

# Intravenous Lidocaine for Acute Pain- The Ottawa Experience

**Dr NAVEEN EIPE, MBBS MD.**

**Co- Director, Acute Pain Fellowship Program**

**Clinical Lead, Bariatric Anesthesia**

**Assistant Professor, uOttawa, Canada.**



# CME FACULTY DISCLOSURE

Dr. Naveen Eipe has no affiliation with the manufacturer of any commercial product or provider of any service discussed in this CME activity.



# Do all your *APS Roads* still lead to the *IVPCA Home*?

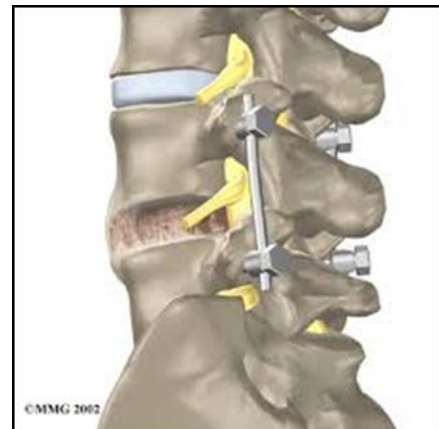
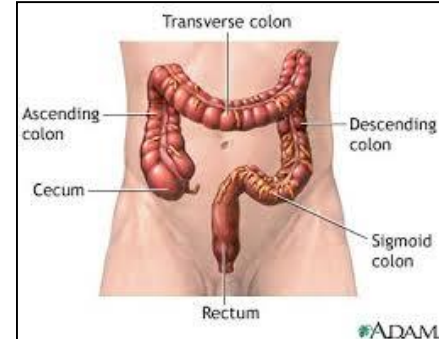
- 65F Vasculopath. Postop Below Knee Amputation (GA) in PACU- **Pain Crises!**
- 73M Laparoscopic sigmoidectomy (GA), converted to open- **Postop APS orders?**
- 42F Chronic Pain & opioid tolerance, 2wks spine fusion-readmitted poorly controlled pain & Ileus. **Analgesic Rescue?**

IVPCA

?Ketamine

?Pregabalin

?Lidocaine



# OBJECTIVES

1. **Pharmacology** of Intravenous (IV) Lidocaine
2. **Evidence** for IV lidocaine in Acute Pain
3. The Ottawa Lidocaine **Experience**



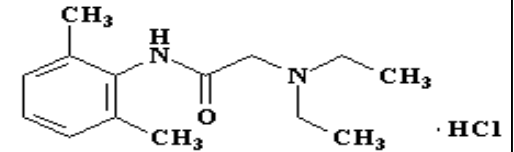
Pain is a more terrible lord of mankind than even death itself.

*Albert Schweitzer 1931*

# Pharmacology of Lidocaine

(ACETANI) LID (E)+CAINE

Lidocaine Hydrochloride  
 $C_{14}H_{22}N_2O \cdot HCl$



Amide Local Anesthetic- Sodium Channel Blocker

Stabilizes neuronal membranes, prevents depolarization and reduces action potentials

**Preparations- (Xylocaine, Lignocaine, Xylocard- 0.4% to 5%- 10ml- 500ml)**

1. Plain Solutions (pH 5.0-7.0)

2. with Epinephrine & antioxidant sodium metabisulfite

3. with preservative methylparaben

**IV Lidocaine:** Bolus 1-2 mg/kg, Infusion 1-2 mg/kg/ hr

Half Life **1 – 2hrs**

- High **hepatic** extraction ratio & clearance

proportional to hepatic blood flow

- **Renal** excretion

## IV Lidocaine Toxicity

Toxicity: **narrow therapeutic index-**

*[severe toxicity may occur slightly above the therapeutic range]*

- therapeutic plasma level (**2.5-3.5 mcg/mL**)
- toxicity (**>5mcg/mL**)
- ultimately a simple matter of excessive blood concentration
- common cause is a **dosing or delivery error**

**Factors influence-**

1. the speed and or dose injected,
2. acid-base status,
3. hypercapnia, hypoxia,
4. plasma protein level and hepatic function
5. Rarely hypersensitivity, idiosyncrasy or diminished tolerance

## CNS Toxicity

Begins at **6mcg/mL** & definite at **10mcg/mL**

awake patients, predictable progression-

- begins with numbness of the tongue, metallic taste, lightheadedness and then tinnitus.
- Visual disturbances progress to muscle twitching, unconsciousness and seizures
- Coma, respiratory arrest and cardiovascular collapse ensue
- More **common complaint** is a ketamine like psychotropic effects- sedation, sleepiness, light-headedness, relaxation, euphoria, unreality, 'flying and drunkenness'

## CVS Toxicity

Less common than CNS toxicity

*[Lidocaine is less cardiotoxic than lipophilic bupivacaine]*

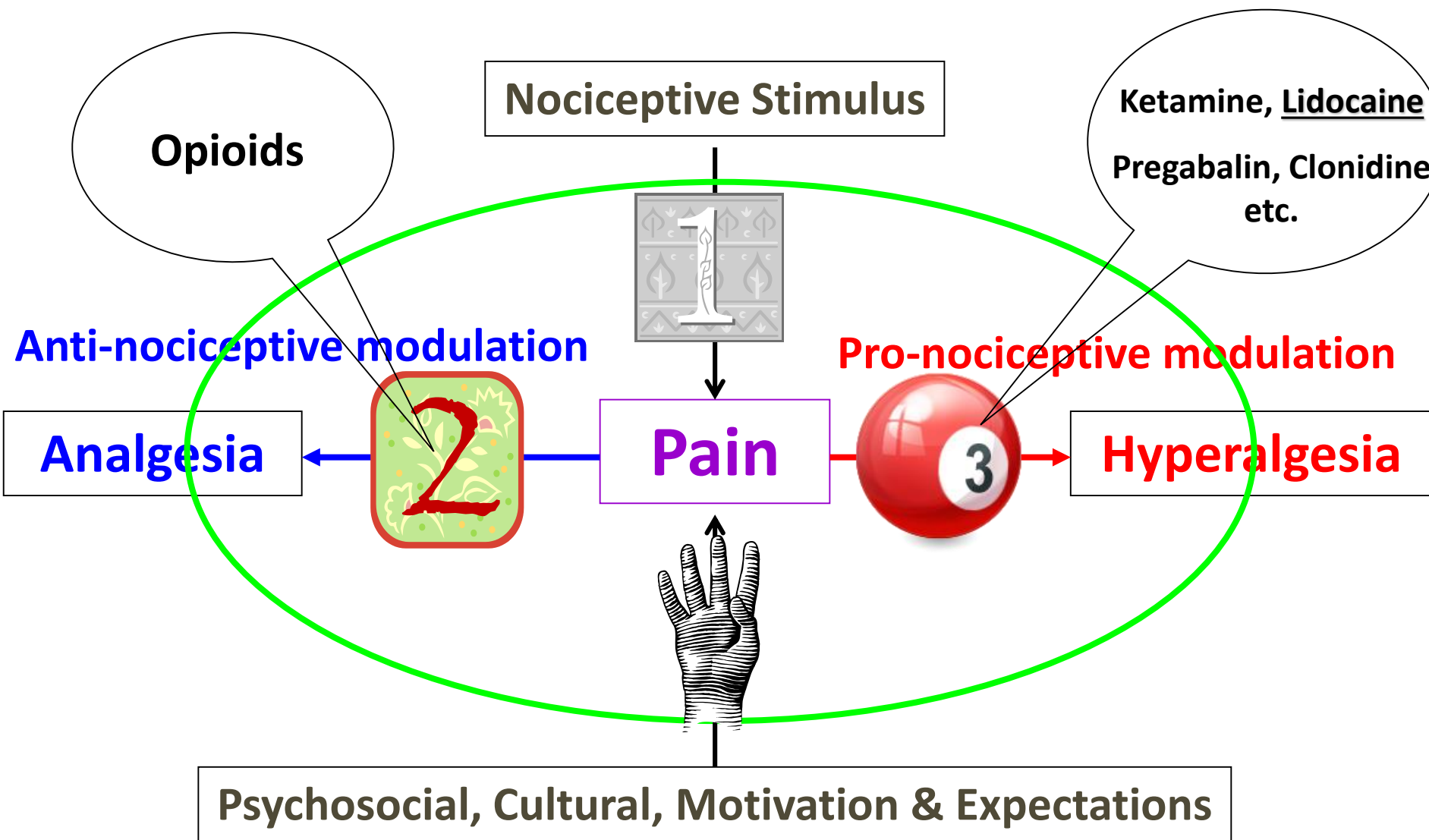
- Serum levels **>10mcg/mL**
- Negative **inotropic**- conduction problems or after MI
- **Conduction** effects- widened PR interval & QRS duration, sinus tachy. & arrest, partial or complete AV dissociation
- Effects on **vascular** tone- hypertension precedes hypotension
- Potentiated by acidosis, hypercapnia and hypoxia (cardiac suppression & arrhythmia)- **ICU patients, under Anesthesia**



## IV Lidocaine Uses

1. **Anti-arrhythmic**
2. Blunt sympathetic response to Laryngoscopy
3. Prevent bronchospasm & cough reflex during intubation/ extubation
4. Analgesia-Pain on Propofol injection
5. Chronic neuropathic pain
6. **Multimodal analgesia**

