)] are expressed as a percentage of baseline values (B).

Isnardon S et coll. Eur J Anaesthesiol 2013;30:429-34.

Détection efficacité ALR pédiatrie

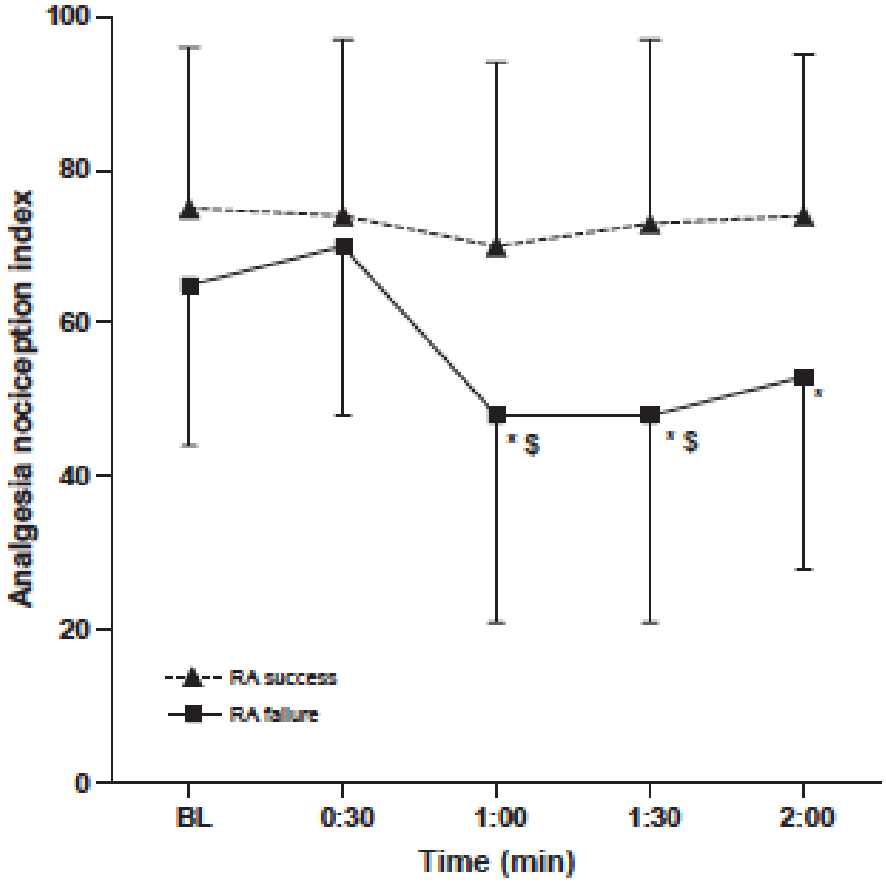
- 58 enfants > 2 ans
- AG + AR (rachi ou BNP)
- PDR après incision



Migeon A et coll. Paediatr Anaesth 2013;23:1160-5

Idem avec ANI

- 58 enfants > 2 ans
- AG + AR (rachi ou BNP)
- ANI après incision



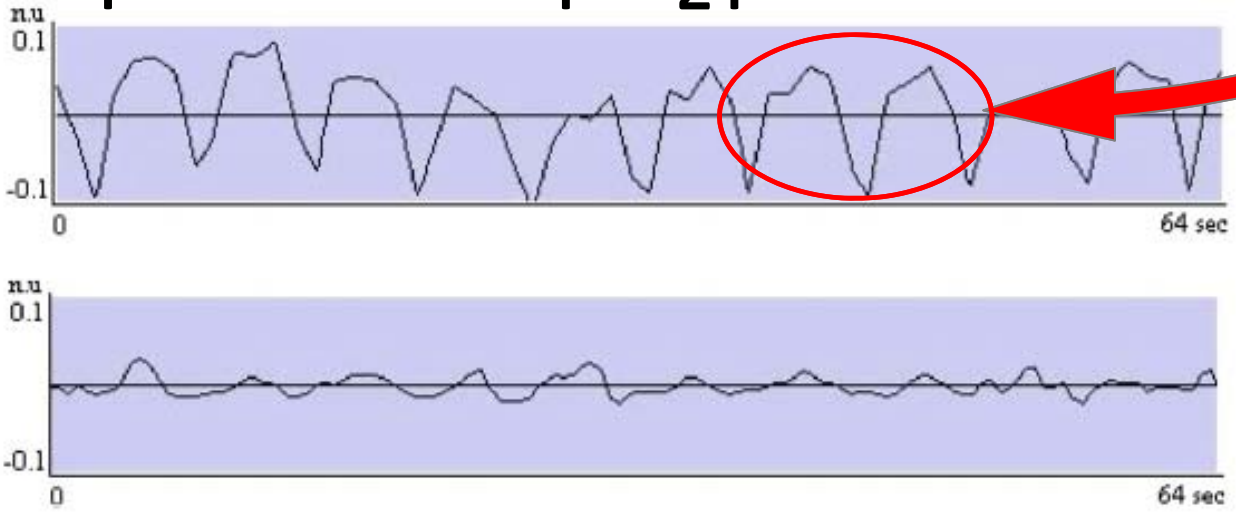
Migeon A et coll. Paediatr Anaesth 2013;23:1160-5

Analgesia/Nociception Index (ANI)

Variabilité de la fréquence cardiaque

- Arythmie respiratoire sinusale
- Influence respiration sur intervalle RR
- Reflète la BAN

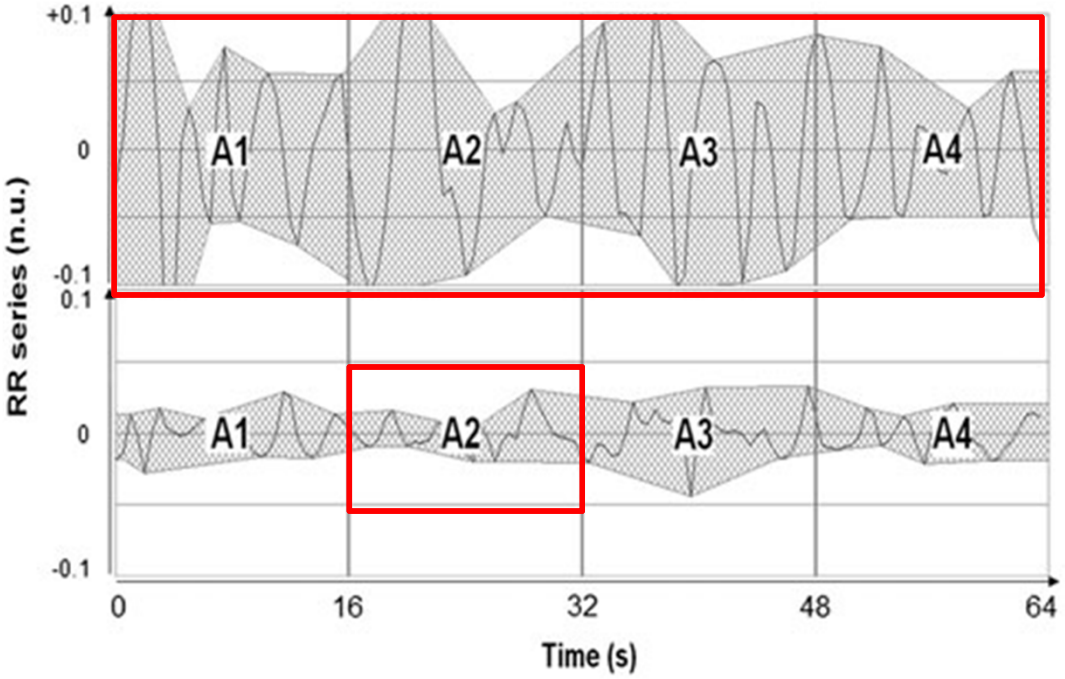
VFC importante = tonus para∑ prédominant = analgésie



