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Emergency Medicine Pearls

Section Advisory Group on Emergency Care
Section of Clinical Specialists and Scientists
American Society of Health-System Pharmacists (ASHP)

Disclosure

- The program chair and presenters for this continuing education activity have reported no relevant financial relationships.

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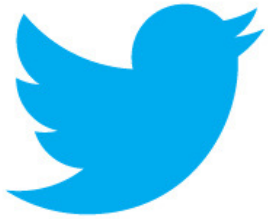

@PharmERToxGuy

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Cole Sloan @DrugInfoGeek
Emily Kilber @enkilber
Linda Barstow @EDPharmBars
Matt Bilhimer @MBNYPharmD
Giles Slocum @uiowarxgrad

Part 1

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Antidote Stewardship:

Possible Role for Carbapenems in Valproic Acid Toxicity

Colgan "Cole" Sloan, Pharm.D., BCPS
Clinical Pharmacist – Emergency Medicine
University of Utah Health Care
Twitter @DrugInfoGeek

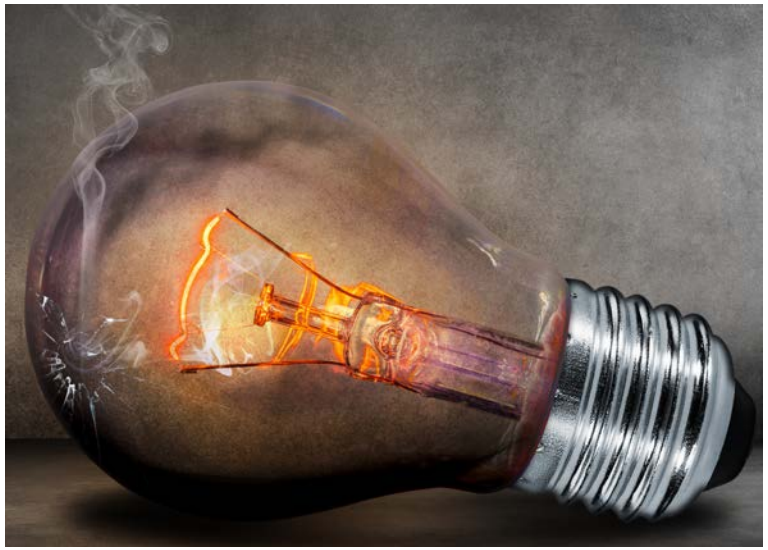
Learning Objective

- Assess the risks and benefits of using a carbapenem to treat valproic acid toxicity

Introduction

- One of the coolest drug interactions… ever
  - Case report if it does **not** occur

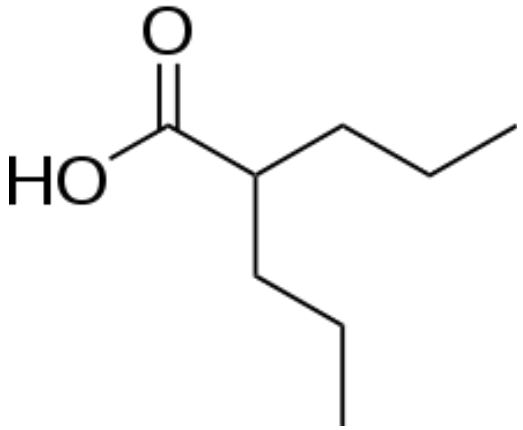
- Several proposed mechanisms for this drug-drug interaction (DDI)



Spriet. Ann Pharmacother 2011;45(9):1167-8

POTENTIAL Toxicologic Use

- Could this interaction treat valproic acid (VPA) toxicity?
- Effects of the DDI may persist
- Remember your ABCs
- One report, thus far, of intentionally using this DDI for VPA overdose



Zosel. NACCT 2015 Poster #106

Considerations

- Reason for VPA
- Other therapies for VPA toxicity
  - Supportive care
  - Activated charcoal
  - Levocarnitine
  - Hemodialysis
  - Tincture of time
- Won’t address all sequelae of VPA toxicity

