

LIFE LONG LEARNING

DOGMA, Traditions: What is the Evidence?

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CEO Trollway Anesthesia and Educational Services

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Disclosure;

I tutor at-risk Nurse Anesthesia Residents for school, SEE, and NCE but have NO financial relationship with the big six review companies.

I am NOT an item writer!

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STORM ANESTHESIA
recertCRNA

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Important Notice

Every attempt has been made to us generic names. At times trade names are used.

I do use the vernacular

Mentioning a company does not imply endorsement

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Disclaimer; Chronic Cough



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Hard Lecture to Give

PresenterMedia <https://www.presentermedia.com/>

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TOPAMAX BIRTH DEFECTS

67 BIRTH DEFECTS

32 MILLION Birth Defects

4.3 MILLION Birth Defects

581 MILLION Birth Defects

422 REPORTS of Birth Defects

75 LAWSUITS Filed

Topamax® (topiramate)

Topamax® (topiramate) Tablets 200 mg

CAUTION: Verify Prescription Before Dispensing

ATTENTION PHARMACIST: Dispense Accompanying Medication Guide to Each Patient

Rx only 60 tablets

Count 7802409

Exp. Date

Revised November 2011

janssen

7

High-dose riboflavin treatment is efficacious in migraine prophylaxis: an open study in a tertiary care centre.

Boehrike C¹, Reuter U, Flach U, Schuh-Hofer S, Einhäupl KM, Arnold G.

Headache Pain. 2008 Oct;10(5):381-5. doi: 10.1007/s10194-008-0142-2. Epub 2009 Aug 1.

Effectiveness of high-dose riboflavin in migraine prophylaxis. A randomized controlled trial.

Condi M¹, Pesar A, Abbazzi A, Parneggiani A.

Schoenen J¹, Jacoux J, Lenaerts M.

400 mg of riboflavin, 65 mg of caffeine and 325 mg Acetaminophen

Supplementation with Riboflavin (Vitamin B2) for Migraine Prophylaxis in Adults and Children: A Review.

Namazani N¹, Heshmati J², Tariqat-Esfahani A³.

Int J Vitam Nutr Res. 2015;85(1-2):79-87. doi: 10.1024/0300-9831/a000225.

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How Do You View Things?

The Same Problem, Different Path, but the Same Answers?

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Like three people will get this but it's worth it.

PENCIL...

In less than 5 years tapes were gone

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14-17 Years

If you ever think about giving up, remember why you held on for so long.

Hayley Williams

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Practice Question

Do you put Succinylcholine in the fridge?


If you do, why do you do that?

How do I answer?

This is Me

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Did You Ever Wonder Why?




In 2007, Adnet found that a 20 ml vial of succinylcholine is stable at room temp for 4.8 months.


The tradition we follow is based on succinylcholine POWDER and JACHO

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It is the mark of an educated mind to be able to entertain a thought without accepting it



~ Aristotle ~



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Shibboleth -- Ancient Hebrew Word


A *custom*, principle, or belief distinguishing a particular class or group of people.

Dogma

Dogma is a principle or set of principles laid down by an authority as incontrovertibly true.

It serves as part of the primary basis of an ideology or belief system, and it cannot be changed or discarded

ANESTHESIA especially a long-standing one regarded as outmoded or no longer important:

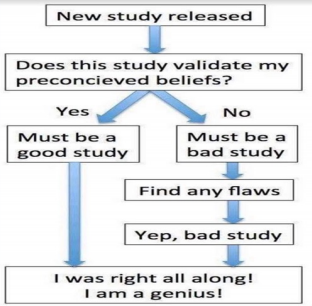


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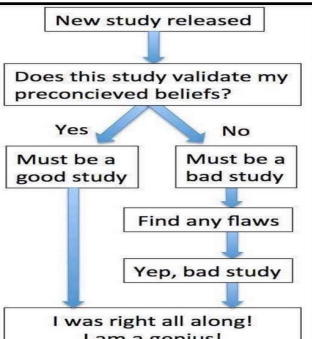
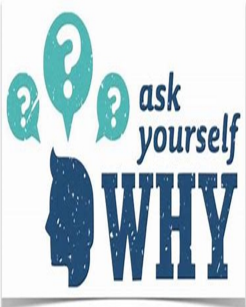


Shibboleth

A *custom*, principle, or belief distinguishing a particular group of people.

It serves as part of the primary basis of an ideology or belief system, and it cannot be changed or discarded

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THE MOST DANGEROUS PHRASE IN THE LANGUAGE IS 'WE'VE ALWAYS DONE IT THIS WAY'

I have always done it this way?

This is the way I was taught?

I have been doing anesthesia this way and it always worked?

This is what we do at the organization?



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How Do We Practice Now?

Traditions, Dogma and Myths in Anesthesia Practice
 John H. Pennant, M.B.B.S., F.R.C.A.; Girish P. Joshi, M.B.B.S., MD, FFAR.C.S.I.
 ASA Monitor 04 2009, Vol.73, 10-11.

Evidenced-Based Practice
People tend to pick and choose this!

"Not in my wheel-house"
 We don't have enough money!

We like to blame OTHERS! Punitive System



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Challenges of Dogma

Inborn fear of change **We know what we are currently doing has been SAFE for us!**

The owners of a dogma are in control

Providers need control

Dogmas generate income




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To Fight Dogma (Culture)

Strong Personal Conviction
Thick Skin (Some People Will Hate You!)
"Young" People – Early Innovators
No Industry Dependence
 Knowledge of dogmas in the history of anesthesia and stay up-dated

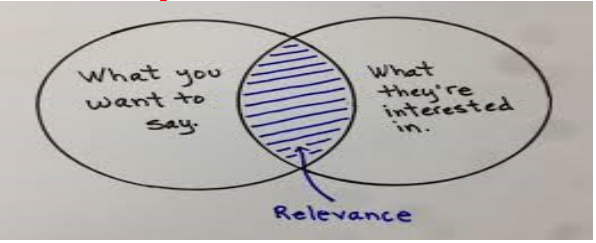


We Must Fight Them!