VFC réduite : tonus ∑ prédominant = nociception

Jeanne M et coll. Conf Proc IEEE Eng Med Biol Soc 2009; 2009: 1840-3

Principe calcul ANI



ASC_{max}

ASC_{min}

$$ANI = 100 \times (\alpha \times ASC_{min} + \beta) / ASC_{max}$$

0 = Nociception maximale (∑)

100 = Analgésie maximale (para∑)

Logier R et coll. Conf Proc IEEE Eng Med Biol Soc 2010; 2010: 1194-7

Limites ANI

- Arythmie
- Apnée
- Dysfonction SNA
- Cardiotropes et vasopresseurs
- ß-bloquants ?

Détection DPO immédiate

200 patients ASA I-II

Anesthésie générale

- halogénés / rémifentanil (ORL ou chirurgie plastique)
- propofol / rémifentanil (endoscopie ORL)

ANI et ENS arrivée et départ SSPI

Boselli E et coll. Br J Anaesth 2013; 111: 453-9

Détection DPO immédiate

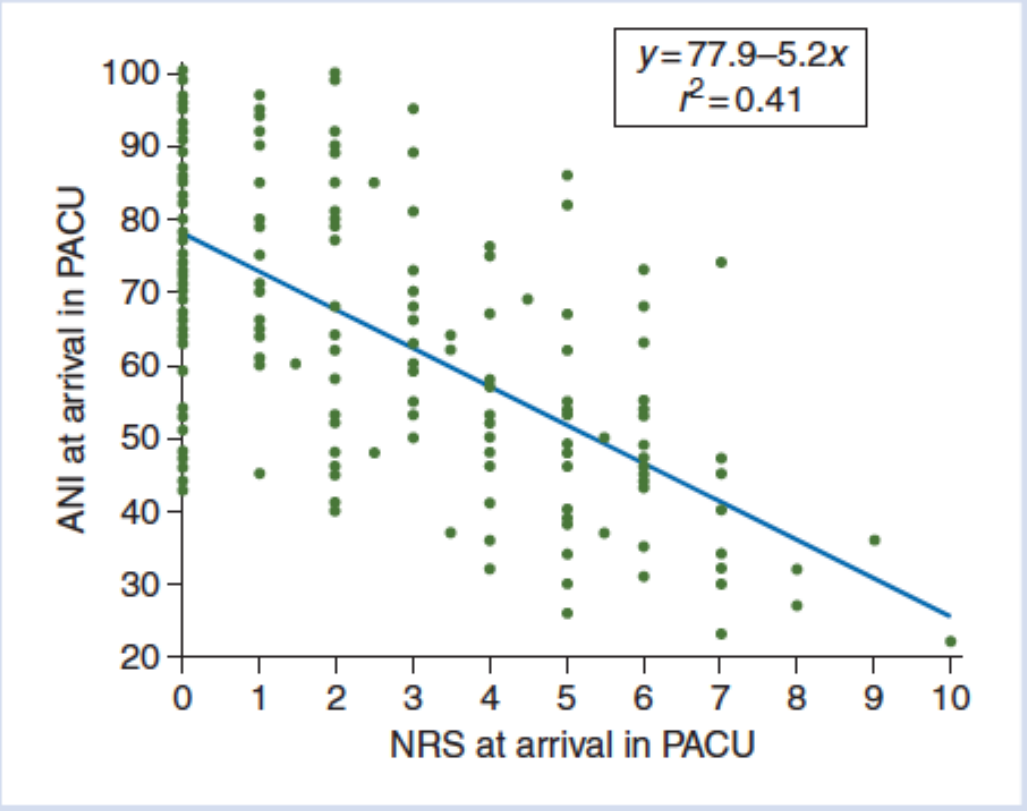
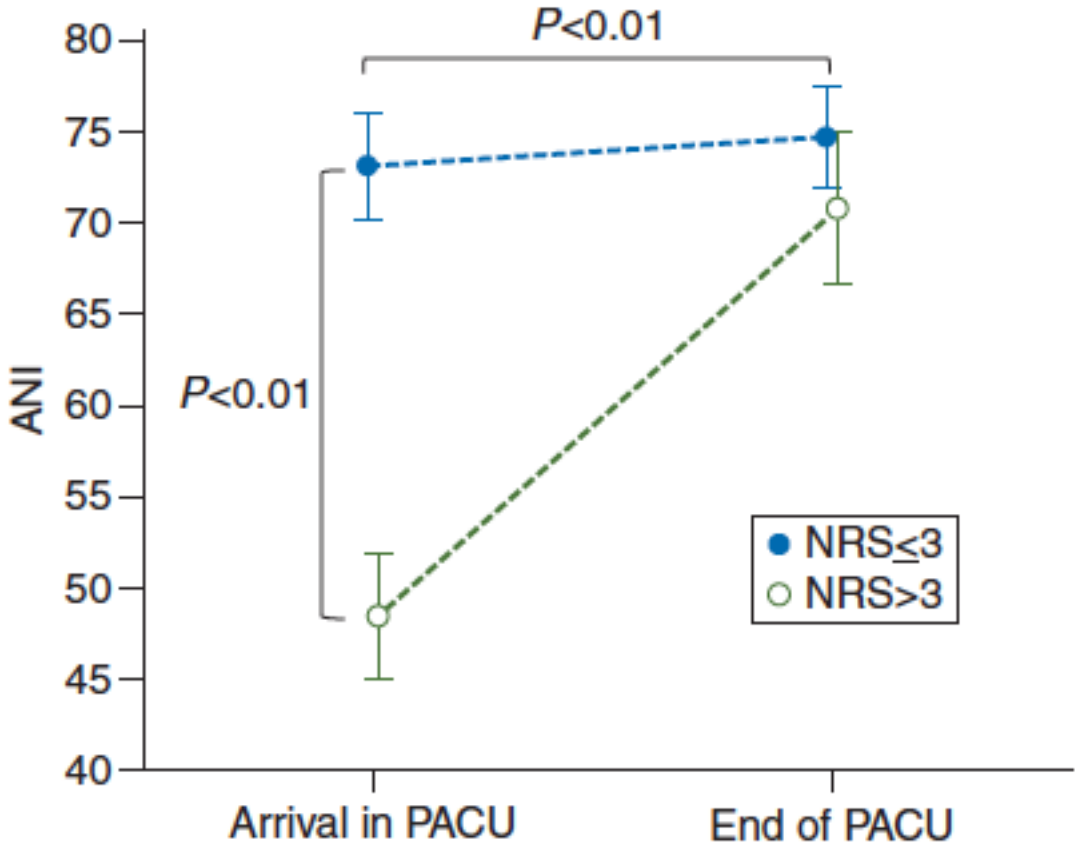