Which Carbapenem

- All available carbapenems associated with this DDI
  - Availability
  - Pharmacokinetics
  - Duration

- Imipenem-Cilastatin, greater risk of seizures?
  - Imipenem (7/1124) vs meropenem (4/1116)
  - Odds Ratio 1.48 (0.54, 4.04)

Cannon. J Antimicrob Chemother. 2014;69(8):2043-55

Key Takeaways

- Key Takeaway #1
  - Consider patient specific factors and adverse event potential before using a carbapenem to treat VPA toxicity
- Key Takeaway #2
  - Use of a carbapenem is unlikely to treat all complications of serious VPA toxicity – do not eschew the basic management of toxicology patients
- Key Takeaway #3
  - If you undertake this approach, write the case up; there are many unknowns with using this DDI in toxicology

References

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- Spriet, et al. No interaction between valproate and meropenem in a cirrhotic patient. Ann Pharmacother. 2011;45(9):1167-8. PMID: 21811003
- Spriet, et al. Interaction between valproate and meropenem: a retrospective study. Ann Pharmacother. 2007;41(7):1130-6. PMID: 17609232
- Spriet, et al. Meropenem -valproic acid interaction in patients with cefepime-associated status epilepticus. Am J Health Syst Pharm. 2007;64(1):54-8. PMID: 17189580
- Zosel, et al. Novel use of ertapenem to intentionally decease serum valproate concentration after an intentional overdose of valproate resulting in toxicity. NACCT 2015 Poster #106. Link

Presenter's Email: cole.sloan@gmail.com Twitter: @DrugInfoGeek

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Laboratory Monitoring to Determine the Presence of DOACs

Emily Kilber, PharmD
PGY2 EM Pharmacy Resident
The University of Arizona

Objective

- Identify specific laboratory tests to aid in detecting the presence of direct oral anticoagulants (DOAC)