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Clinically Relevant -- DOGMA




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Hypotensive Thought Pattern
They stopped making Vasopressin

Methylene blue?
 Vasopressin?
 Glucagon?
 Norepinephrine 2-4 mcg IV PUSH?



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Norepinephrine

Norepinephrine Intermittent Intravenous Boluses to Prevent Hypotension During Spinal Anesthesia for Cesarean Delivery: A Sequential Allocation Dose-Finding Study
 Chwastek, Desire N. MBBS BSc (Hons), FRCA; Ngan Kee, Warwick D. MBChB, MD, FANZCA, FRCA; Fung, Lillian MD, FRCP; Downey, Kristi MSc; Ye, Xiang Y. MSc; Carvalho, Jose C. A. MD, PhD, FANZCA, FRCP

Anesthesia & Analgesia, July 2017 - Volume 125 - Issue 1 - p 212-218
 doi: 10.1213/ANE.0000000000001846
 Obstetric Anesthesiology - Original Clinical Research Report

"The use of intermittent IV norepinephrine boluses to prevent spinal-induced hypotension in elective CD seems feasible and was not observed to be associated with adverse outcomes. Practically, we suggest an ED₅₀ dose of 0.1 mcg/kg. Further work is warranted to elucidate the comparative effects of intermittent IV bolus doses of phenylephrine and norepinephrine, in terms of efficacy and safety.

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Vasopressin




<https://www.aacnline.com/>

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Dosing of Vasopressin

Cost was \$59

Intraoperative Hypotension

Dilute with 19 mL NS in a 20cc syringe to create a concentration of 1 unit/mL.

Administer 0.5 – 1 unit to treat hypotension in an adult.



<https://www.aacnline.com/>

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Shortage


Reason for the Shortage American Regent discontinued vasopressin injection in early 2015.

Fresenius Kabi stopped distributing vasopressin on March 15, 2015.

Par Sterile Products introduced Vasostrict injection in November 2014.

This is the only FDA-approved vasopressin injection.

Cost = \$1,597
2606% Increase



<https://www.aacnline.com/>

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24 hours drug free before surgery



72 hours drug free

WHICH IS BETTER?

<https://www.aacnline.com/>

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What Would YOU DO?

40 mg of Lisinopril day of surgery



What would YOU DO?

They NO LONGER Produce Vasopressin

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Cancel.....

ACEI and ARB
Risk of hypotension requiring vasopressors during induction of anesthesia 50% higher in a systematic review

Risk of post-operative acute renal failure after cardiothoracic surgery 28% higher in one recent study

The Official Journal of the Anesthesia Patient Safety Foundation

apsf NEWSLETTER Spring/Summer 2012

In this issue:
Postoperative Woundings - The Darkworld Experience
Survey Results on C-Pain

Vasoplegic Syndrome and Renin-Angiotensin System Antagonists
By Tomi Okano, MD, and David Greenberg, MD

J Hosp Med 2008;3:319-325.
Clin J Am Soc Nephrol. 2008;3:1266-1273.
Ann Thorac Surg.2008;86:1160-116

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Preoperative Use of Angiotensin-Converting Enzyme Inhibitors/Angiotensin Receptor Blockers Is Associated with Increased Risk for Acute Kidney Injury after Cardiovascular Surgery

Pradeep Arora,*¹ Srinji Rajagopalam,¹ Rajiv Ranjan,*¹ Hari Kolli,¹ Manpreet Singh,¹ Rocco Venuto,¹ and James Lohr*¹
 *Division of Nephrology, Veterans Administration Medical Center, and ¹Division of Nephrology, State University of

Their results were published in the June 20, 2012, edition of the *American Journal of Cardiology*.¹ The researchers found that patients who had used ACE inhibitors before surgery were more likely than those who had not to have had problems following surgery. While heart attacks and strokes occurred in the same percentages for both groups, those taking ACE inhibitors had a significantly higher risk of problems involving renal dysfunction and atrial fibrillation after bypass surgery.

In all, 38.1 percent of patients who had used ACE inhibitors had some level of adverse event or events immediately following surgery.

AM Miri, S. Murphy, J. Yu, KD Kochanek. Deaths: Final data for 2008. *National Vital Statistics Reports*; vol. 59 no 10. Hyattsville, MD: National Center for Health Statistics, 2011.
 Si Bandoli, WT Kaye, VJ Lee, W Pao, MA Elzabi, V Nair, HJ Hersh, M Alam, JM Wilson, Y Birnbaum, CM Ballantyne, SS Wang. "Outcomes of Preoperative Angiotensin-Converting Enzyme Inhibitor Therapy in Patients Undergoing Isolated Coronary Artery Bypass Grafting." *Am J Cardiol*. 2012 Jun 20. [Epub ahead of print.]