# **Systemic Effects of IV Lidocaine- ANALGESIA**



# The Four Dimensions of Pain

*John Penning, Ottawa*

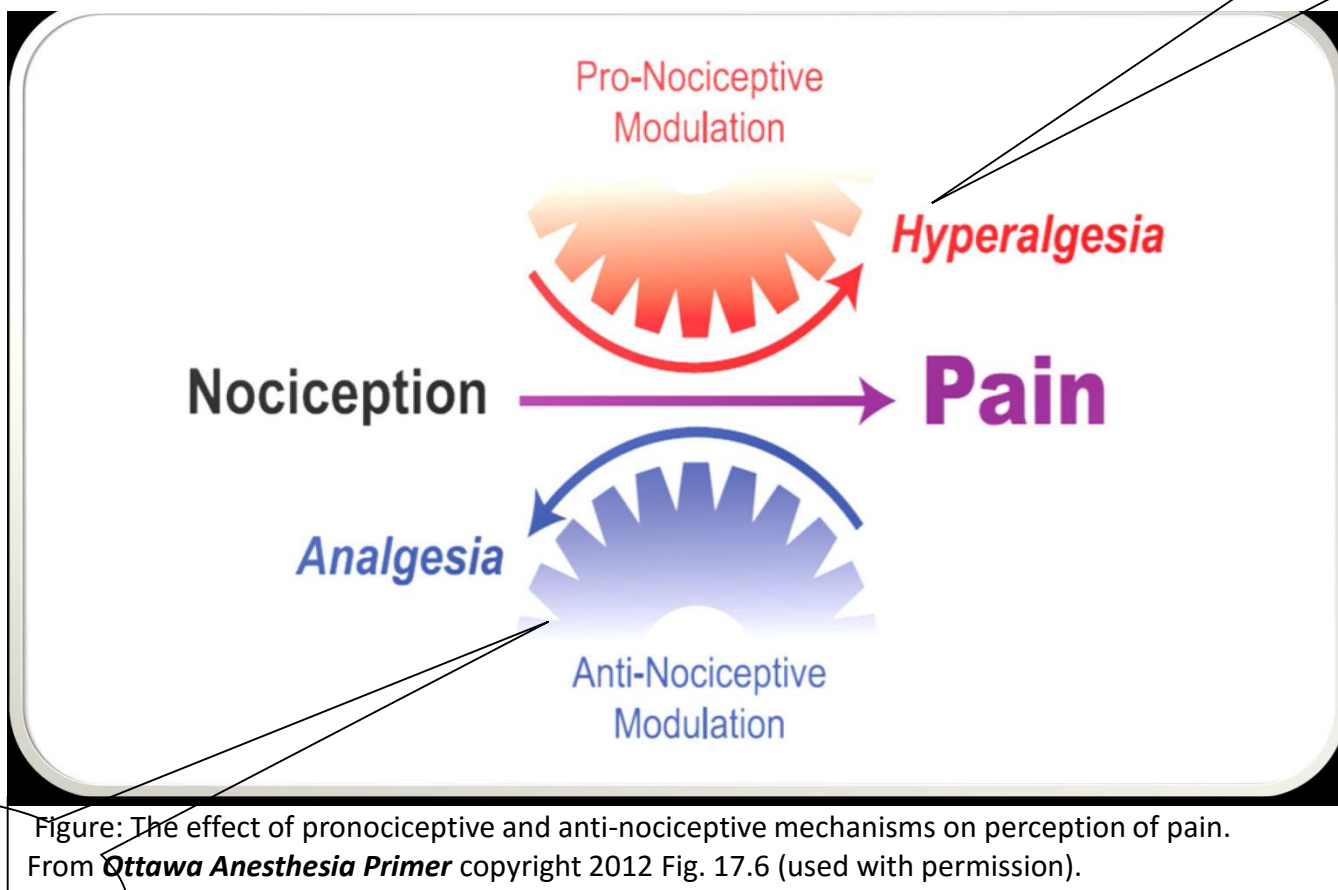


Figure: The effect of pronociceptive and anti-nociceptive mechanisms on perception of pain.  
From *Ottawa Anesthesia Primer* copyright 2012 Fig. 17.6 (used with permission).

Opioids



**Dr. John Penning**

Medical Director, Acute Pain Service,  
(Founded in 1989) The Ottawa Hospital.

## IV Lidocaine- Analgesic Mechanisms

**Chronic Pain-** in damaged & dysfunctional nerves

Neural Tissues- reduces action potentials & membrane depolarization

Tissue- neoproliferation of Na Channels & spontaneous firing

Spinal Cord- reduces sensitivity & activity at spinal cord neurons  
(central sensitization)

**Acute Pain-** Preventive Analgesia

Anti-inflammatory- Decreased Levels of Cytokines & other markers

Decreases stress response

Sympathetic Blockade- restores gut motility & protects anastomosis

Anti- Hyperalgesic- ?NMDA mediated

Improves well being

## **Evidence for Perioperative Use of IV Lidocaine**

# Rimback: Lidocaine and Ileus (A&A1990)

- IPL shortened post op ileus
- IV Lido in Cholecyst. using radio markers, RCT n=30
- Lido 100mg + 3mg/min x **24hrs**
- Lido group showed earlier radiological evidence of motility
- Significantly lower analgesic use on D1

- Direct- excitatory effect smooth muscle
- Indirect- Reducing pain & opioid requirements
- Blockade of sympathetic reflexes
- Reducing catecholamines
- Anti inflammatory effects

414 ANESTH ANALG  
1990;70:414-9

---

Treatment of Postoperative Paralytic Ileus by Intravenous Lidocaine Infusion

Gunnar Rimbäck, MD, Jean Cassuto, MD, PhD, and Per-Olof Tollesson, MD

---

# Koppert: Lidocaine and Outcomes (A&A2004)

ANESTH ANALG  
2004;98:1050-5

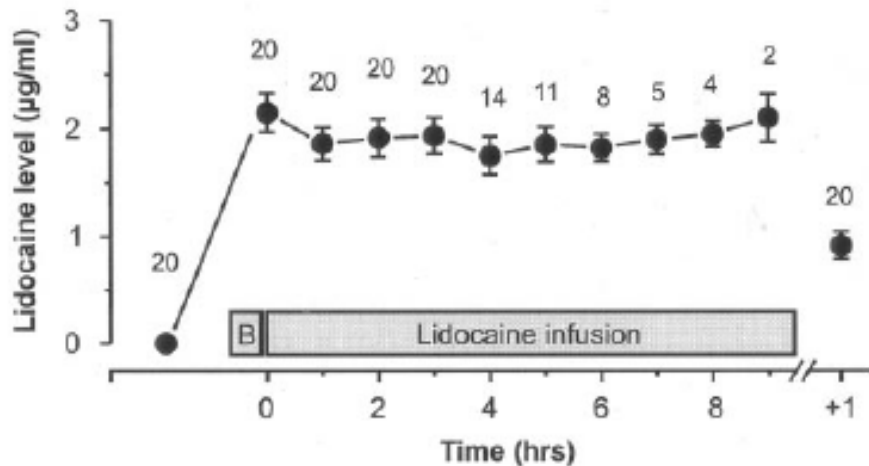


Figure 1. Lidocaine plasma levels before and immediately after bolus infusion of 1.5 mg/kg (B) and during and 1 h after continuous infusion of 1.5 mg · kg<sup>-1</sup> · h<sup>-1</sup>. Figures indicate the number of patients receiving the infusion; values are mean ± SEM.

- No side effects
- Sig. lower morphine requests and lower pain on movement
- More prominent effects after 36h
- Effects best if administered during surgery

## Perioperative Intravenous Lidocaine Has Preventive Effects on Postoperative Pain and Morphine Consumption After Major Abdominal Surgery

Wolfgang Koppert, MD, Marc Weigand, MD, Frank Neumann, MD, Reinhard Sittl, MD, Jürgen Schuetzler, MD, Martin Schmelz, MD, and Werner Hering, MD

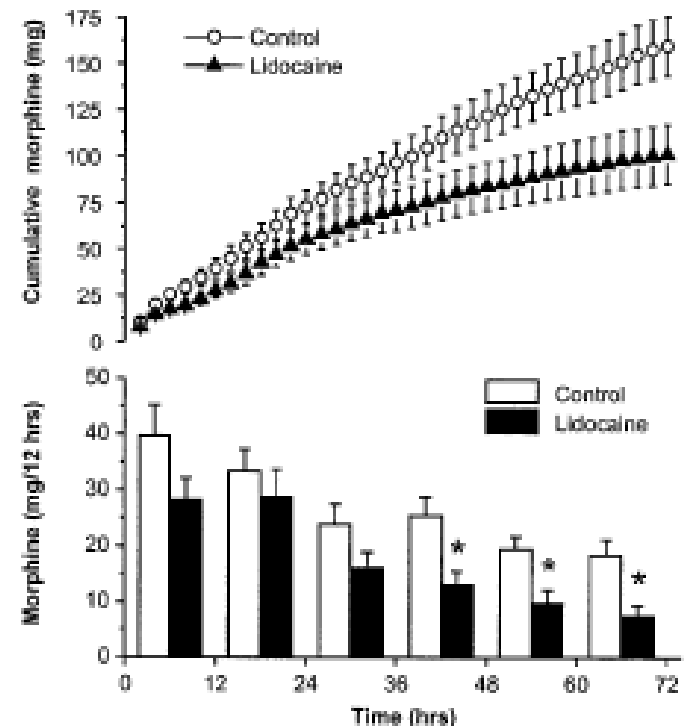


Figure 2. Upper panel: cumulative postoperative morphine consumption in the two groups during 72 h after connection of the patient-controlled analgesia pump. Lower panel: morphine consumption in 12-h intervals in the two groups. Values are mean ± SEM. \*  $P < 0.01$ ; unpaired Student's  $t$ -test corrected with the Bonferroni procedure.