Imagine…

- 55 year old male
- Unresponsive
- Unknown PMH
- CT scan: SDH

Oral Anticoagulants

- Vitamin K Antagonist
  - Warfarin

Monitor with INR

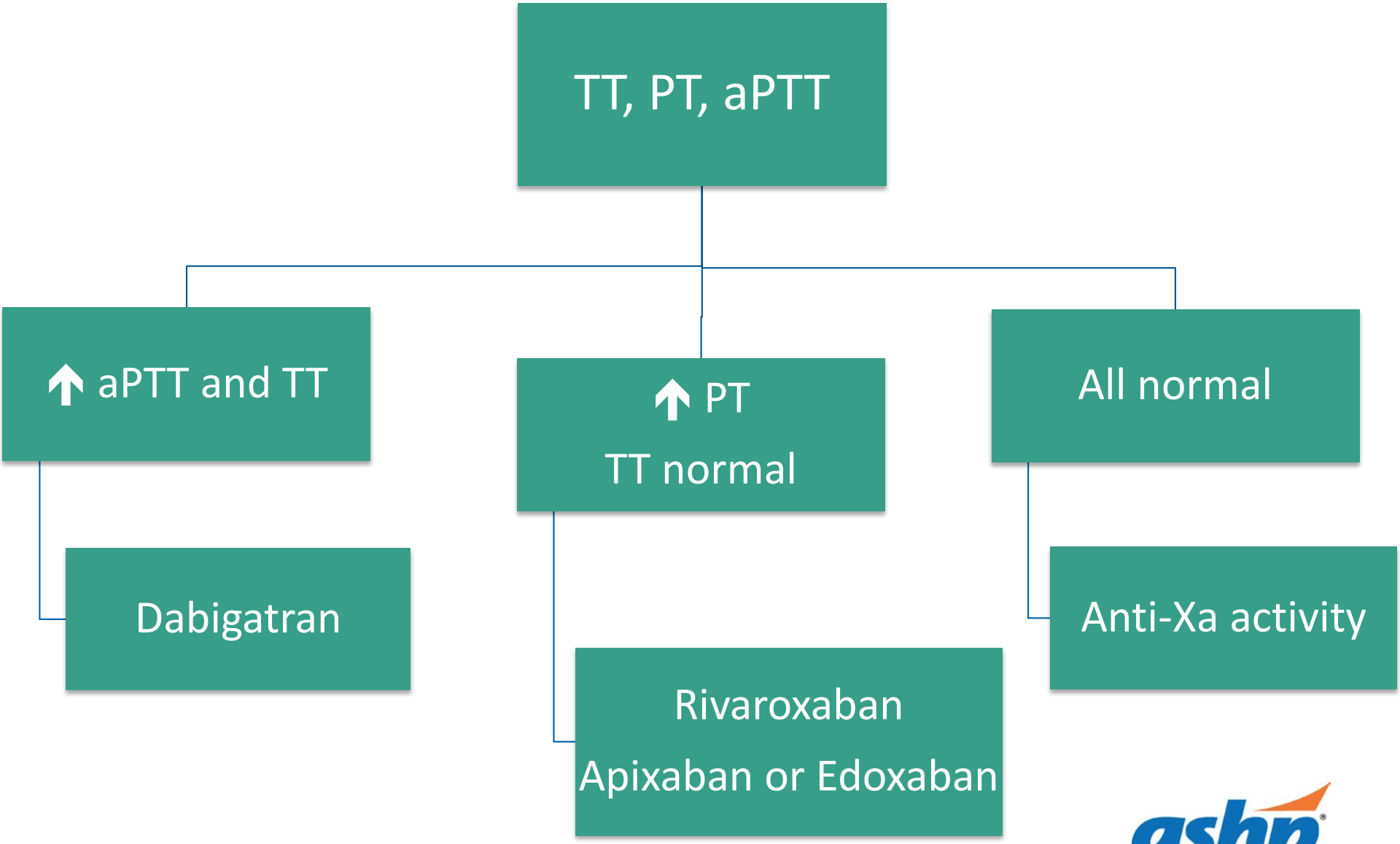
- DOACs
  - Dabigatran
  - Rivaroxaban
  - Apixaban
  - Edoxaban

Unclear monitoring

DOAC	aPTT	PT	TT	Anti-Xa	Other Tests
Dabigatran	++	+	+++	--	dTT, DTI, ECT, ECA, ACT
Rivaroxaban	+	++	--	++	None
Apixaban	-/+	-/+	--	++	None

ACT, activated clotting time; aPTT, activated partial thromboplastin assay; DTI, direct thrombin inhibitor (assay); dTT, dilute thrombin time; ECA, ecarin chromogenic assay; ECT, ecarin clotting time; PT, prothrombin time; TT, thrombin time

Favaloro et al. *Seminars in Thrombosis and Hemostasis*. 2015;41:208-227.
Lippi et al. *Clin Chem Lab Med.* 2015;53(2):185-197.
Barrett et al. *Thromb Haemost*. 2010;104:1263-1271.



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Use of Ketamine in Resistant Alcohol Withdrawal

Linda Barstow, PharmD
PGY2 Emergency Medicine Pharmacy Resident
University of Maryland Medical Center
Baltimore, MD

Learning Objective

- To identify the role of ketamine for treatment of alcohol withdrawal syndrome (AWS)