Fig 2 Negative linear relationship between ANI and NRS (linear regression).

Boselli E et coll. Br J Anaesth 2013; 111: 453-9

Détection DPO immédiate



Boselli E et coll. Br J Anaesth 2013; 111: 453-9

Prédiction DPO immédiate

200 patients ASA I-III

ORL ou orthopédie MI

Anesthésie générale :

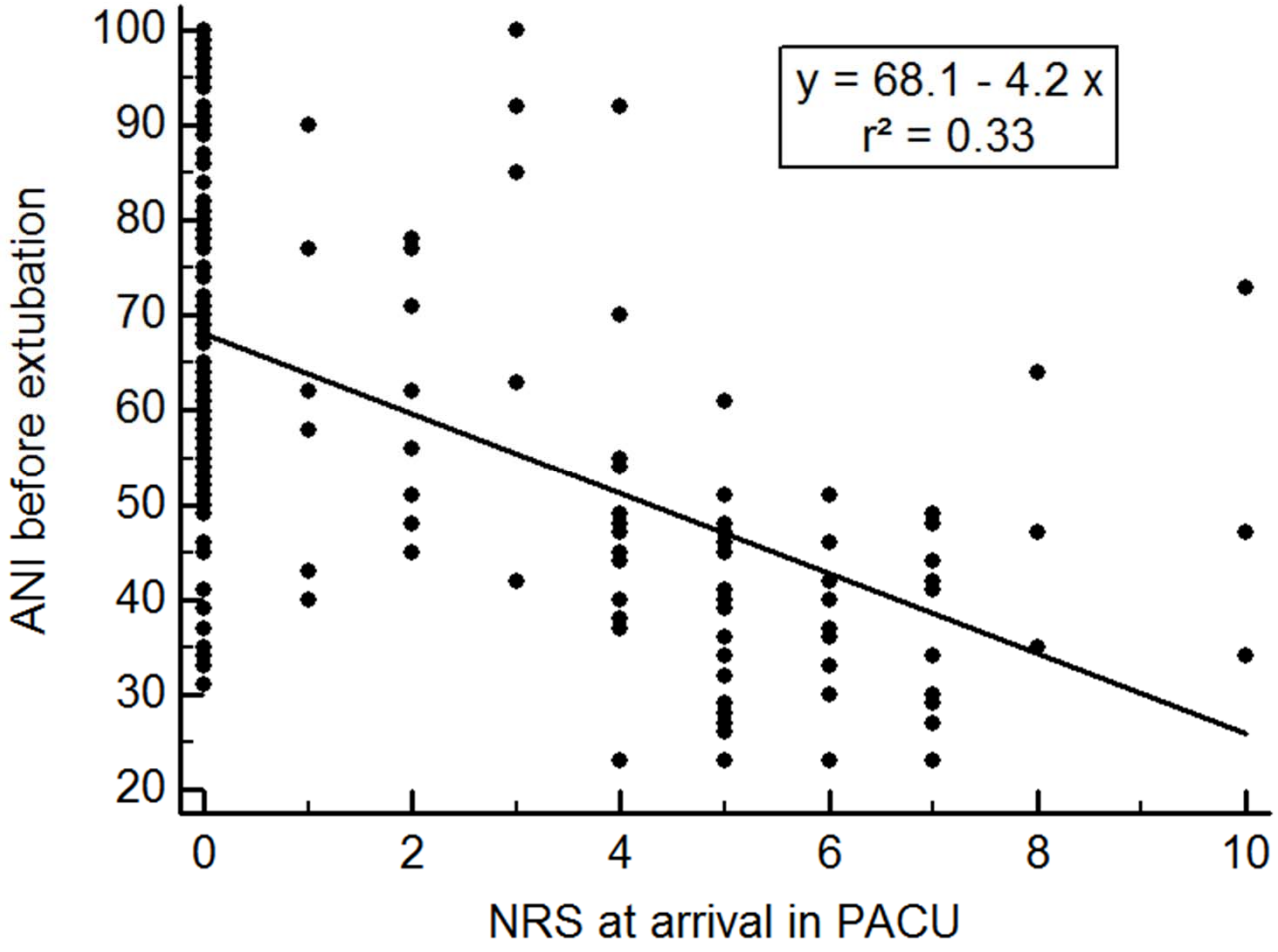
- Desflurane
- Rémifentanil
- ± cisatracurium