# Kuo: Lidocaine vs Epidural (BJA 2006)

British Journal of Anaesthesia 97 (5): 640-6 (2006)  
doi:10.1093/bja/ael217 Advance Access publication September 4, 2006

BJA

Comparison of the effects of thoracic epidural analgesia and i.v. infusion with lidocaine on cytokine response, postoperative pain and bowel function in patients undergoing colonic surgery

C. P. Kuo<sup>1</sup>, S. W. Jao<sup>2</sup>, K. M. Chen<sup>3</sup>, C. S. Wong<sup>1</sup>, C. C. Yeh<sup>1</sup>, M. J. Sheen<sup>1</sup> and C.T. Wu<sup>1\*</sup>

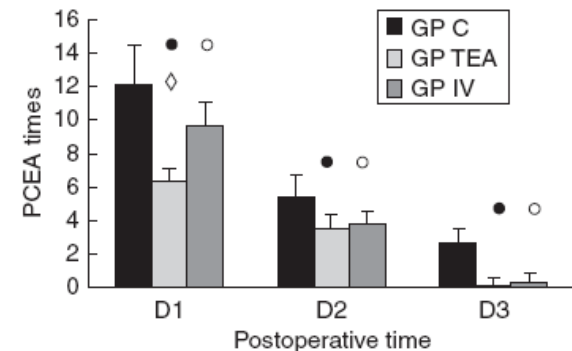
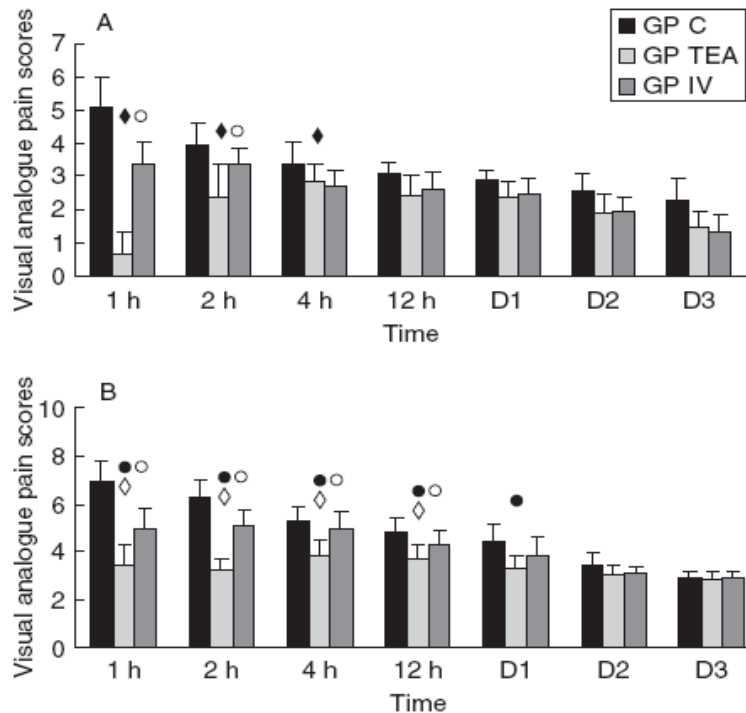


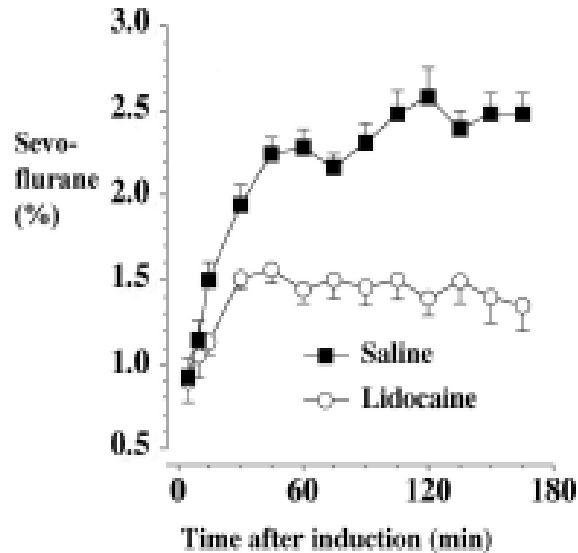
Fig 2 Total patient-controlled epidural analgesia (PCEA) delivery times more than 3 days (D) after surgery. Total delivery times in TEA (thoracic epidural analgesia with lidocaine) or IV (i.v. lidocaine) group were less than those in the control group. ° $P < 0.01$  compared with the control group, \* $P < 0.01$  compared with the control group, ° $P < 0.01$  compared with IV group. GP, Group.

pain relief, lower opioid consumption, earlier bowel function, less cytokine surge-

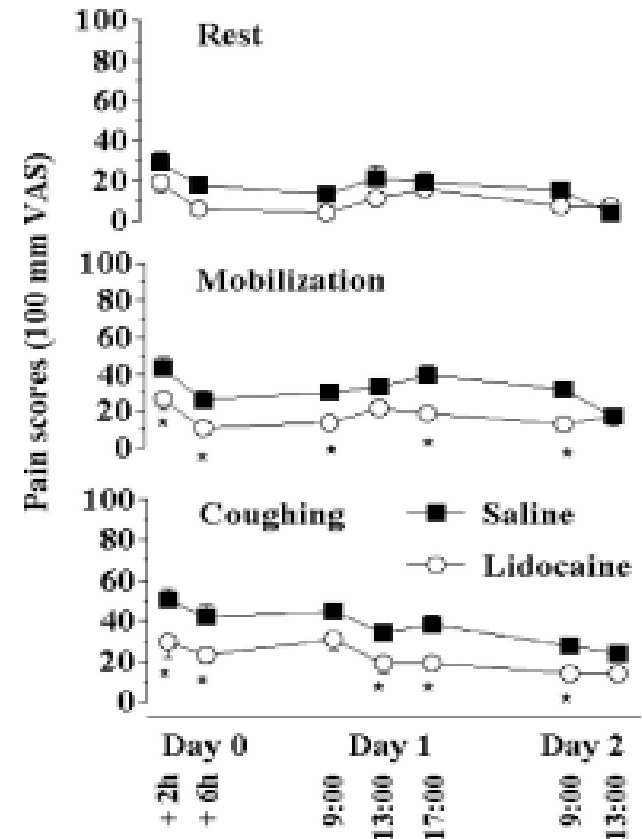
•Epidural > IV Lidocaine > Control group

IV Lido useful for epidural difficulties or contraindication

# Kaba: Lidocaine and ERAS (Anesthesiology 2007)



- Lap Colectomy- ERAS (RCT n=45)
- 1.5mg/kg + 2mg/kg/hr x24h
- MAC sparing effect
- Decreased VAS coughing & mobilization
- Early bowel recovery and short hospital stay
- No toxicity, side effects and well tolerated



# Wongyingsinn M: Lidocaine vs. Epidural (RAPM 2011)

*Regional Anesthesia and Pain Medicine* • Volume 36, Number 3, May-June 2011

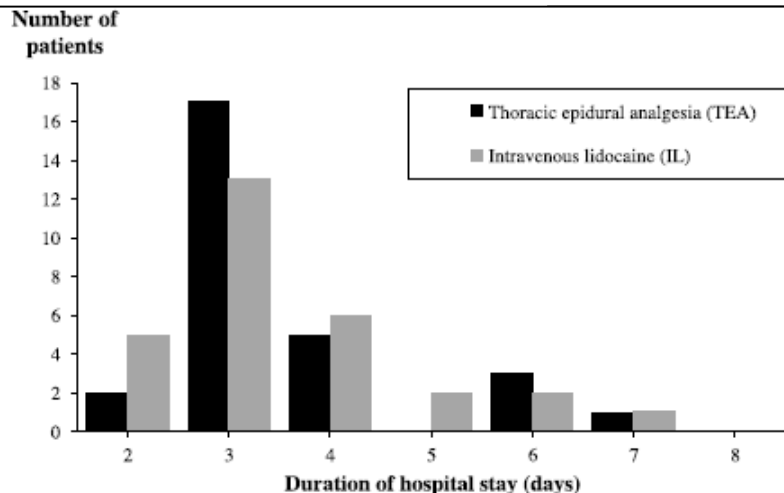


FIGURE 2. Distribution of duration of hospital stay.

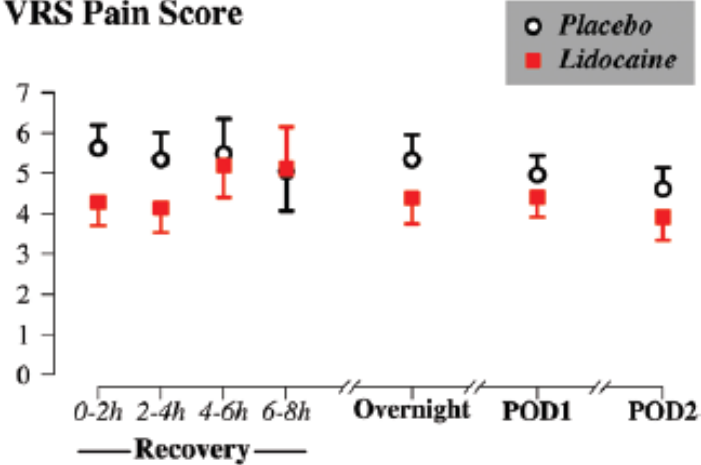
- Laparoscopic Colorectal RCT n=60
- TEA vs IV Lidocaine plus PCA
- Standardized ERAS Protocol
- No difference in outcomes
- No difference in LOS
- **IV Lidocaine has the same impact as Epidurals.**

TABLE 5. Clinical Data of Postoperative Period

	TEA (n = 30)	IL (n = 30)	P
Time to first drink, hr	4.25 (3–6)	3.75 (2–6)	0.252
Time to first full diet, hr	35 (22–51)	38 (22–46)	0.894
Time sitting out of bed, min			
Day 1	90 (28–135)	120 (27–240)	0.603
Day 2	83 (28–300)	120 (30–360)	0.528
Day 3	125 (30–338)	120 (30–375)	0.801
Time walking out of bed, min			
Day 1	10 (2–15)	9 (3–15)	0.788
Day 2	25 (10–40)	15 (10–46)	0.870
Day 3	30 (12–60)	30 (14–60)	0.817
Readiness to discharge, d	3 (3–4)	3 (3–4)	0.534
Hospital stay, d	3 (3–4)	3 (3–4)	0.744
Nausea	17 (57%)	11 (37%)	0.438
Vomiting	18 (60%)	12 (40%)	0.791
Postoperative complications in hospital			
Urinary retention	3 (10%)	0 (0%)	0.076
Ileus	2 (7%)	6 (20%)	0.129
Bleeding per rectum	1 (3%)	0 (0%)	0.313
Exudate from stoma	0 (0%)	1 (3%)	0.313
Other medical complications	2 (7%)	1 (3%)	0.554

Data are presented as median (interquartile range) or absolute number (%).