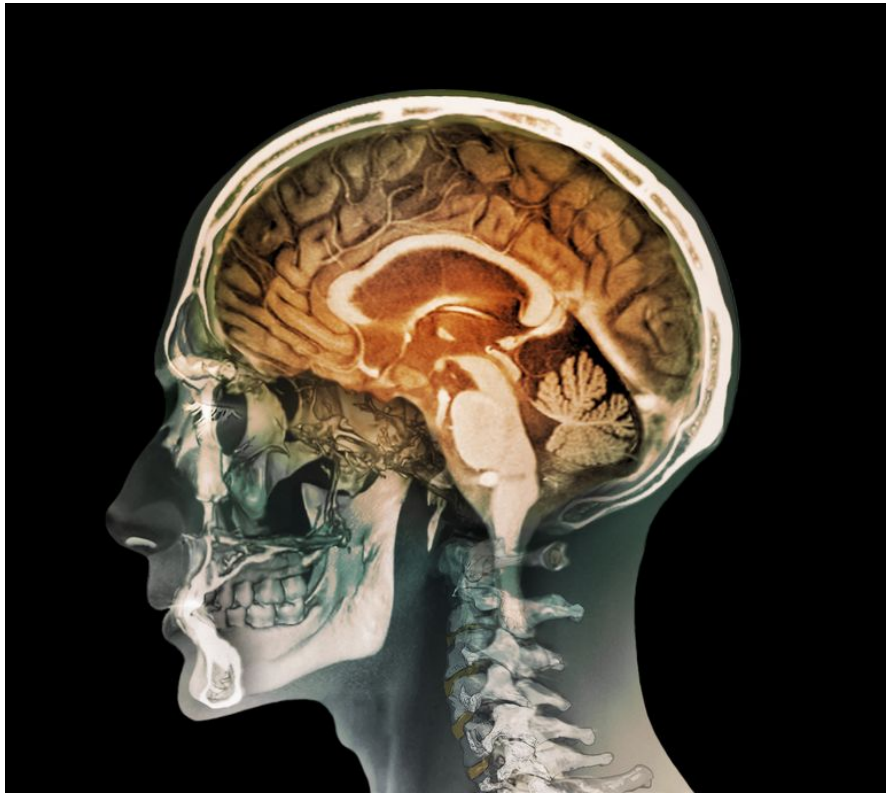
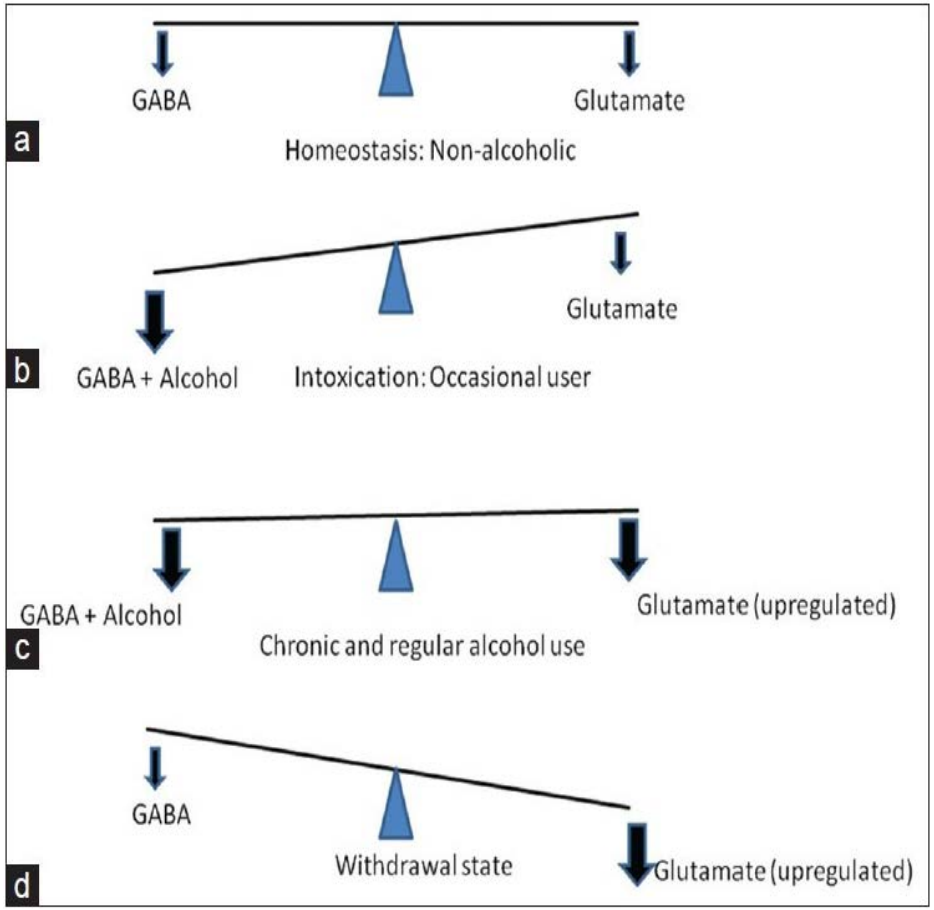