ANI immédiatement avant extubation

ENS arrivée SSPI

Boselli E et coll. Br J Anaesth 2014;112:715-21

Prédiction DPO immédiate



Boselli E et coll. Br J Anaesth 2014;112:715-21

Variations ANI pendant coelioscopie

15 patients adultes

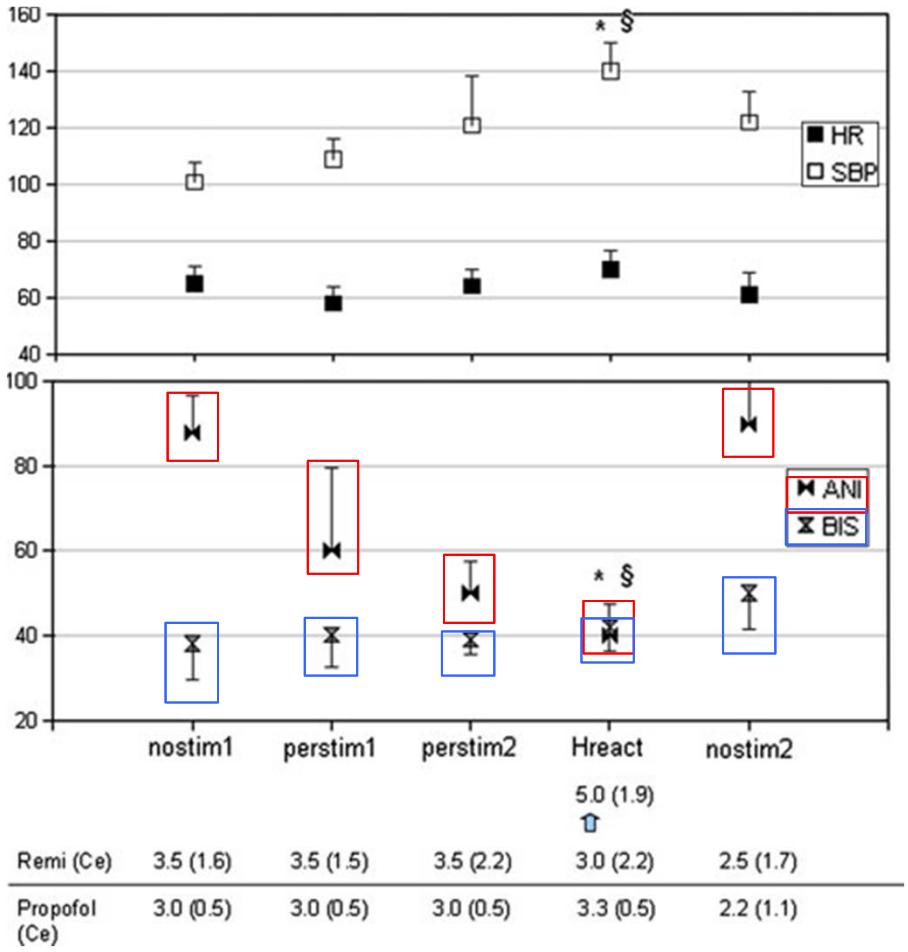
Appendicectomie ou cholécystectomie

AIVT

- propofol (BIS 40-60)
- rémifentanil
- cisatracurium

Jeanne M et coll. J Clin Monit Comput 2012; 26: 289-94

Variations ANI pendant coelioscopie



Jeanne M et coll. J Clin Monit Comput 2012; 26: 289-94

Effet stimulation nociceptive

25 patients ASA I-II (18-65 ans)

Chirurgie programmée avec ML

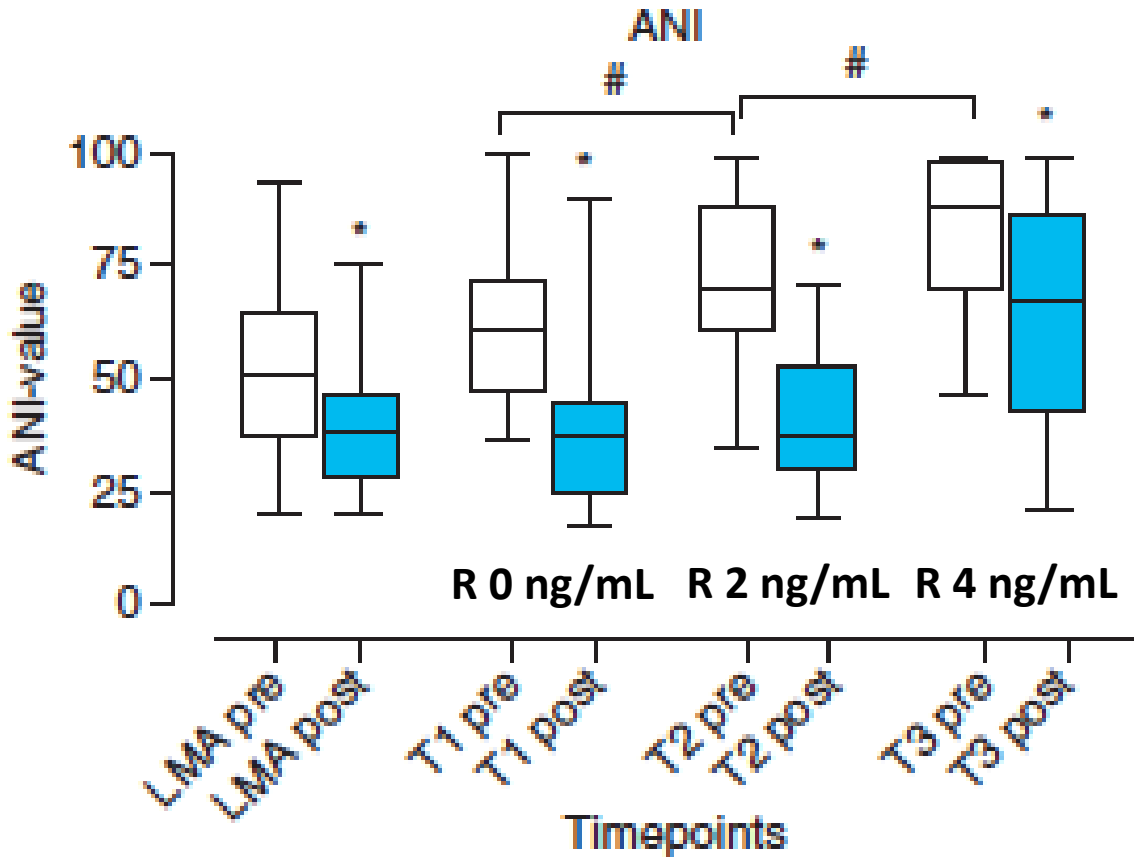
AIVT

- propofol (BIS 30-60)
- rémifentanil doses variables

Stimulation tétanique ulnaire (60 mA, 50 Hz, 30 s)

Gruenewald M et coll. Br J Anaesth 2013; 110: 1024-30

Effet stimulation nociceptive



*P<0.05 vs. prestimulation value

#P<0.05 vs. lower remifentanil concentration

Gruenewald M et coll. Br J Anaesth 2013; 110: 1024-30

Variations dynamiques ANI (ΔANI)

128 patients ASA I-III

ORL ou chirurgie orthopédique membre inférieur

Anesthésie générale :