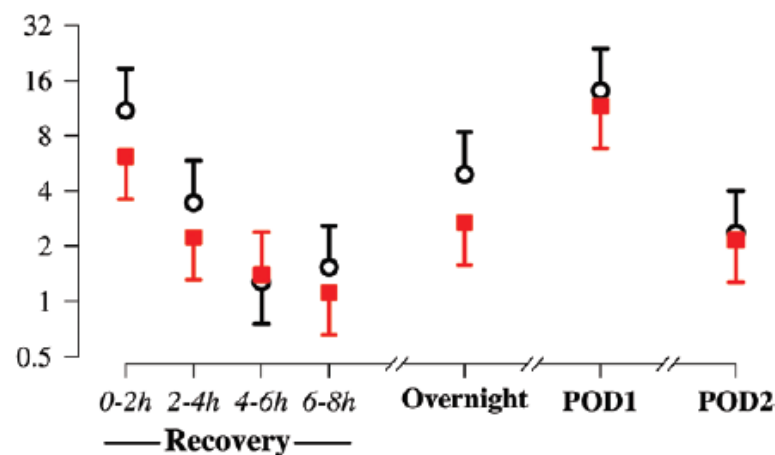
### A VRS Pain Score



## Effect of Perioperative Intravenous Lidocaine Administration on Pain, Opioid Consumption, and Quality of Life after Complex Spine Surgery

Ehab Farag, M.D., F.R.C.A.,\* Michael Ghobrial, M.D.,† Daniel I. Sessler, M.D.,‡ Jarrod E. Dalton, Ph.D.,§ Jinbo Liu, M.D.,|| Jae H. Lee, B.A.,# Sherif Zaky, M.D.,\*\* Edward Benzel, M.D.,†† William Bingaman, M.D.,‡‡ Andrea Kurz, M.D.§§

### B IV Morphine Equivalent Dose (mg)



- Complex Spine, RCT n= 116
- IV lido 2mg/kg/hr from induction to 8h (max 200mg/hr)
- 10- 20% Pain reduction
- 25% reduction in Opioid Consumption at 48h
- Significant improvement in overall recovery

# IV Lidocaine-Systematic Reviews & Meta-Analysis

## Meta-analysis

### Meta-analysis of intravenous lidocaine and postoperative recovery after abdominal surgery

E. Marret<sup>1</sup>, M. Rolin<sup>2</sup>, M. Beaussier<sup>2</sup> and F. Bonnet<sup>1</sup>

**Marret & Bonnet, BJS 2008.**

## REVIEW ARTICLE

Drugs 2010; 70 (9): 1149-1163  
0012-6667/10/0009-1149/\$55.55/0

© 2010 Adis Data Information BV. All rights reserved.

### Impact of Intravenous Lidocaine Infusion on Postoperative Analgesia and Recovery from Surgery

A Systematic Review of Randomized Controlled Trials

Grace C. McCarthy, Sohair A. Megalla and Ashraf S. Habib

Department of Anesthesiology, Duke University Medical Center, Durham, North Carolina, USA

**McCarthy & Habib, Drugs 2010.**

Can J Anesth/J Can Anesth (2011) 58:22–37  
DOI 10.1007/s12630-010-9407-0

## REPORTS OF ORIGINAL INVESTIGATIONS

### Perioperative intravenous lidocaine infusion for postoperative pain control: a meta-analysis of randomized controlled trials

Perfusion intraveineuse périopératoire de lidocaïne pour le contrôle de la douleur postopératoire: une méta-analyse d'études randomisées contrôlées

Louise Vigneault, MD • Alexis F. Turgeon, MD • Dany Côté, MD •  
François Lauzier, MD • Ryan Zarychanski, MD • Lynne Moore, PhD •  
Lauralyn A. McIntyre, MD • Pierre C. Nicole, MD • Dean A. Fergusson, PhD

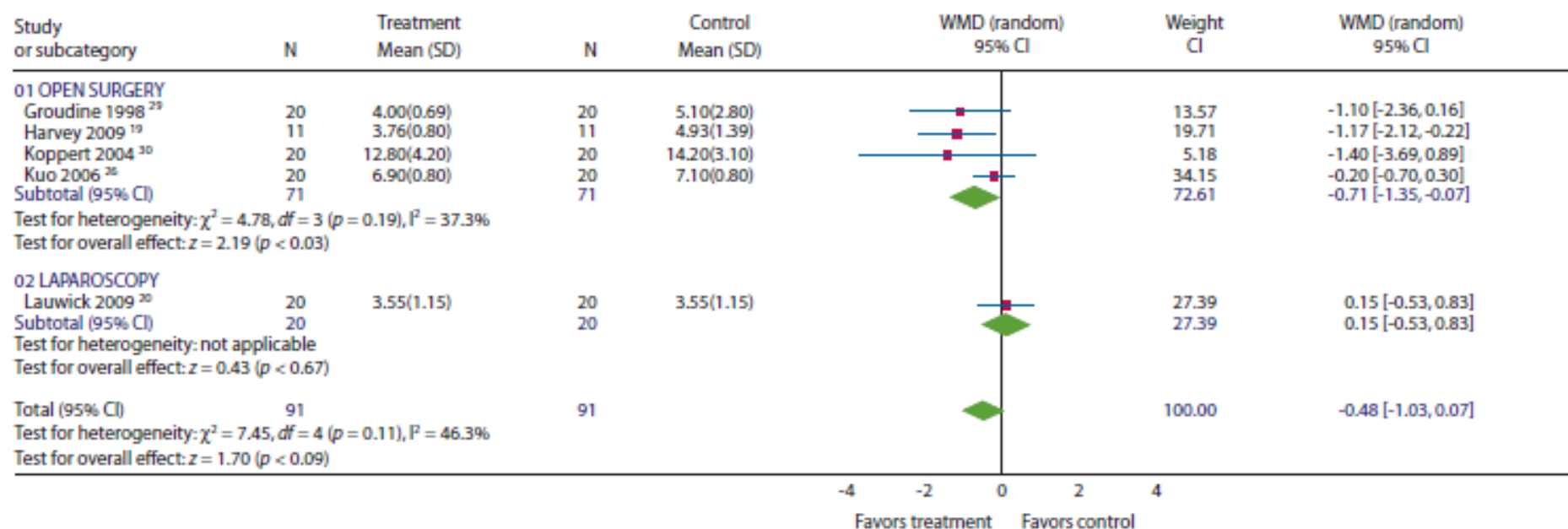
**Vigneault & Fergusson, CJA 2010.**

# Perioperative Systemic Lidocaine for Postoperative Analgesia and Recovery after Abdominal Surgery: A Meta-analysis of Randomized Controlled Trials

Yanxia Sun, M.D.<sup>1</sup> • Tianzuo Li, M.D.<sup>1</sup> • Nan Wang, M.D., Ph.D.<sup>2</sup> • Yue Yun, M.D.<sup>3</sup>  
Tong J. Gan, M.D., M.H.S., F.R.C.A.<sup>4</sup>

Review: Intravenous lidocaine for postoperative pain management  
Comparison: 05 Length of Hospital Stay  
Outcome: 01 LENGTH OF HOSPITAL STAY

DIS COLON RECT. 2012



**FIGURE 5.** Length of hospital stay. WMD = weighted mean differences.

### Case Report

## Continuous intravenous lidocaine in the treatment of paralytic ileus due to severe spinal cord injury

A. BAUMANN<sup>1</sup>, G. AUDIBERT<sup>1</sup>, O. KLEIN<sup>2</sup> and P. M. MERTES<sup>1</sup>

<sup>1</sup>Département d'Anesthésie-Réanimation, Hôpital Central, Centre Hospitalier Universitaire de Nancy, Université Henri Poincaré, 54035 Nancy Cedex, France and <sup>2</sup>Département de Neurochirurgie, Hôpital Central, Centre Hospitalier Universitaire de Nancy, Université Henri Poincaré, France

Patient	Sex	Age	Injury mechanism	SCI level	Ileus length before lidocaine (days)	Transit return after lidocaine (h)
1	M	34	SC section T9	T9	10	17
2	M	60	Compression T6	T6	9	10
3	F	43	T10–T11 fracture	T10	5	None after 36 h
4	M	30	T10 fracture	T10	8	20
5	M	51	T6–T7 fracture	T6	3	None after 36 h
6	F	67	T6–T7 fracture	T6	9	20
7	F	59	T11 fracture	Paraparesia	4	10

# Intraoperative infusion of lidocaine reduces postoperative fentanyl requirements in patients undergoing laparoscopic cholecystectomy

*[Une perfusion peropératoire de lidocaïne réduit les besoins postopératoires en fentanyl chez les patients subissant une cholécystectomie par laparoscopie]*

Severine Lauwick MD,\* Do Jun Kim MSc,\* Giuliano Michelagnoli MD,\* Giovanna Liane Feldman MD,† Gerald Fried MD,† Franco Carli MD MPHIL\*

CAN J ANESTH 55: 11 www.cja-jca.org November, 2008



NIH Public Access

Author Manuscript

*Reg Anesth Pain Med.* Author manuscript; available in PMC 2011 May 1.

Published in final edited form as:

*Reg Anesth Pain Med.* 2010 ; 35(3): 249–254. doi:10.1097/AAP.0b013e3181d23386.

**Intravenous Lidocaine Reduces Ischemic Pain in Healthy Volunteers**

Grigoras A et al. Perioperative intravenous lidocaine decreases the incidence of **persistent pain** after **breast surgery**. *Clin J Pain.* 2012;28:567-72.

De Oliveira GS Jr et al. Systemic lidocaine to improve postoperative quality of recovery **after ambulatory laparoscopic surgery**. *Anesth Analg.* 2012;115:262-7.