Photo: http://www.acesurgical.com/ketamine-50mg-ml-10ml-injection.html

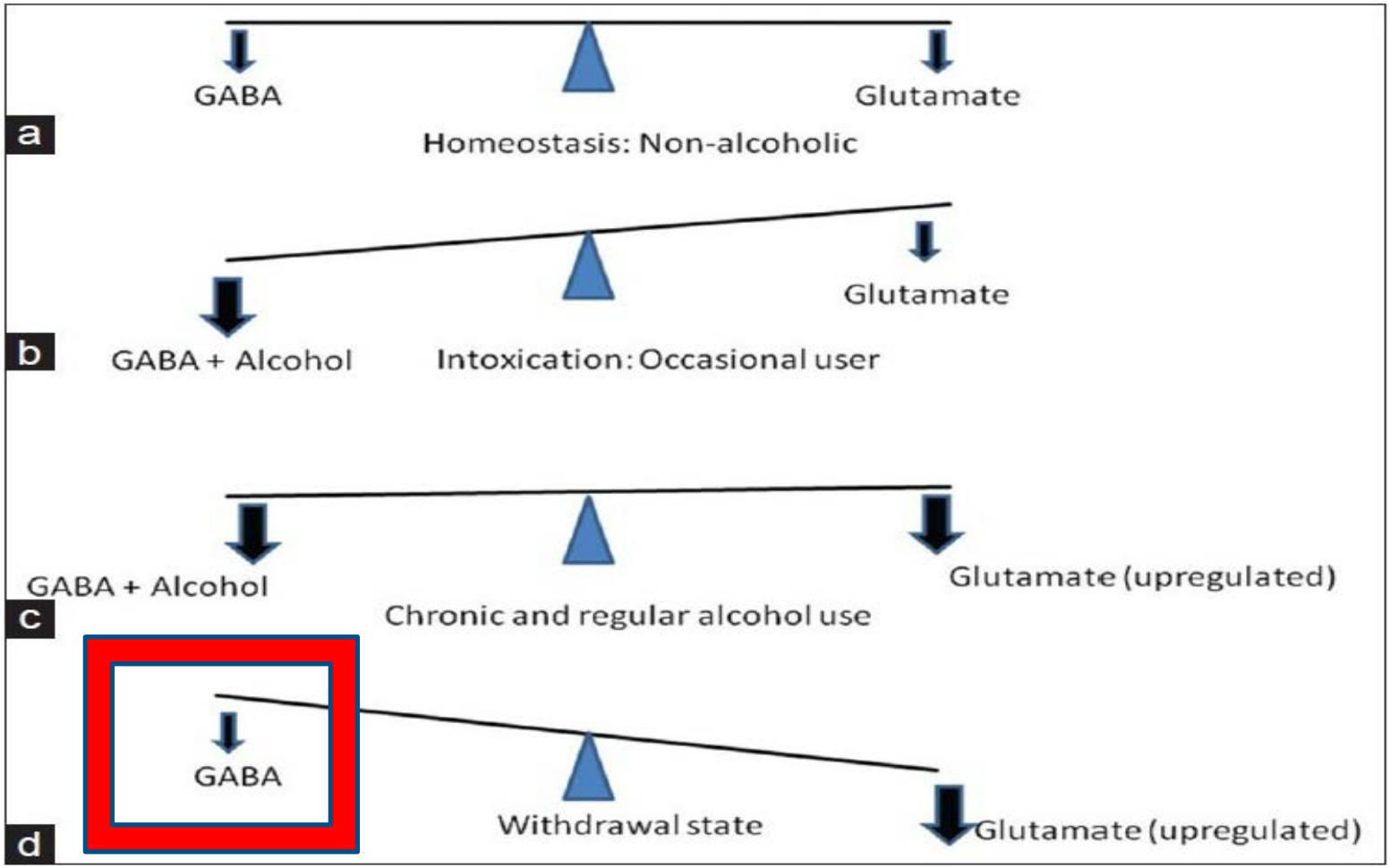
Pathophysiology & Symptoms



- Hypertension, tachycardia, tachypnea, hyperpyrexia
- Anxiety, tremor, tongue fasciculations, diaphoresis
- Delirium, seizures, death
- Severity difficult to predict