- Desflurane
- Rémifentanil
- ± cisatracurium

ANI, ANI_{1min} et ΔANI à T0, T1, T2, T3

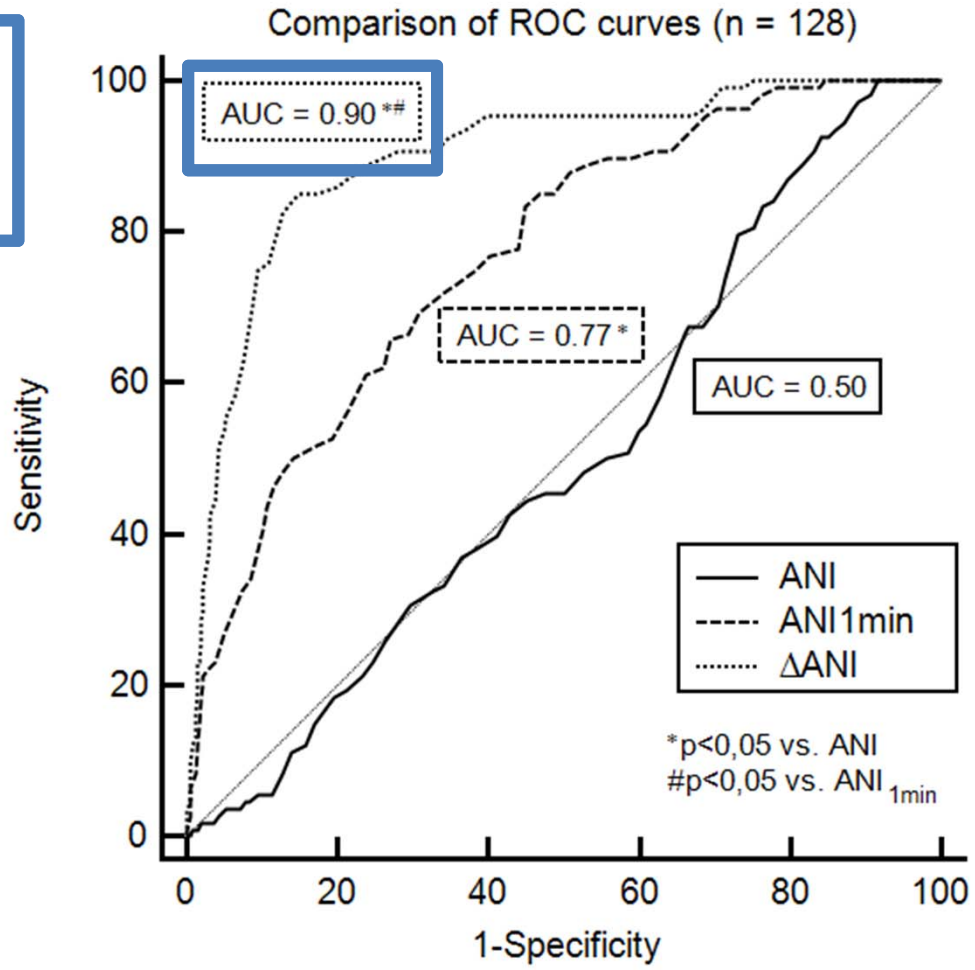
Boselli E et coll. J Clin Monitor Comput 2015 (e-publication anticipée)

Variations dynamiques ANI (ΔANI)

ΔANI ≤-19%
Réactivité HD

Se = 85%

Sp = 85%



Boselli E et coll. J Clin Monitor Comput 2015 (e-publication anticipée)

Étude comparative ?

British Journal of Anaesthesia Page 1 of 6
doi:10.1093/bja/aeu411

BJA

Postoperative pain after laparoscopic cholecystectomy is not reduced by intraoperative analgesia guided by analgesia nociception index (ANI®) monitoring: a randomized clinical trial

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Peninsula Health, Hastings Road, Frankston, VIC 3199 Australia

* Corresponding author. E-mail: jszental@gmail.com

Editor's key points

- Immediate postoperative pain is common after laparoscopic cholecystectomy, often repairing rescue analgesia.
- This study used intraoperative heart rate variability as a pain surrogate, to direct analgesia.
- The use of the analgesia nociception index (ANI) to direct intraoperative morphine did not improve postoperative analgesia.
- Further clinical investigation is required to establish the role of the ANI in pain management.

Background. Laparoscopic cholecystectomy frequently results in significant immediate postoperative pain. A new pain monitor, analgesic nociception index (ANI®), based on heart rate variability, has recently been approved for intraoperative nociception monitoring. We designed a single-blind, parallel-group, randomized control trial to test the hypothesis that protocol-driven intraoperative analgesia guided by ANI during laparoscopic cholecystectomy would improve titration of intraoperative analgesics leading to decreased postoperative pain.

Methods. One hundred and twenty consecutive adult participants presenting for elective laparoscopic cholecystectomy were recruited. Participants were randomly allocated by sealed envelope to receive intraoperative morphine either guided by ANI via a protocol (intervention group) or guided by the anaesthetist with ANI concealed (control group). All participants received paracetamol, parecoxib, fentanyl at induction, and local anaesthetic to port sites. The primary endpoint was the presence of moderate/severe pain (visual analogue scale ≥ 50 mm) at any of the four time points in the first postoperative hour. Secondary endpoints included postoperative rescue morphine.

Results. Sixty participants were randomized to each group, and all but one drop-out from the intervention group were analysed. The usage of ANI guidance did not result in a decrease in the rate of moderate/severe pain (50.8% *vs* 45.0%: difference of −5.8%, 95% confidence interval, −23.7% to 12.1%, $P=0.58$), or the use of postoperative rescue analgesia.

Conclusions. This randomized control trial of intraoperative ANI-guided morphine administration in elective laparoscopic cholecystectomy failed to show any advantage over the current standard of care, and demonstrated a high level of postoperative pain, despite the use of multimodal analgesia.

Clinical trial registration. ANZCTR Reference ACTRN12612000953831 (URL: http://www.anzctr.org.au/trial_view.aspx?ID=362949).

Keywords: analgesics, opioid/therapeutic use; cholecystectomy, laparoscopic; heart rate; pain measurement/methods; pain, postoperative/drug therapy

Accepted for publication: 7 October 2014

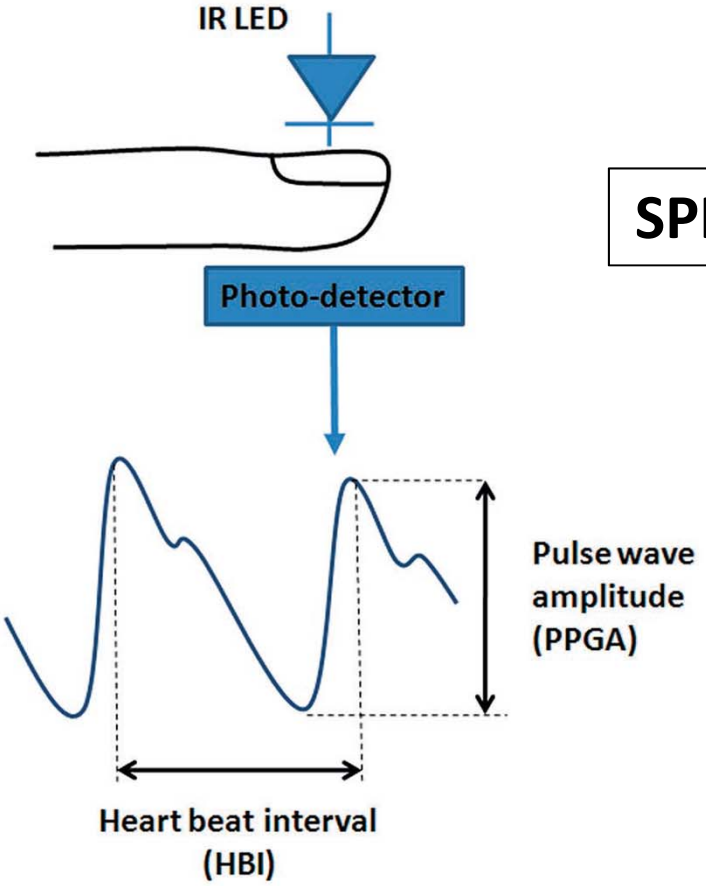
Opiacé peropératoire = morphine

Étape suivante : administration automatisée ?