31

A little light reading on ACE Inhibitors

Rosenman DL, McDonald FS, Ebbert JD, Erwin PJ, LaBella M, Montori VM. Clinical consequences of withholding versus administering renin-angiotensin-aldosterone system antagonists in the preoperative period. *J Hosp Med*. 2008;3:319-325.
 Coriat P, Rice C, Douraki T, et al. Influence of chronic angiotensin-converting enzyme inhibition on anesthetic induction. *Anesthesiology*. 1994;81(2):299-307.
 McCarthy GJ, Hainsworth M, Lindsay K, Wright JM, Brown TA. Pressor responses to tracheal intubation after sublingual captopril. A pilot study. *Anesthesia*. 1990;45(1):243-245.
 Benedetto U, Sciarretto S, Rosciana A, Fiorani B, Refice S, Angeloni E, Sinagra R. Preoperative angiotensin-converting enzyme inhibitors and acute kidney injury after coronary artery bypass grafting. *Ann Thorac Surg*. 2008;86(4):1160-1165.
 Arora P, Rajagopalam S, Ranjan R, et al. Preoperative use of angiotensin-converting enzyme inhibitors/angiotensin receptor blockers is associated with increased risk for acute kidney injury after cardiovascular surgery. *Clin J Am Soc Nephrol*. 2008;3(5):1266-1272.
 Coca SG, Garg AX, Swaminathan M, et al.; TRIBE-AKI Consortium. Preoperative angiotensin-converting enzyme inhibitors and angiotensin receptor blocker use and acute kidney injury in patients undergoing cardiac surgery. *Nephrol Dial Transplant*. 2013;28(11):2787-2799.
 Cilitanova M, Zubicki A, Savu C, et al. The chronic inhibition of angiotensin-converting enzyme impairs postoperative renal function. *Anesth Analg*. 2001;93(5):1111-1115.
 Yacoub R, Patel N, Lohr JW, Rajagopalam S, Naber N, Arora P. Acute kidney injury and death associated with renin-angiotensin system blockade in cardiothoracic

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A little light reading on ACE Inhibitors

Ishikawa S, Griesdale DE, Lohrer J. Acute kidney injury after lung resection surgery: incidence and perioperative risk factors. *Anesth Analg*. 2012;114:1256-1262.
 Khetarpal S, Khadgarpari D, Shanks A, O'Reilly M, Tremper KK. Chronic angiotensin-converting enzyme inhibitor or angiotensin receptor blocker therapy combined with diuretic therapy is associated with increased episodes of hypotension in noncardiac surgery. *J Cardiothorac Vasc Anesth*. 2008;22:180-186.
 Kluger RV, White WD, Hale B, Habib AS, Bennett-Guerrero E. Hemodynamic impact of dexmedetomidine administration in 15,656 noncardiac surgical cases. *J Clin Anesth*. 2012;24:212-220.
 Monk TG, Saini V, Weldon BC, Sigler JC. Anesthetic management and one-year mortality after noncardiac surgery. *Anesth Analg*. 2005;100:4-10.
 Barrios V, Coca A, Eszbor C, Enrique R, Rincon LM. Use of angiotensin-converting enzyme inhibitors and angiotensin receptor blockers in clinical practice. *Expert Rev Cardiovasc Ther*. 2012;10:159-166.
 Varin R, Mulder P, Tomlan F, et al. Improvement of endothelial function by chronic angiotensin-converting enzyme inhibition in heart failure: role of nitric oxide, arachidonic acid, oxidant stress, and bradykinin. *Circulation*. 2000;102:351-356.
 Auron M, Harre B, Kumar A, Michota F. Renin-angiotensin system antagonists in the perioperative setting: clinical consequences and recommendations for practice. *Postgrad Med J*. 2011;87:472-481.
 Billings FTJ, Pretorius M, Siew ED, Yu C, Brown NI. Early postoperative statin therapy is associated with a lower incidence of acute kidney injury after cardiac surgery. *J Cardiothorac Vasc Anesth*. 2010;24:913-920.
 American College of Physicians. *ACP Smart Medicine: Perioperative Medication Management: Tables: Perioperative Cardiovascular Medication Management.*

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Methylene Blue

AANA Journal Course
 Update for Nurse Anesthetists **1**
Pathophysiology and Management of Angiotensin-Converting Enzyme Inhibitor-Associated Refractory Hypotension During the Perioperative Period
 Andrea Thoma, CRNA, MS

ACE inhibitors for refractory hypotension

Methylene Blue
 AANA Journal; April 2013; Vol. 81, No. 2
 Andrea Thoma CRNA MSNA

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Methylene Blue

Methylene blue has been demonstrated to be a potent monoamine oxidase inhibitor (MAO-I) and may cause potentially fatal serotonin toxicity (serotonin syndrome) when combined with serotonin reuptake inhibitors (SRIs).

For treatment of drug-induced methemoglobinemia:
MEMORIZE ME!

Dose: 1-2 mg/kg by slow IV injection
 Symptomatic improvement usually occurs within 30 minutes.
 Repeat IV dose after 30-60 minutes if required.

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"But I Have Never Heard of That?"

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CRICOID PRESSURE TO CONTROL REGURGITATION OF STOMACH CONTENTS DURING INDUCTION OF ANÆSTHESIA

WHEN the contents of stomach or œsophagus gain access to the air-passages during anæsthesia the consequences are disastrous. In spite of modern anæsthetic techniques—or sometimes, regrettably, because of them—regurgitation is still a considerable hazard during the induction of anæsthesia, particularly for operative obstetrics and emergency general surgery.¹⁻⁸

By a simple manœuvre during induction of anæsthesia, regurgitation of gastric or œsophageal contents can be controlled until intubation with a cuffed endotracheal tube is completed. The same manœuvre may also be used to prevent inflation of the stomach (a potent cause of regurgitation) resulting from positive-pressure ventilation

<https://maes.ccoflife.com/>

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Cricoid – esophagus – C5 body alignment

Esophagus lateral to cricoid cartilage in > 50%

<https://maes.ccoflife.com/>

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Cricoid pressure improves patient safety during emergency intubations

Cricoid pressure was introduced to medicine by Brian Sellick in 1961. In **26 patients** considered at risk for aspiration,

No regurgitation occurred during or after application of cricoid pressure in 23.