## **IV Lidocaine Use-**

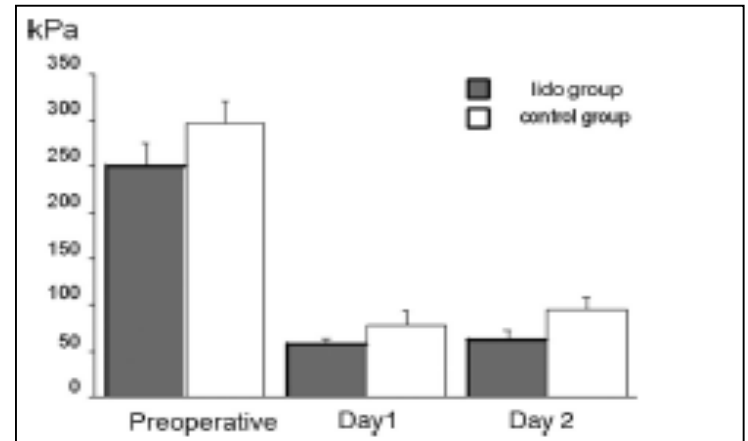
### **The Good, The Bad & The Ugly!**

# **Lack of Impact of Intravenous Lidocaine on Analgesia, Functional Recovery, and Nociceptive Pain Threshold after Total Hip Arthroplasty**

Frédéric Martin, M.D.,\* Kamel Cherif, M.D.,† Marc Emile Gentili, M.D., Ph.D.,‡ Dominique Enel, M.D.,‡ Emuri Abe, Pharm.D.,§ Jean Claude Alvarez, Pharm.D., Ph.D.,|| Jean Xavier Mezoit, M.D., Ph.D.,# Marcel Chauvin, M.D., Ph.D.,\*\* Didier Bouhassira, M.D., Ph.D.,†† Dominique Fletcher, M.D., Ph.D.\*\*

**Table 2. Perioperative Opioid Consumption**

	Lidocaine	Placebo
Perioperative sufentanil dose, $\mu\text{g}$	50 [40–66]	45 [35–54]
Morphine given in PACU, mg	12 [8–20]	18 [12–20]
0–24 h cumulative postoperative morphine consumption without PACU, mg	17 [9–28]	15 [9–23]
0–48 h cumulative postoperative morphine consumption including PACU, mg	43 [28–63]	46 [32–57]



- THR, RCT n=60, Lido 1.5mg/kg x 1h
- Post op IV PCA morphine
- No effect on VAS- rest & movement (24h, 48h & 3mo.)
- No reduction in PCA use,
- No decrease in hyperalgesia or hospital stay

## **Equivalent Outcomes During Postoperative Patient-Controlled Intravenous Analgesia with Lidocaine Plus Morphine Versus Morphine Alone**

M. Soledad Cepeda, MD\*, Martha Delgado, MD\*, Marion Ponce, MD\*, Carlos A. Cruz, MD\*, and Daniel B. Carr, MD†

Departments of Anesthesia, \*San Ignacio Hospital, Bogotá, Colombia, and †New England Medical Center, Boston, Massachusetts

To evaluate a possible opioid-sparing effect of intravenous lidocaine we conducted a randomized, double-blind clinical trial. Patients undergoing intraabdominal surgery under general anesthesia were treated with patient-controlled analgesia (PCA) in three groups: Group 1 ( $n = 100$ ; morphine 1 mg/mL), Group 2 ( $n = 44$ ; morphine 1 mg/mL plus lidocaine 10 mg/mL), and Group 3 ( $n = 51$ ; morphine 1 mg/mL plus lidocaine 20 mg/mL). Pain was evaluated using a 0–10 visual analog scale in the postanesthesia care unit (PACU) during deep inhalation at 15 and 30 min, and at 1, 2, and 4 h after arrival in the PACU, and continued after PACU

discharge every 4 h for 36 h. Patients whose pain was more than 4/10 in the PACU received 2.5 mL of the respective solutions every 7 min until pain was less than 4/10; then PCA was started. The number of bolus and cumulative drug doses during the study were recorded. Along with pain intensity, we assessed vital signs and side effects. Time to acceptance of oral liquids was also determined. Adding lidocaine 10 or 20 mg/mL to PCA morphine 1 mg/mL for acute pain treatment after abdominal surgery yielded no differences in opioid use, pain levels, or side effects.

(Anesth Analg 1996;83:102–6)

# Caution- Intra-operative Use

1122 Anesth Analg 1996;83:1122-5

## **The Effect of Intravenous Lidocaine on Intraoperative Somatosensory Evoked Potentials During Scoliosis Surgery**

Virginie Chaves-Vischer, MD\*, Robert Brustowicz, MD†, and Sandra L. Helmers, MD\*

Department of Neurology, \*Division of Neurophysiology and †Anesthesiology, Harvard Medical School, Children's Hospital, Boston, Massachusetts

In conclusion, our observations in two patients undergoing scoliosis surgery show that an IV bolus of lidocaine can transiently depress, or even suppress, the intraoperative cortical SSEP, and may therefore mimic spinal cord ischemia. Although these results

## **The Effects of Systemic Lidocaine on Airway Tone and Pulmonary Function in Asthmatic Subjects**

**CONCLUSION:** Lidocaine, which reduces airway responsiveness to drugs that cause bronchospasm through sensory nerve activation, did not reduce baseline airway tone. Instead, even when administered IV, lidocaine significantly increased airway tone and caused airway narrowing. Therefore, while the administration of lidocaine can prevent intubation-induced bronchospasm, the airways should be constantly monitored by auscultation even during IV lidocaine administration.

(Anesth Analg 2007;104:1109-15)

Chang HY, Togias A, Brown RH. Anesth Analg. 2007 May;104(5):1109-15

## The Effect of Too Much Intravenous Lidocaine on Bispectral Index

Cheryl M. Gaughen, MD

Marcel Durieux, MD, PhD

(Anesth Analg 2006;103:1464-5)

Vol. 103, No. 6, December 2006

- 79 yr, 50kg gyne Sx
- GA + Lidocaine, accidental 800mg bolus iv
- set **100mg/min** instead of **100mg/hr**
- BIS 80 to 0, BP 55/35, HR 70/min, PACs
- Resuscitation- BIS returned to 60 after 10 mins
- Sx proceeded, Lido restarted and BIS remained normal
- After 3h Sx, remained weak and drowsy
- extubated 1h later in PACU, recovered fully, no sequelae.

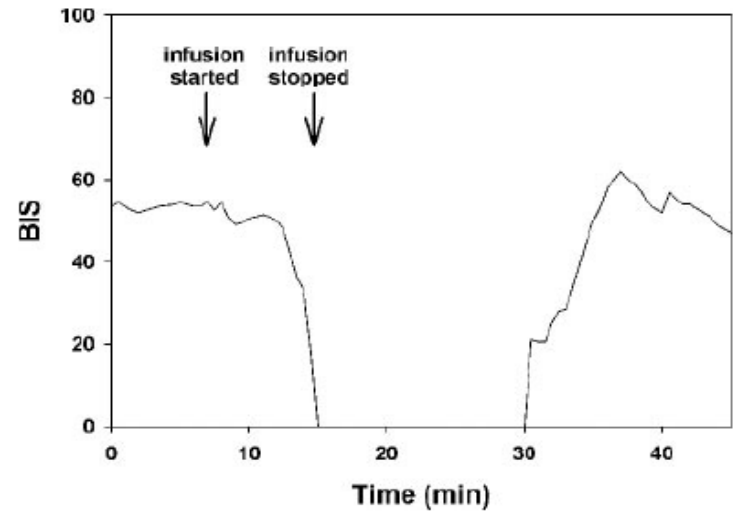


Figure 1. Bispectral index (BIS) progression after administration of approximately 800 mg of lidocaine IV over 8 min by a misprogrammed infusion pump in an anesthetized patient. BIS rapidly decreased to 0, and returned to normal values approximately 15 min later. Data were traced directly from the BIS monitor screen.

## Anesthesiologist Mistakenly Administers Fatal Dose of Lidocaine

Death is blamed on medication mix-up.

Published: March 19, 2014

Category: [Outpatient Surgery News and Trends](#) > [General Surgical News and Reports](#)

A Connecticut anesthesiologist who administered a fatal dose of lidocaine instead of the intended Hespan has been fined \$7,500 and reprimanded by the state's medical examining board.



## **Lidocaine and Acute Pain- The Ottawa Experience**

# **Intravenous lidocaine does not reduce length of hospital stay following abdominal hysterectomy**

## **La lidocaïne intraveineuse ne réduit pas la durée de séjour à l'hôpital après une hystérectomie abdominale**

Gregory L. Bryson, MD · Ilia Charapov, MD ·  
Gregory Krolczyk, MD · Monica Taljaard, PhD ·  
Dennis Reid, MB ChB

Received: 29 January 2010 / Accepted: 10 May 2010 / Published online: 8 June 2010  
© Canadian Anesthesiologists' Society 2010



**Table 4** Numeric rating scores for pain

	Lidocaine ( <i>n</i> = 44)	Control ( <i>n</i> = 46)	Mean difference (95% CI)
NRS rest (PACU)	3.9 (3.0)	4.6 (2.6)	−0.7 (−1.9 to 0.5)
NRS active (PACU)	5.3 (3.3)	5.3 (2.9)	0.0 (−1.3 to 1.3)
NRS rest (6 hr)	3.1 (2.0)	3.2 (1.9)	−0.1 (−0.9 to 0.7)
NRS active (6 hr)	4.7 (2.4)	5.3 (2.1)	−0.6 (−1.5 to 0.4)
NRS rest (24 hr)	2.3 (1.7)	2.0 (1.7)	0.3 (−0.5 to 1.0)
NRS active (24 hr)	4.4 (2.3)	4.6 (2.2)	−0.2 (−1.1 to 0.7)
NRS rest (48 hr)	1.4 (1.2)	1.3 (1.3)	0.2 (−0.4 to 0.7)
NRS active (48 hr)	3.5 (2.0)	3.3 (2.4)	0.7 (−0.7 to 1.0)



## IV Lidocaine- Intraoperative Indications

### ***Sans peridurale*** (Non Epidural)

- GI/ GU/ HPB/ Vascular/ ERAS
- contraindicated
- refused
- difficult/ failed

### ***Douleur difficile*** (Difficult Pain)

- major Spines, trauma
- chronic pain, vascular
- opioid tolerant,
- substance abuse etc.