De Jonckheere J et coll. Conf Proc IEEE Eng Med Biol Soc 2013; 2013: 1952-5

Surgical Pleth Index (SPI)

Principe calcul SPI



$$SPI = 100 - (0{,}7 \times PPGA_{norm} - 0{,}33 \times HBI_{norm})$$

0 = bas niveau de stress

100 = haut niveau de stress

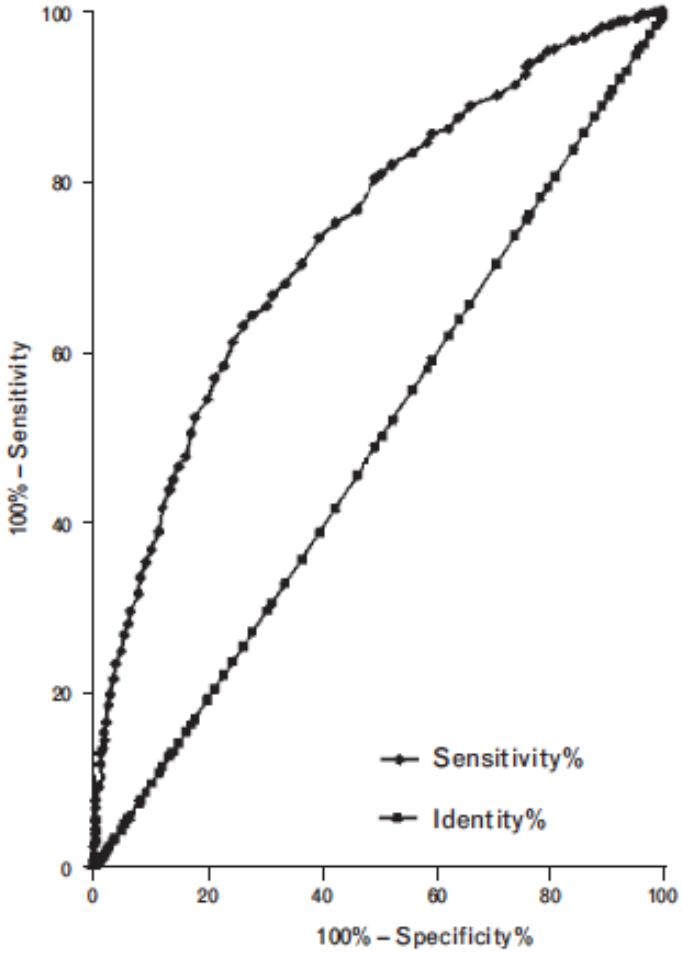
De Jonckheere J et coll. Yearb Med Inform 2015;10:95-101