In 3 patients, regurgitation occurred only after cricoid pressure was relieved following tracheal intubation.

Sellick provided no details regarding induction drugs, ventilation, patient body habitus, or other relevant factors that might also explain his findings.

<https://maes.ccoflife.com/>

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Clin Respir J. 2016 Jun 7. doi: 10.1111/crj.12508. [Epub ahead of print]

A Pilot Randomized Clinical Trial Assessing the Effect of Cricoid Pressure on Risk of Aspiration.
 Bohman JK¹, Kashyap R¹, Lee A², He Z³, Soundar S³, Bolling LL³, Kor DJ¹.

Sellick Made Several Key Assumptions

That the cricoid cartilage, esophagus, and anterior surface of the vertebral body would be in constant alignment; **FALSE**

That his maneuver would fully occlude the esophagus and would prevent gastric contents from refluxing past the cricoid; **FALSE**

That his maneuver would reduce the incidence of pulmonary aspiration associated with “full stomach” conditions; **NO OUTCOME STUDIES PROVING IT**

That cricoid pressure had no adverse consequences. **OBSTRUCTS VIEW OF AIRWAY**

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Truth or Myth

To establish mask ventilation before paralysis or paralysis anytime?

Anesthesia Dogmas and Shibboleths: Barriers to Patient Safety?
 Ronald J. Gordon, MD, PhD, 2012

In 2009, Pennant and Joshi in their paper, “Traditions, Dogmas and Myths in Anesthesia Practice,” noted that, “the more logical and safer approach in all patients would be to administer a muscle relaxant at the earliest opportunity without having to demonstrate facemask ventilation beforehand.”

Salem and Ovassapian emphasized the same point, noting this particular dogma is not supported by available clinical evidence.

Warters et al. reported an identical conclusion, demonstrating a favorable effect of neuromuscular blockade on the ease of difficult mask ventilation.

Calder et al., in a provocative editorial, “Could Safe Practice Be Jeopardizing Safe Practice?” discussed the potential disadvantages resulting from a ventilation check before administration of a muscle relaxant.

<https://maes.ccoflife.com/>

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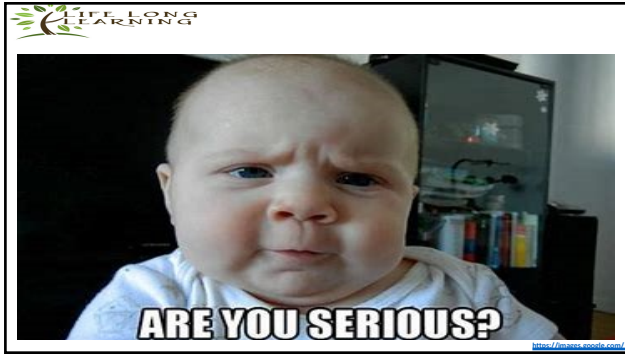
Evaluation of changes in tidal volume during mask ventilation following administration of neuromuscular blocking drugs.
 Sachdeva R¹, Kannan TR, Mendonca C, Patteni M.

The effect of neuromuscular blockade on mask ventilation.
 Warters RD¹, Szabo TA, Spinale FG, DeSantis SM, Reeves JG.

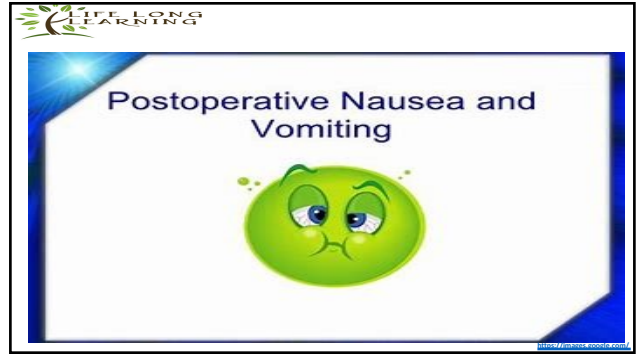
Effects of muscle relaxants on mask ventilation in anesthetized persons with normal upper airway anatomy.
 Ikeda A¹, Isono S, Saito Y, Yogo H, Saito J, Ishikawa T, Nishino T.

Prediction and outcomes of impossible mask ventilation: a review of 50,000 anesthetics.
 Khetani S¹, Martin L, Shanks AM, Trampier KK.

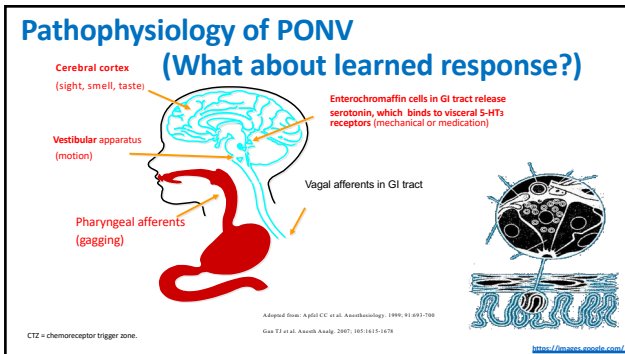
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Maintain Blood Pressure

Decrease risk of PONV

Keep them at Baseline!