# FentaKetaCaine

1- 2mcg/kg/hr	Fentanyl	200mcg
0.1-0.2mg/kg/hr	Ketamine	20mg
1-2 mg/kg/hr	Lidocaine	200mg

**FentaKetaCaine** [Program Syringe Pump for Lidocaine]



The Ottawa | L'Hôpital  
Hospital | d'Ottawa

## NURSING POLICIES, PROCEDURES & PROTOCOLS

### PAIN - INTRAVENOUS OR SUBCUTANEOUS LIDOCAINE FOR PAIN MANAGEMENT

NO.: 00063

(Formerly NSG2397)

The initial dose of lidocaine will be administered in a clinical area where cardiac monitoring and resuscitative equipment is available e.g. Post-Anesthesia Care Unit (PACU), Pain Management Unit (PMU), or clinical unit (provided 12-lead ECG, resuscitative equipment/cardiac arrest cart, non invasive blood pressure and pulse oximeter are available to monitor vital signs). The anesthesiologist or palliative care physician must remain in attendance with the patient for at least 15 minutes after administration of the lidocaine bolus. An exception regarding location of treatment may be made for palliative care patients. It is the physician's responsibility to co-ordinate the location.

Following the initial doses of lidocaine, patients whose pain control is maintained with a continuous lidocaine infusion do not require cardiac monitoring and continuous BP monitoring. The Ottawa Hospital Drug Parenteral Manual requires cardiac monitoring during a lidocaine infusion due to the most common indication of intravenous lidocaine as a cardiac antiarrhythmic medication. Since this is not the indication for the use of lidocaine in this instance, the requirement for continuous cardiac monitoring during the continuous infusion is set aside.

## Acute Pain Service patients:

- Lidocaine 1.5 mg/kg given slow IV push over 2-4 minutes then initiate infusion of 0.5-2 mg/kg/hr at the discretion of attending anesthesiologist. Usually an infusion of 1 mg/kg/hr is a good starting dose. This infusion can be adjusted by 0.25-0.5 mg/kg/hr based on clinical response (pain scores) or signs of toxicity. Allow 8 hours for steady-state serum levels to be achieved before

### During treatment of Lidocaine administration (by Physician)

- i. Assess pain q 15 minutes until pain is stable, or as determined by the physician.
- ii. Continuous visual patient monitoring during first 20 minutes after initiation of infusion, and then as per Physician's orders:
  - Oxygen saturation, blood pressure and heart rate: q5 minutes for first 20 minutes, then q30 minutes for 1 hour, then as per Physician's orders.
  - Side effects
  - Sedation:
    - 0 None-Fully awake, alert
    - 1 Mild-occasionally drowsy, easily aroused
    - 2 Moderate-frequently drowsy; easily roused, drifts off to sleep during conversation
    - 3 Severe-Somnolent; difficult to arouse, minimal or no response to stimuli
    - S Sleep-Normal sleep; easily aroused, RR > 10 and even, not shallow
- iii. ECG monitoring may be carried out at the discretion of the attending physician.
- iv. Administer Midazolam 1-2mgs IV PRN if patient develops twitching, tremors or seizures.

# Post Op (APS) Indications for IV Lidocaine



## 1. Alternative to Regional Anesthetic Technique

- GI/ GU Sx- Epidural required- not done/ inadequate
- Polytrauma- multiple/ significant injuries
- Rib Fractures
- large areas of superficial injury, burns, degloving, crush injury

## 2. ERAS

- Laparoscopic Surgery

## 3. Difficult to treat APS patients- Spines and Amputations

- Diagnosis- Acute Neuropathic Pain
- Therapy- Single bolus/ Infusion in Chronic pain/ Opioid tolerant

## 4. Opioid Sparing Technique- Obese, OSA, elderly, sensitive



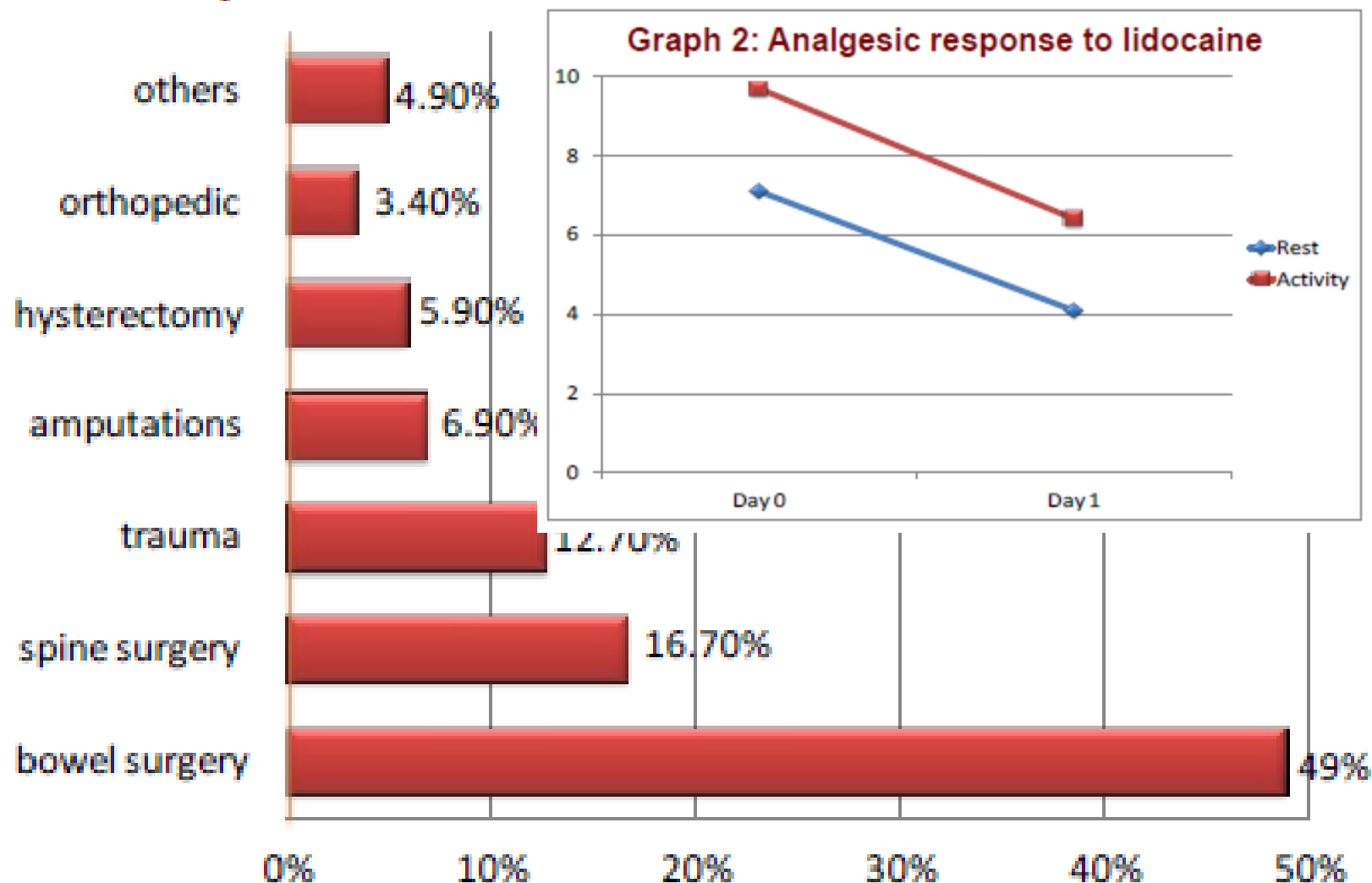
## IV LIDOCAINE INFUSION FOR ACUTE PAIN ON THE SURGICAL WARDS: A RETROSPECTIVE STUDY

Qutaiba A.Tawfic<sup>1</sup>, Naveen Eipe<sup>2</sup>, John Penning<sup>3</sup>

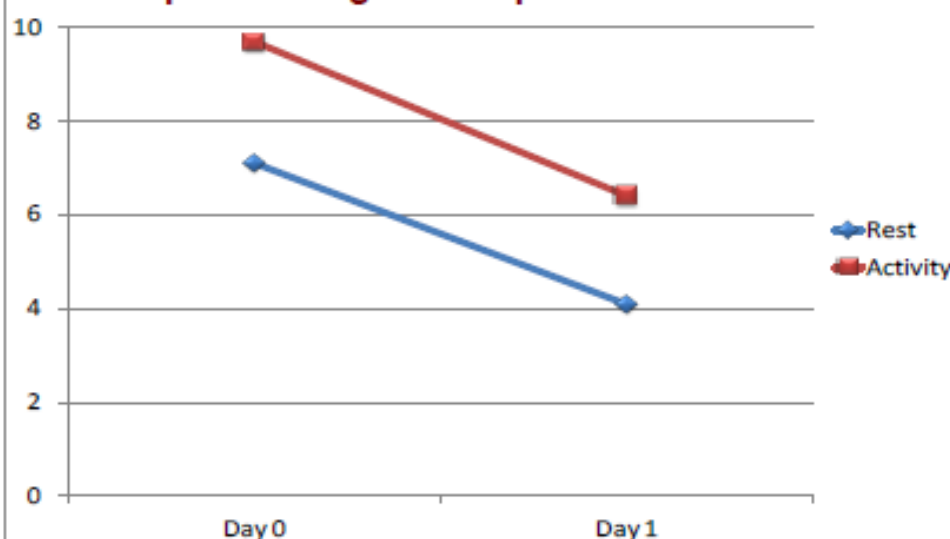
Clinical Fellows<sup>1</sup>, Staff Anesthesiologist<sup>2</sup>, Director<sup>3</sup>; Acute Pain Service. Department of Anesthesiology, The Ottawa Hospital.