Détection DPO immédiate

100 patients ASA I-III

SPI et NRS en SSPI

SPI ≤ 45
ENS ≤ 3
Se = 67 %
Sp = 69 %



Thee C et coll. Eur J Anaesthesiol 2015;32:44-8

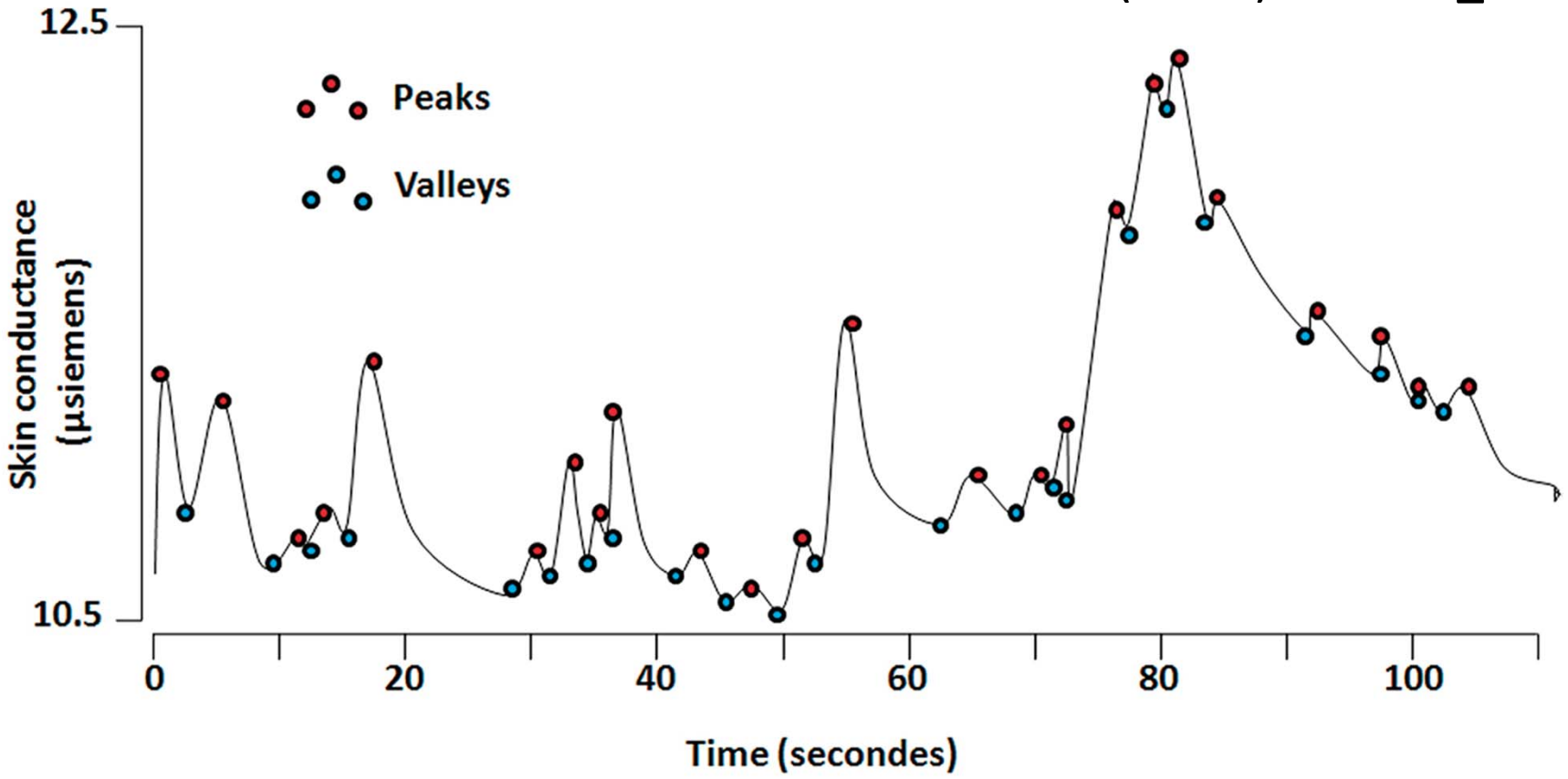
Étude comparative rémifentanil

- 80 patients chir ORL
- AIVOC propofol : BIS 40-60
- AIVOC rémifentanil :
  - contrôle
  - SPI 20-50
- ↘ rémifentanil (µg/kg/h):
  - SPI = 8,5 ± 3,8
  - vs contrôle = 12,3 ± 5,2 ($p<0,05$)
- Meilleure stabilité hémodynamique