KEEP CALM & CHECK YOUR BLOOD PRESSURE

Borgeat A, Ekatozdrakis G, Schenker CA. Postoperative Nausea and Vomiting in Regional Anesthesia. *Anesthesiology*. 2003;98(2):530-547. doi:10.1097/0000542-200302000-00036

Manuilang TB, Visconti CM, Pace NL. Intrathecal Fentanyl is Superior to Intravenous Ondansetron for the Prevention of Postoperative Nausea During Cesarean Delivery with Spinal Anesthesia. *Anesthesia & Analgesia*. 2000;90(5):1162-1166. doi:10.1097/0000539-200005000-00030

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Dosing of Ephedrine

Use of Ephedrine for the Short-Term Treatment of Postoperative Nausea and Vomiting: A Case Report

Elisa Wulman, MS, BC, FNP-BC, Mary Clark, MA, BC, FNP

Intramuscular ephedrine reduces emesis during the first three hours after abdominal hysterectomy

A study by Rothenberg et al. (1991) showed that ephedrine 0.5 mg/kg IM has an antiemetic effect in patients undergoing outpatient laparoscopy with general anesthesia.

Efficacy of Ephedrine in the Prevention of Postoperative Nausea and Vomiting.

Rothenberg D, M. MD, Passaro S, Samuel M. MD, Librock, Kim PhD, RN, McCarthy, Robert J. PharmD, Newman, L. Anesthesiology & Analgesia. JANUARY 1991. SCIENTIFIC ARTICLE. PDF ONLY

EPHEDrine 50 mg/mL

Date _____ Time _____ Int _____

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Dextrose

Intravenous dextrose administration reduces postoperative antiemetic rescue treatment requirements and postanesthesia care unit length of stay.

October 20, 2009 (New Orleans, Louisiana) — The simple intravenous (IV) administration of dextrose following surgery significantly reduces the occurrence of postoperative nausea and vomiting (PONV) and the need for antiemetic medication in the postoperative anesthesia care unit (PACU), investigators reported here at the American Society of Anesthesiologists 2009 Annual Meeting.

Diabu-Bondoc S¹, Vadivelu N, Shimono C, English A, Kosarussavadi B, Dai E, Shellev K, Feinleib J.

More recent ASA recommendations to drink carbohydrate clear fluid 2 hours PREOP (ASA.hq.org guidelines)

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I Want Relaxation!!!!

<https://www.poonit.com/>

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Root of the Problem

Maybe it is not about when or how to reverse, but rather are we using paralytics correctly?

Curr Anesthesiol Pap, 2016;6:164-168. Epub 2016 Mar 22.

Qualitative Neuromuscular Monitoring: How to Optimize the Use of a Peripheral Nerve Stimulator to Reduce the Risk of Residual Neuromuscular Blockade.

Thilen SR¹, Bhananker SM¹.

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“Objective neuromuscular monitoring is evidence-based practice?”

Objective is the key word --- Subjective is what we do.... Leading to bad judgements!

Ericksson LI. *Anesthesiology* 2003;98:1037-9.

Decision Support Tool - Objective Evaluation!

Piezoelectric Sensor

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GE NMT

1. NMT Module
2. NMT Sensor cable
3. ElectroSensor
4. Mechansensor

GE Healthcare E-NMT

- Kinemegraphy provides TOF count and ratio
- Position Mechansensor between thumb and index finger
- Secure with tape across palm

GE Healthcare E-NMT

- Electromyography - Provides TOF count and ratio
- Position 5 electrodes based on colors
- Difficult to properly position all 5 leads

Using the GE-NMT

1. Connect Mechansensor or ElectroSensor and push Start. Automatic baseline TOF established.
2. Give NMTA, continue monitoring. Degree NMTA updated automatically.
3. Return of motor function.

Stampod by Alvarit

- Accelerometer
- No calibration necessary
- Provides TOF count and ratio

Twitch View

- Electromyography - Provides TOF count and ratio
- Single sensor application over thumb
- New, expected approval 2018

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Defasciculating Dose of Paralytics?

Rapid Sequence Induction and Intubation: Current Controversy

El-Orbany, Mohammad MD; Connolly, Lois A. MD

Anesthesia & Analgesia May 2010 - Volume 110 - Issue 5 - p 1318-1325
doi: 10.1213/ANE.0b013e3181d5ae47
Patient Safety: Review Article

Schreiber JU, Lysakowski C, Fuchs-Buder T, Tramer MR. Prevention of succinylcholine-induced fasciculation and myalgia: a metaanalysis of randomized trials. *Anesthesiology* 2005;103:877-84.

La Cour D. Prevention of rise in intragastric pressure due to rocuronium fasciculations by prior dose of d-tubocurarine. *Acta Anaesthesiol Scand* 1979;14:5-15C.

Stern JA, Grosslight KR, Bedford RS, Volmer D. "Defasciculation" with metocurine prevents succinylcholine-induced increases in intracranial pressure. *Anesthesiology* 1987;67:30-3.

<https://www.poonit.com/>

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“Not In My Wheel-House”


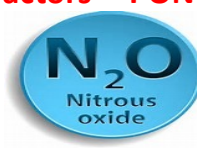

<https://www.poonit.com/>

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Anesthetic-Specific Risk Factors -- PONV

Use of nitrous oxide??




Use of neostigmine to reverse NMB ??

Guo TJ et al. Consensus Guidelines for Managing PONV. Anesth Analg 2003;97:62-71.
Sindler DR. Can post-operative nausea and vomiting be predicted? Anesthesiology 1999;91:106-118.

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Is It True?

https://www.scotlife.com/

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Glassman SD, Rose SM, Dimar JR, et al. The effect of postoperative nonsteroidal anti-inflammatory drug administration on spinal fusion. Spine 1998; 23:834-8.



https://www.scotlife.com/

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Ketorolac TORADOL (KETOROLAC TROMETHAMINE)

J Orthop Trauma. 2016 Sep;30(9):479-82. doi: 10.1097/BOT.0000000000000620.