Ind Psychiatry J. 2013;22(2):100-108
N Engl J Med. 2014;371(22):2019-13
Ann of Pharm. 2015;49(1):14-19

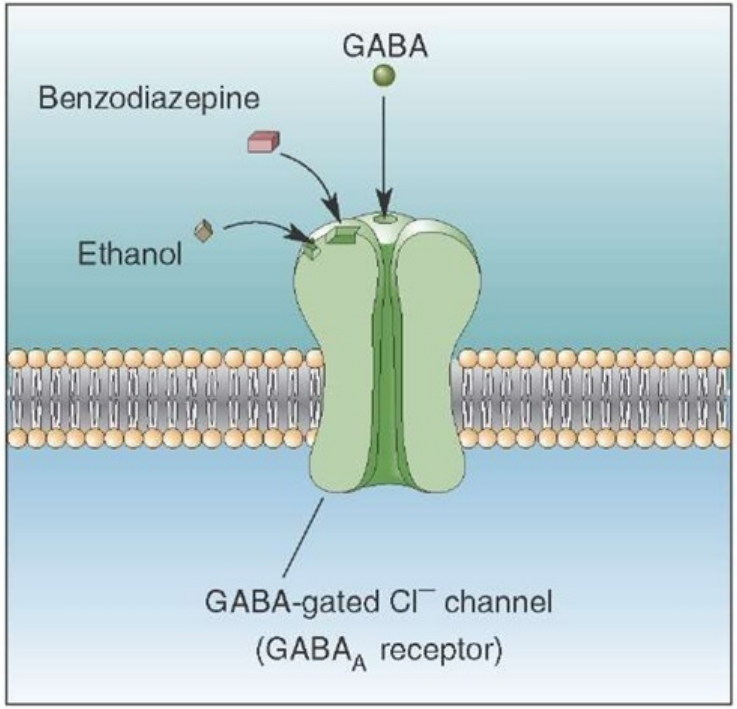
Current Treatment



Ind Psychiatry J. 2013;22(2):100-108

First Line Treatment

- Benzodiazepines
  - Diazepam, lorazepam, chlordiazepoxide



Arch Intern Med. 2004;164: 1405-1412
Ann of Pharm. 2015;49(1):14-19
Photo: neuroscience/behavioral-and-psychiatric-disorders-integrative-systems

Resistant Alcohol Withdrawal (RAW)

- Definition by treatment requirement
  - 1 hour: > 50mg diazepam or > 10mg lorazepam
  - 4 hours: > 200mg diazepam or > 40mg lorazepam
- Pathophysiology poorly understood
  - Endogenous GABA neurotransmitter depletion
  - Profound down-regulation and/or altered structure of GABA receptors