Chen X et al. Anesthesiology 2010;112:1175-83

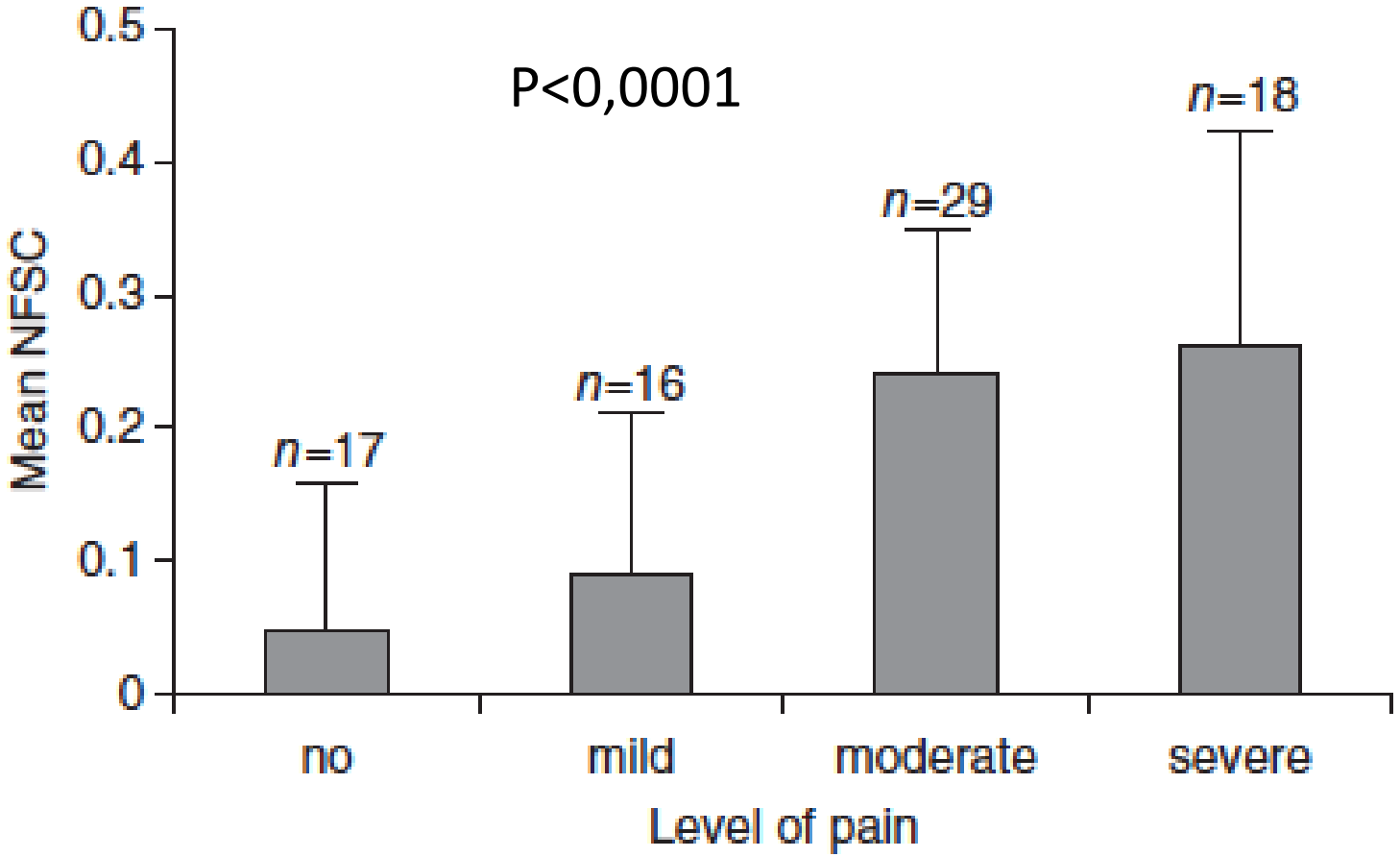
Conductance cutanée

Nb. fluctuations conductance cutanée (NFSC) : reflet ∑



De Jonckheere J et coll. Yearb Med Inform 2015;10:95-101

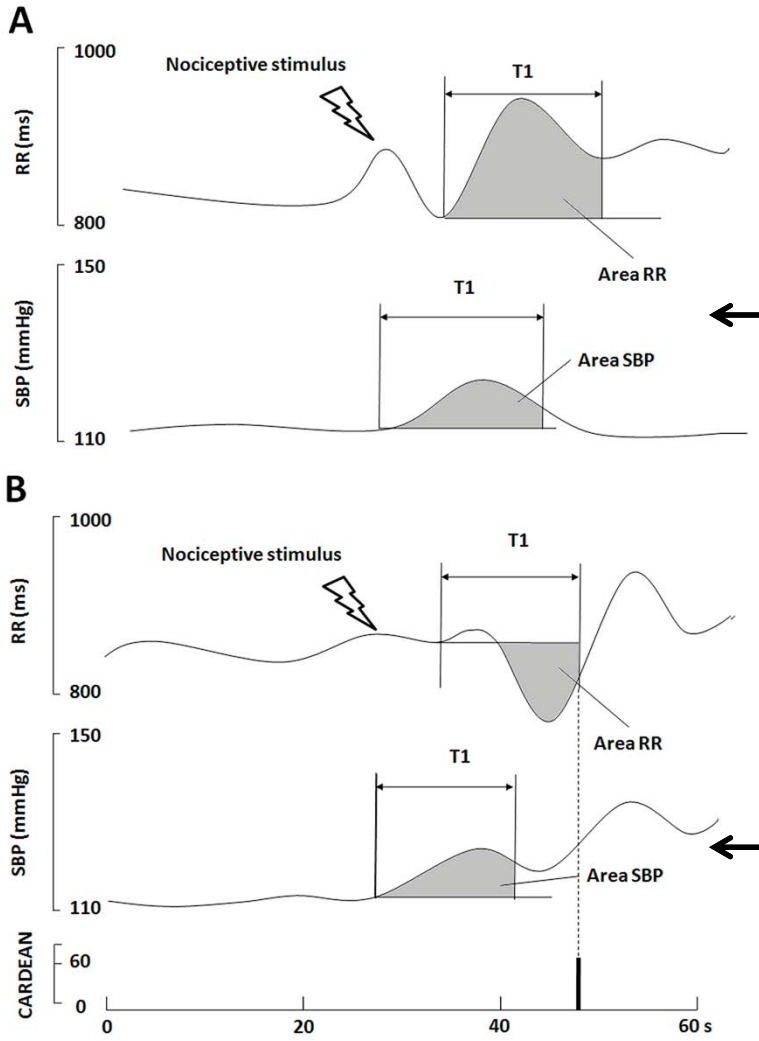
Détection DPO immédiate



Ledowski T et coll. Br J Anaesth 2006;97:862-5

CARDEAN

Cardiovascular depth of analgesia



Baroréflexe normal
CARDEAN = 0
(analgésie)

Inhibition baroréflexe
CARDEAN = 100
(nociception)

De Jonckheere J et coll. Yearb Med Inform 2015;10:95-101

CARDEAN

Journal of Clinical Monitoring and Computing (2007) 21:91–101
DOI: 10.1007/s10877-006-9061-9

BEAT-BY-BEAT CARDIOVASCULAR INDEX TO PREDICT UNEXPECTED INTRAOPERATIVE MOVEMENT IN ANESTHETIZED UNPARALYZED PATIENTS: A RETROSPECTIVE ANALYSIS

A. Cividjian, MEng, PhD[3,4], J. Y. Martinez, MD, MSc[1], E. Combourieu, MD[1], P. Precloux, MD[1], A. M. Beraud, MD[1], Y. Rochette, MD[1], M. Cler, MD[1], L. Bourdon, MD, PhD[2], J. Escarment, MD[1] and L. Quintin, MD, PhD[4]

J Clin Monit Comput (2012) 26:441–449
DOI 10.1007/s10877-012-9372-y

A beat-by-beat, on-line, cardiovascular index, CARDEAN, to assess circulatory responses to surgery: a randomized clinical trial during spine surgery

M. Rossi · A. Cividjian · M. C. Fevre · M. E. Oddoux · J. Carcey · C. Halle · M. Frost · M. Gardellin · J. F. Payen · L. Quintin

A Beat-by-Beat Cardiovascular Index, CARDEAN: A Prospective Randomized Assessment of Its Utility for the Reduction of Movement During Colonoscopy

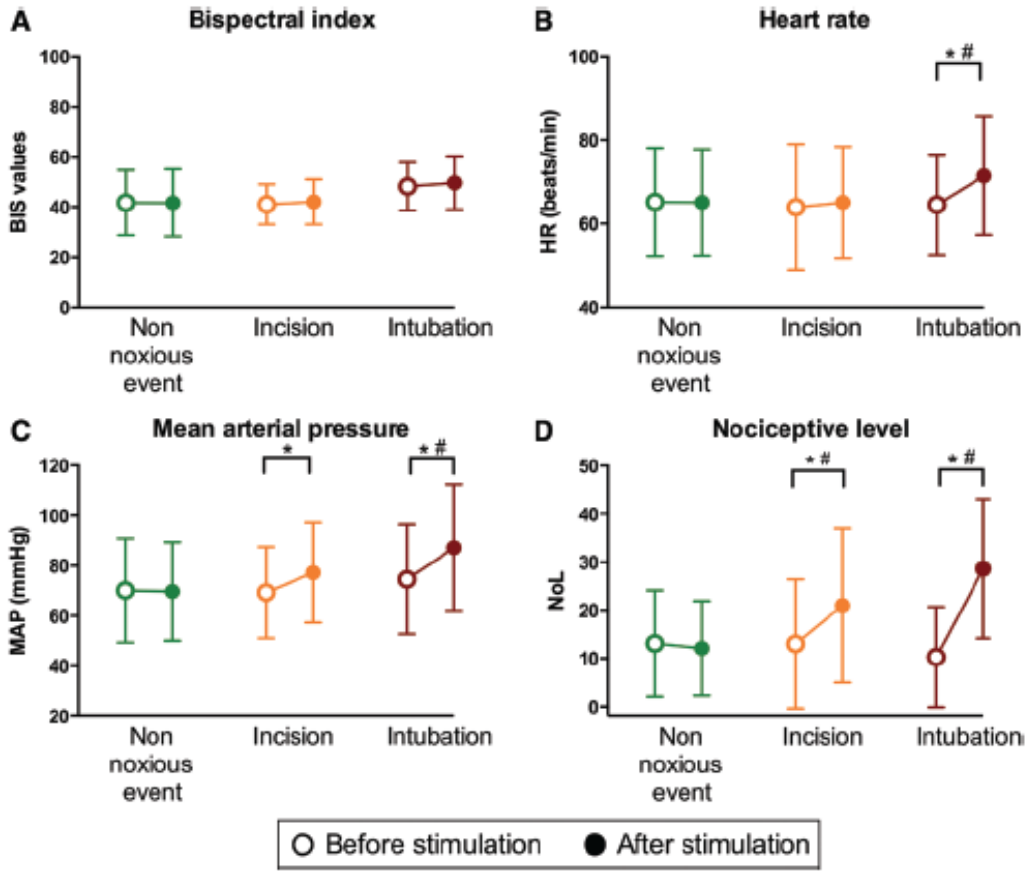
Jean Yves Martinez, MD, MSc,* Pierre François Wey, MD,* Christophe Lions, MD,* Andrei Cividjian, MEng, PhD,† Muriel Rabilloud, MD, PhD,†§ Alvine Bissery, MSc,†§ Lionel Bourdon, MD, PhD,‖ Marc Puidupin, MD,* Jacques Escarment, MD,* and Luc Quintin, MD, PhD¶

ANESTHESIA & ANALGESIA
March 2010 • Volume 110 • Number 3

NoL

(Nociception Level)

- Index composite :
  - FC
  - VFC
  - pleth
  - conductance
- 72 patients
  - ASA I-III
  - propofol
  - rémifentanil
- NoL avant/après



Martini CH et coll. Anesthesiology 2015;123:524-34

Conclusion

Monitorage analgésie en plein essor

- Nombreux moniteurs
- Balance sympathovagale
- Limites à connaître ou à déterminer
- Probablement plus utiles avec opiacés rapides (rémifentanil)
- Études comparatives