Ketorolac Administered in the Recovery Room for Acute Pain Management Does Not Affect Healing Rates of Femoral and Tibial Fractures.

	Femur		P*	Tibia		P*
	Ketorolac (n = 33)	No Ketorolac (n = 104)		Ketorolac (n = 52)	No Ketorolac (n = 139)	
Time to union in days (range)	147 (85-304)	159 (44-406)	0.81	175 (58-456)	175 (45-387)	0.57
Nonunion, n (%)	3 (9.1)	11 (10.6)	1.00	3 (5.8)	17 (12.2)	0.29

*P value calculated using Mann-Whitney U test for time to union. P value calculated using Fisher Exact test for percent nonunion.

https://www.scotlife.com/

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Ketorolac TORADOL (KETOROLAC TROMETHAMINE)

Spine (Phila Pa 1976). 2008 Sep 1;33(19):2079-82. doi: 10.1097/BRS.00013a31818396f4.

Ketorolac and spinal fusion: does the perioperative use of ketorolac really inhibit spinal fusion?

Pradhan BB¹, Tatsumi RL, Gallina J, Kuhns CA, Wang JC, Dawson EG.

	Toradol Group	Non-Toradol Group	P
Nonunions	12/28 (5.3%)	11/77 (8.2%)	>-0.05
Nonunions in 1-level fusions	3/28 (10.7%)	5/80 (6.3%)	>-0.05
Nonunions in 2-level fusions	3/77 (3.9%)	3/71 (4.2%)	>-0.05
Nonunions in 3-level fusions	2/25 (8.0%)	3/28 (11.5%)	>-0.05
Nonunions with iliac crest bone graft	10/25 (40.0%)	10/53 (18.9%)	>-0.05
Nonunions with local bone ± allograft	2/103 (1.9%)	1/24 (4.2%)	>-0.05
Nonunions in patients of surgeon 1	12/28 (5.3%)	7/85 (8.2%)	>-0.05
Nonunions in patients of surgeon 2		4/92 (4.3%)	

“The use of ketorolac after primary lumbar spinal fusion surgery in humans did not affect fusion rates when compared with surgical patients who did not receive the same drug.”

https://www.scotlife.com/

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Is it True? Neostigmine

Arch. J. Pharm. Med. 1999; 102: 375-81
M. R. Thandi¹ and T. Fache-Baker²

Omitting antagonism of neuromuscular block: effect on postoperative nausea and vomiting and risk of residual paralysis. A systematic review

Meta-analysis by Cheung, Sessler, Apfel

933 patients in 10 studies

Extracted data on PON and POV for early, delayed, and overall postoperative periods

Neostigmine was not associated w/ a significant ↑ in PON or POV.


Combination of neostigmine with either atropine or glycopyrrolate did not significantly ↑ incidence of PON or POV (0-24 h)

No ↑ vomiting w/ ↑ dose of neostigmine


Cheung et al. Does Neostigmine Administration Produce a Clinically Important Increase in Postoperative Nausea and Vomiting? A & A 2005;191:1349-55

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Nitrous




Omitting nitrous oxide in general anesthesia: Meta-analysis of intraoperative awareness and postoperative emesis in randomized controlled trials.

British Journal Anaesthesia 76:186-93,1996. Nitrous oxide adds to the number of patients who have postoperative vomiting only if the baseline risk of vomiting is above average.

The average risk groups experience no increase in PONV when nitrous oxide is used.

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The Effect of Nitrous Oxide On Postoperative Nausea and Vomiting

Article in [Marmara Medical Journal](#) 20(2):85-91 - January 2007

Conclusion: Our data demonstrate that nitrous oxide does not increase the incidence or severity of PONV in patients undergoing laparoscopic cholecystectomy.

Anesthesia & Analgesia. 66(8):761-765, AUG 1987
 PMID: 3500426
 ISSN Print: 0903-2999
 Publication Date: 1987/08/01



Nitrous Oxide Does Not Increase the Incidence of Nausea and Vomiting after Isoflurane Anesthesia

K. Korttila; J. Hovorka; O. Erkola

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ORIGINAL ARTICLE

The Effect of 50% Nitrous Oxide on Postoperative Nausea Vomiting in Patients Undergoing Laparoscopic Cholecystectomy

KHALEEL AHMAD¹, MAQSOOD ZAHID², MUHAMMAD JAVAJD³

ABSTRACT

Background: Postoperative nausea and vomiting (PONV) is a common problem and its cause is multifactorial. The relationship between PONV and nitrous oxide is under debate.

Aim: To evaluate the relationship between nitrous oxide and PONV in patients undergoing laparoscopic cholecystectomy.

Methods: We randomly divided 60 female patients, ASA I or II, age 18-60 years and weighing between 50-100 kg, scheduled for elective laparoscopic cholecystectomy into two groups. Anaesthesia was induced in all patients with propofol, midazolam and atracurium. Anaesthesia was maintained with sevoflurane, nitrous oxide in oxygen in group I and sevoflurane in oxygen in group II. Perioperatively paracetamol was infused in all patients. The patient's PONV and pain scores were assessed 24 hours postoperatively.

Results: In group I, PONV scores were significantly higher at 1st and 6th hour postoperatively; however, there was no significant difference in group II. However there was no significant difference in PONV and pain scores and the percentage of patients needing antiemetics between two groups. We could not find any correlation between PONV and use of 50% Nitrous oxide.


Conclusion: Our data concludes that 50% nitrous oxide does not increase the incidence or severity of PONV in patients undergoing laparoscopic cholecystectomy.