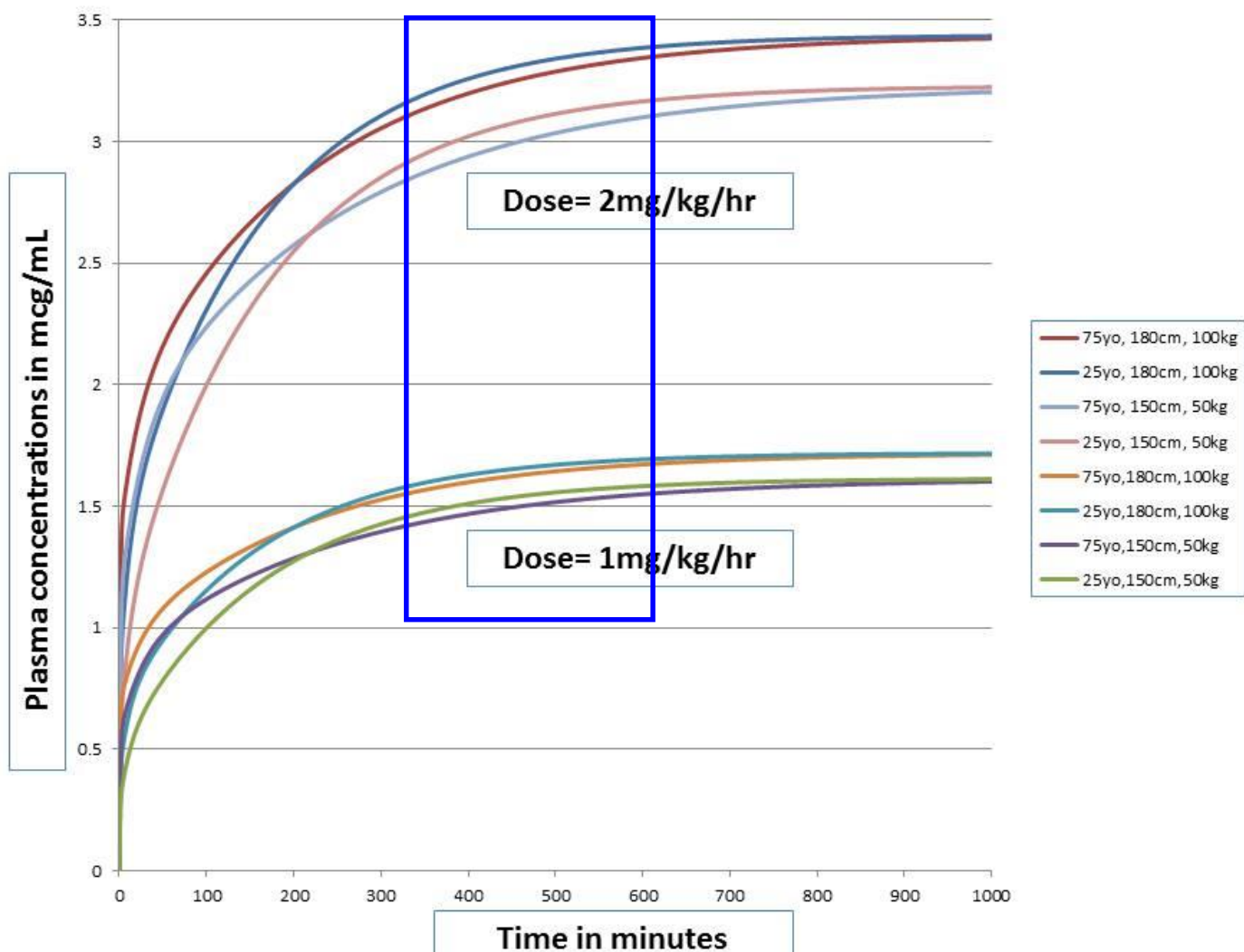
### Graph 1: Indications for intravenous lidocaine



### Graph 2: Analgesic response to lidocaine



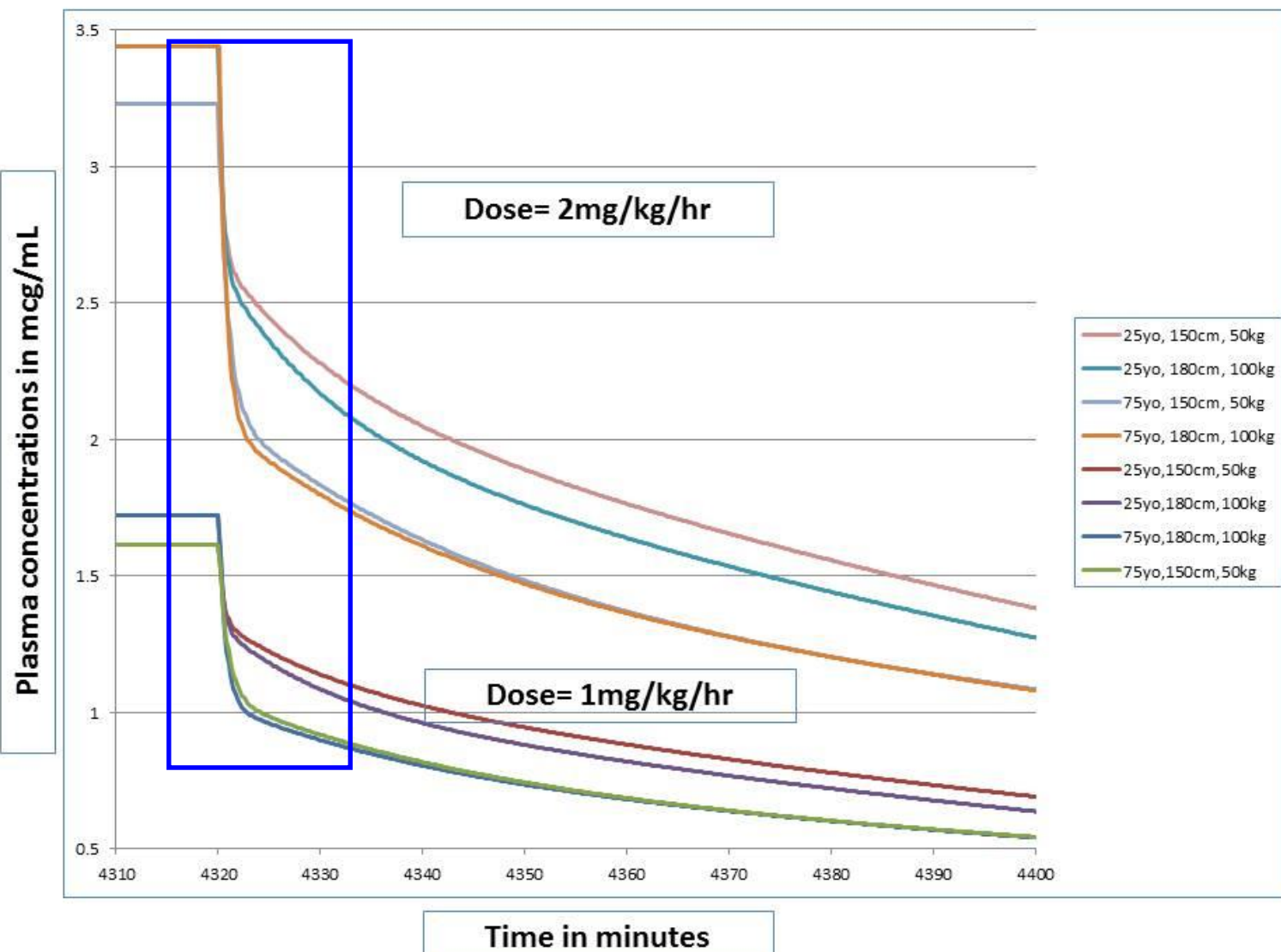
# Simulated Safety of Lidocaine Infusion (*without bolus*)



Kuipers JA et al . Modeling population pharmacokinetics of lidocaine: should cardiac output be included as a patient factor? *Anesthesiology*. 2001; 94:566-73.



# Simulated Safety of Discontinuing Lidocaine Infusion



Kuipers JA et al . Modeling population pharmacokinetics of lidocaine: should cardiac output be included as a patient factor? *Anesthesiology*. 2001; 94:566-73.