Keywords: Nitrous oxide, nausea, vomiting, laparoscopic cholecystectomy

Collaboration of Health Issues Journal Vol. 10, NO. 3, JUL - SEP 2016

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Secondary analysis of ENIGMA-II patients

Confirmed risk factors: females, opioid use, hx of PONV

New risk: Asian descent?

Risk of PONV from N₂O mitigated by prophylaxis



Perioperative Medicine | May 2016

Severe Nausea and Vomiting in the Evaluation of Nitrous Oxide in the Gas Mixture for Anesthesia II Trial

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KETAMINE TOOLKIT

Questions & Answers for Your Medical Director



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Table 1. Summary of 1970s studies on ketamine and intracranial pressure

Study	Study type	Ketamine dosage	Study population	ICP	MAP	Calculated CPP
Garner et al. ¹	Case-control	2 mg/kg IV	11 healthy males for simple surgery	CSFP ↑ by mean 18 mm Hg	↑ by mean 28 mm Hg	↑
Wyte et al. ²	Case report	2 mg/kg route unknown	2 patients (aged 8 and 17 yr) with VP shunts, obstructive hydrocephalus (secondary to aqueductal stenosis and astrocytoma)	ICP ↑ to 75 mm Hg in only 1 patient; no change in other patient	—	—
Gibbs ³	Case-control	1-1.3 mg/kg IV	11 healthy patients for lumbar discectomy; second group of 9 patients with intracranial space occupying lesions	No change in CSFP in healthy patients; in group 2, CSFP ↑ by ~ 12 mm Hg in 6/9	↑ by 24 mm Hg	↑
Gardner et al. ⁴	Case report	2 mg/kg IV	13-year-old boy with glioma, midline shift	CSFP ↑ by ~ 8 mm Hg	↑ by ~ 16 mm Hg	↑
Shapiro et al. ⁵	Case-control	2 mg/kg IV or 4 mg/kg IM	7 patients (5 with external shunts and ↑ ICP)	No change in patients without shunts; ICP ↑ up to 60 mm Hg in certain patients	↑ up to 22 mm Hg	Variable
List et al. ⁶	Case-control	2 mg/kg IV	7 patients with hydrocephalus	1 patient had ↑ CSFP to ~ 25 mm Hg; others had mild ↑ CSFP within normal range	—	—

48 Patients

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Table 2. Key studies of prospective trials of ketamine and intracranial pressure

Study	Study type	Study population	ICP	CPP
Mayberg et al. ¹²	Prospective trial	• 20 neurosurgical patients (10 with supratentorial tumours, the rest with intracranial aneurysms) • ICP measured before and after administration of ketamine 1 mg/kg IV	Small but statistically significant decrease in ICP after ketamine administration	No significant change over 10 min
Kolenda et al. ¹³	Prospective RCT	• 30 patients with moderate or severe head injury • Ketamine + midazolam sedation v. fentanyl + midazolam sedation	Slightly higher ICP values in the ketamine group (- 2 mm Hg difference)	Higher in the ketamine group than the control group by average of 8 mm Hg
Bourgoin et al. ¹⁴	Prospective double-blind RCT	• 25 patients with severe head injury • Continuous infusion ketamine-midazolam v. sufentanil-midazolam infusion	No significant difference between groups	No significant difference between groups
Bourgoin et al. ¹⁴	Prospective double-blind RCT	• 30 patients with TBI receiving sufentanil-midazolam or ketamine-midazolam using target controlled infusion	No significant difference between groups	No significant difference between groups
Schmittner et al. ¹⁵	Randomized prospective trial	• Group 1: methohexitone + ketamine sedation • Group 2: methohexitone + fentanyl sedation	No significant difference between groups	No significant difference between groups

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Himmelseher S, Durieux ME. Revising a dogma: Ketamine for patients with neurological injury? *Anesthesia & Analgesia*. 2005; 101:524-34.


N = 79 trials (> 500 participants)

Revising a Dogma: Ketamine for Patients with Neurological Injury?
Himmelseher, Sabine MD, Durieux, Marcel E. MD, PhD
Anesthesia & Analgesia, August 2005 - Volume 101, Issue 2, p 524-34
doi: 10.1213/01.ANE.0000160265.42887.03
Neurological Intensive Care Article

Methods:
Search from 1994-2004
Randomized controlled trials
Nonrandomized controlled or cohort trials

Ketamine does not increase ICP when used with controlled ventilation, co-administration of a GABA receptor agonist, and without nitrous oxide.

Hemodynamic stimulation induced by ketamine improved cerebral perfusion.



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LR and Hyperkalemia

LR has a potassium concentration of 4 mEq/L, whereas the potassium concentration of normal saline (NS) is zero.

This has led to the common notion that LR should be avoided in a patient with hyperkalemia.

Fear of LR in hyperkalemia appears to be entirely theoretical, due to the fact that LR contains potassium.

Volume of distribution of potassium and its alteration by sympathetic and antihistaminic drugs.
Volume of distribution of potassium and its alteration by sympathetic and antihistaminic drugs.
doi:10.1093/ajph/99.04.011.1514

A randomized, double-blind comparison of lactated Ringer's solution and 0.9% NaCl during renal transplantation.
doi:10.1093/ajph/99.04.011.1514

Effects of normal saline vs. lactated ringer's during renal transplantation.
doi:10.1093/ajph/99.04.011.1514

THE APPARENT VOLUME OF DISTRIBUTION OF POTASSIUM INJECTED INTRAVENOUSLY*
By ALEXANDER W. WINKLER and PAUL K. SMITH
(From the Departments of Internal Medicine and of Pharmacology and Physiology, Yale University School of Medicine, New Haven)

Fluid and electrolyte management for the surgical patient.