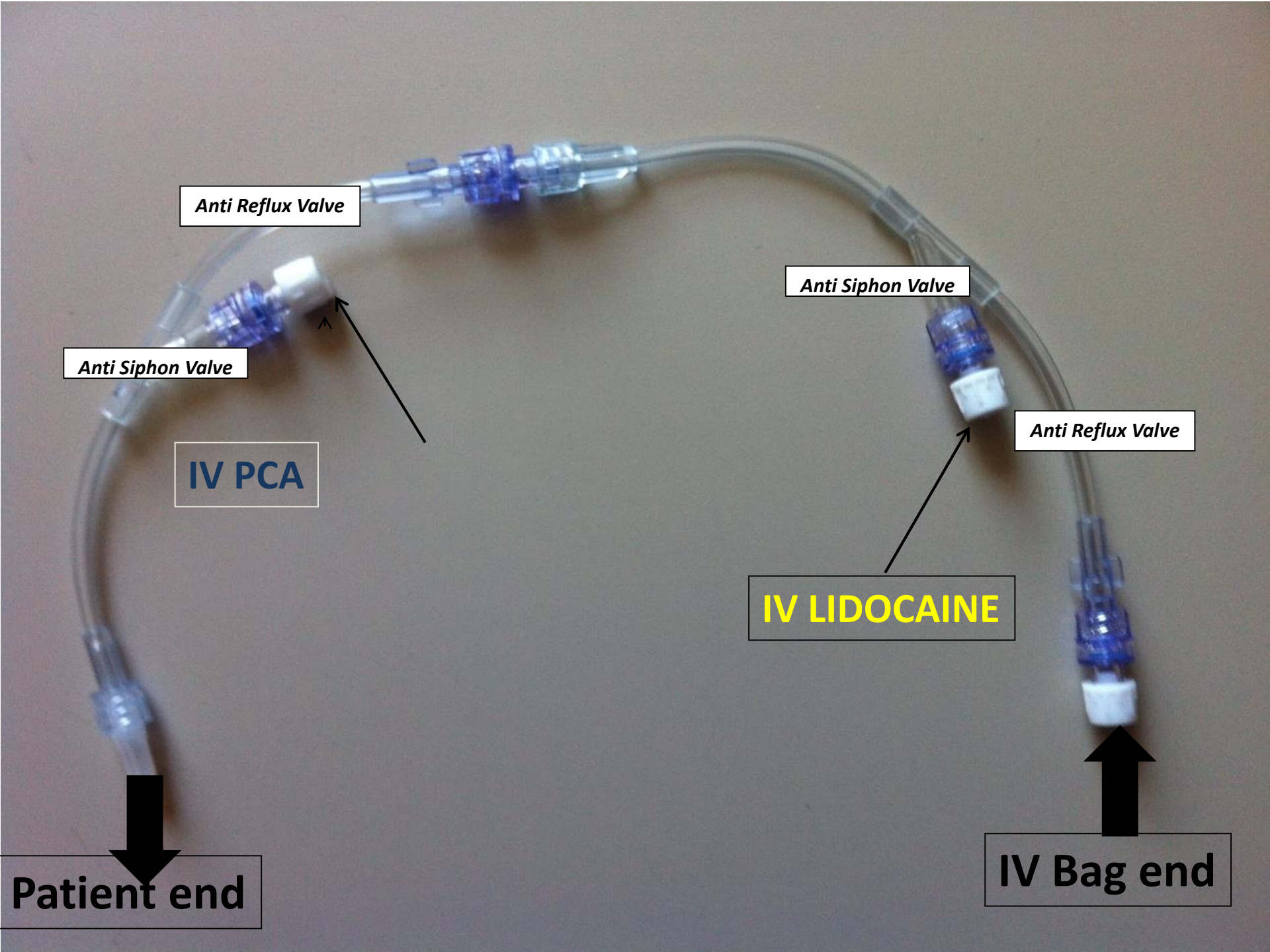


**Accidents Happen-  
1 Near Miss,  
2 Empty Bags &  
3 Steps taken!**

- Postop **Spine**- Sent to Xray Dept.- Came back with empty lidocaine bag- off the pump- feeling much better!
- Postop **Laparotomy**- Sent from PACU to Floor- On transfer from stretcher to bed- unresponsive- code blue- resuscitation- empty lidocaine bag!

**Steps taken-**

1. Reduced Bag **Volume** 500ml to 250ml (0.4% Lido = 1gm)
2. Proper handover & **Bags/ lines** labelled for patient/ Lidocaine
3. Run through PCA **tubing** with anti- siphon valve and anti- reflux lines



*Anti Reflux Valve*

*Anti Siphon Valve*

**IV PCA**

*Anti Siphon Valve*

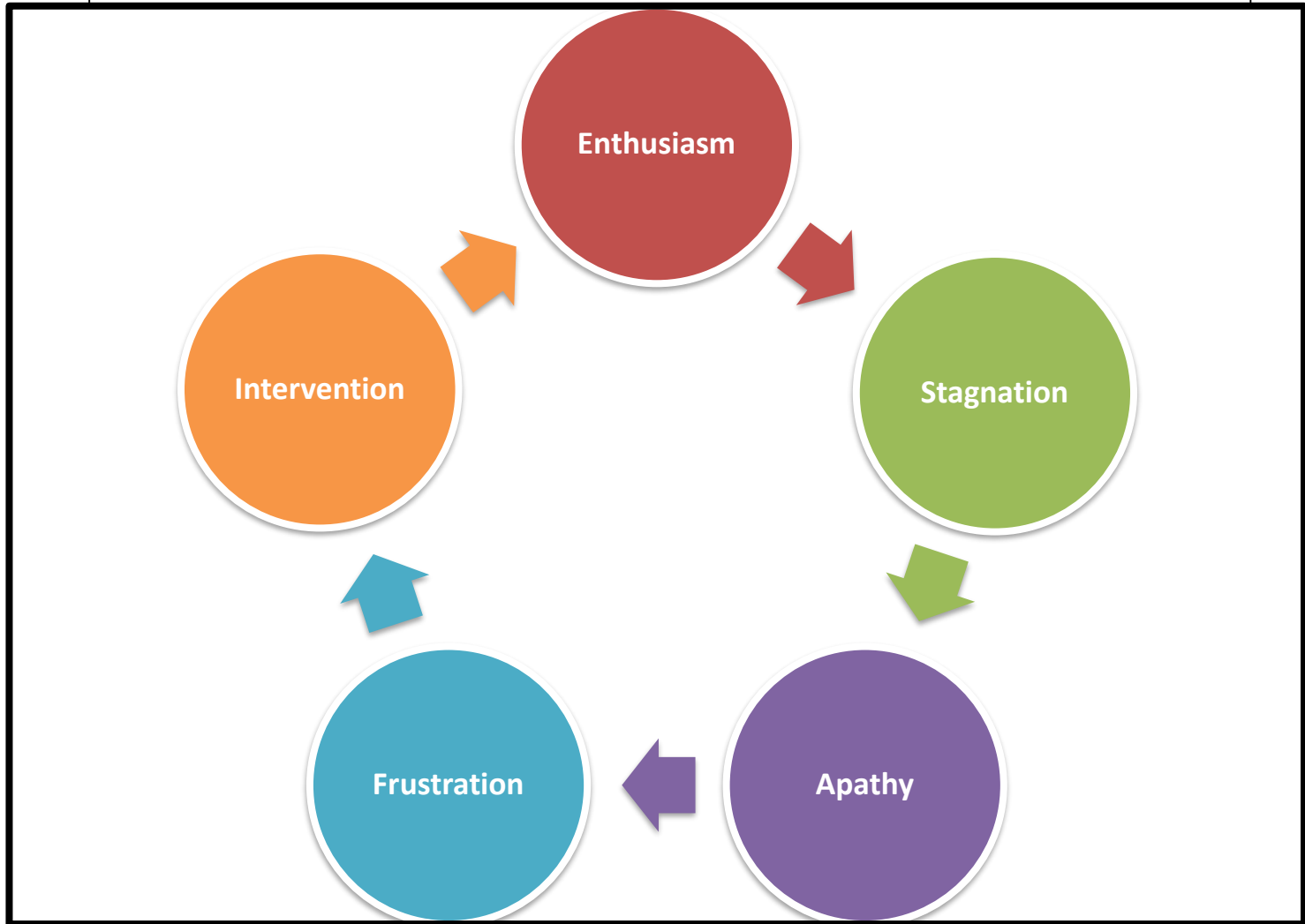
*Anti Reflux Valve*

**IV LIDOCAINE**

**Patient end**

**IV Bag end**

## Implementation of a policy for IV Lidocaine



**Edelwich & Brodsky** (1980): Burn-Out - Stages of Disillusionment in the Helping Professions. Human Sciences Press, New York.

# Summary- IV Lidocaine for Acute Pain

## IV Lidocaine-

- *Anti-inflammatory*
- *Anti nociceptive- analgesic*
- *Anti pronociceptive- antihyperalgesic*
- *Direct/ Indirect effect on GI*

- **Evidence**-decreases pain, opioids & PONV, ileus, enhances bowel recovery, feeding, ambulation, LOS and quality of care (**ERAS**)
- **Dose**- bolus (1-2 mg/kg) & infusion (1- 2 mg/kg/hr) upto 24hrs, titrate
- **Indications**- Alternative to **Epidural** & Acute on **Chronic** Pain
- Careful monitoring- CNS symptoms precede CVS signs
- **Not All** patients & surgical models,
- Diagnosis & Treatment of Acute Hyperalgesia & Neuropathic pain
- Develop local policy- **Ottawa Experience**- safe & well tolerated!

# All APS Roads do not lead to the PCA Home!

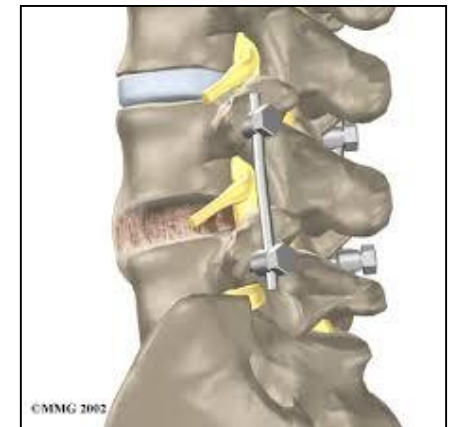
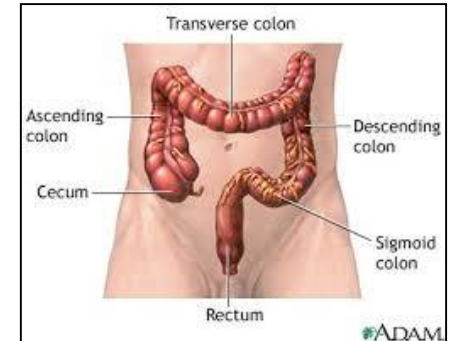
- **AX(65F)** Vasculopath. Postop Below Knee Amputation (GA) in PACU- **Pain Crises!**
- **BY(73M)**: Laparoscopic sigmoidectomy (GA), converted to Laparotomy. **Postop APS orders?**
- **CZ(42M)**: Chronic Pain/ Opioid Tolerant, 2wks postop in ER- poorly controlled pain with Ileus. **Analgesic Rescue?**

1. IVPCA

2. Ketamine

3. Lidocaine

4. Pregabalin





**One good thing about  
Lidocaine when it hits you,  
you feel no pain.**

*-Bob Marley*

## Intravenous Lidocaine for Acute Pain

- Pharmacology
- Evidence
- Experience

Questions/ Comments?- Thank You!

Naveen Eipe, MD [neipe@toh.on.ca](mailto:neipe@toh.on.ca)

Twitter @NaveenEipe