<https://jmasa.sagepub.com/>

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LR and Blood Products; Key Word is Rapid!

Lorenzo M, et al. Can Ringer's lactate be used safely with blood transfusions? *Am J Surg.* April 1998;175:308-10.

The American Journal of Surgery
Volume 175, Issue 4, April 1998, Pages 308-310

Scientific Papers
Can Ringer's Lactate Be Used Safely with Blood Transfusions?
Manuel Lorenzo MDA, James W Davis MDA, Steve Neghi MTB, Krista Kaups MDA, Steven Parks MDA, Daniel Brubaker DOB, Alan Tyroch MDA

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LMA Prone Position



Use of the laryngeal mask airway in the prone position
A. Gabl¹, E. E. Whitaker^{2,3}, J. D. Tobias⁴

The LMA in the prone position is not useful in 10 patients.

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LMA Prone Position

Home > May 2014 - Volume 31 - Issue 5 > Self-positioning followed by induction of anaesthesia and in...

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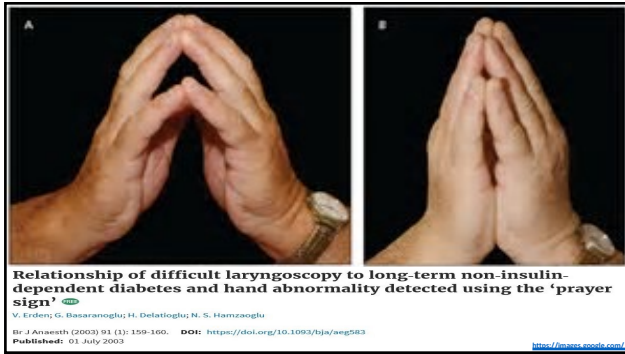
Self-positioning followed by induction of anaesthesia and insertion of a laryngeal mask airway versus endotracheal intubation and subsequent positioning for spinal surgery in the prone position: A randomised clinical trial
Olsen, Karsten S.; Petersen, Jesper T.; Pedersen, Niels A.; Røvsing, Louise

European Journal of Anaesthesiology - May 2014 - Volume 31 - Issue 5 - p 259-265
doi: 10.1097/EJA.000000000000004
Laryngeal mask airway

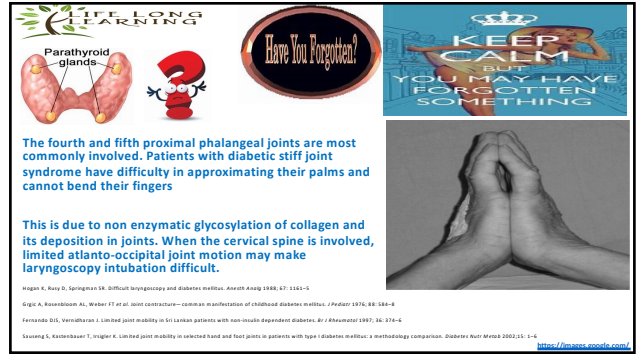
CONCLUSION Self-positioning and induction of anesthesia in the prone position saves time. More patients should be studied to confirm safety and examine whether the method reduces the number of severe complications associated with the prone position

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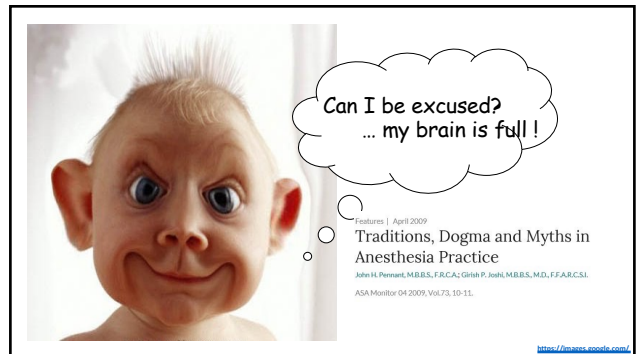
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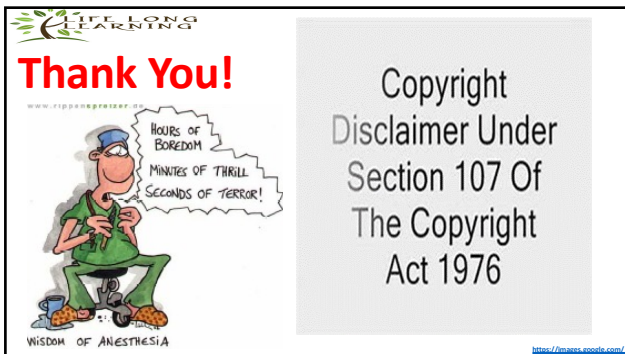
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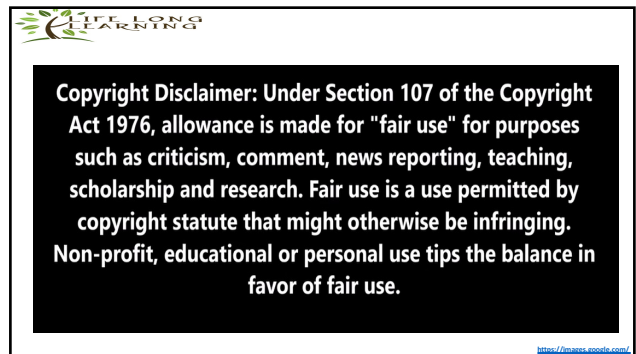
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Financial Disclosure

There is no financial conflicts with this presentation.

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Mentioning a product or company does NOT represent endorsement.

Every attempt has been made to us generic names when possible, at times brand names are used.

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