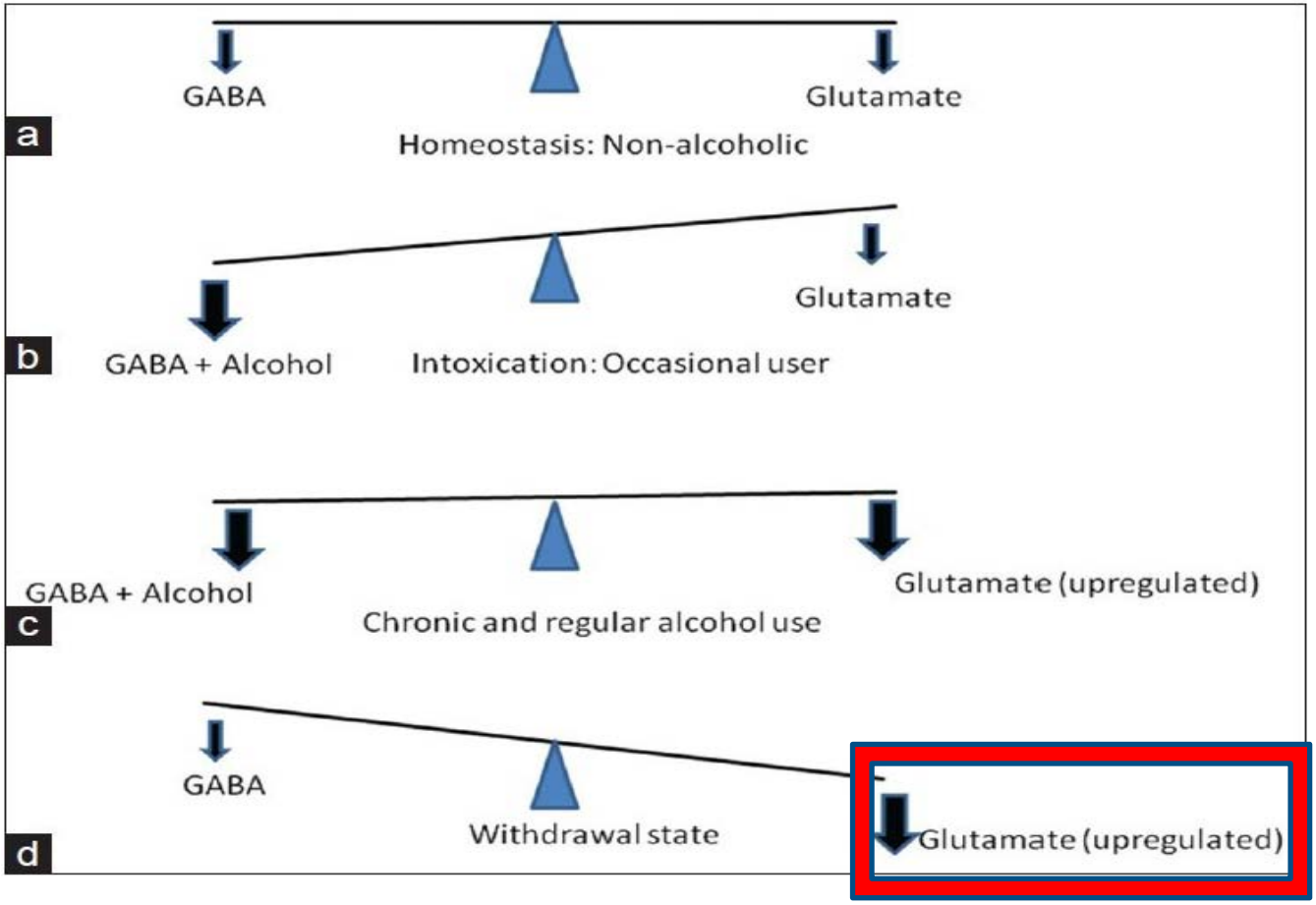
Crit Care Med. 2007;35(3)724-30
Pharmacother. 2016; epub ahead of print

RAW Treatment Options

- Barbiturates (phenobarbital)
  - Alternative agent of choice
  - Increases duration GABA channel is open
- Dexmedetomidine
  - Selective α_2 agonist
  - Does not treat underlying mechanism
- Propofol
  - GABA agonist activity at alternative receptor site
    - GABA independent
  - NMDA receptor antagonism

Crit Care Med 2007;35(3)724-30
Pharmacother. 2016; epub ahead of print

Ketamine MOA



Ind Psychiatry J. 2013;22(2): 100-108

Wong et al.

- Purpose: Evaluate use of adjunctive ketamine for management of severe AWS
- Study Design: Retrospective cohort study of adult patients administered ketamine for AWS
  - LD (when used): 0.3 mg/kg
  - Mean initial infusion rate: 0.21 mg/kg/hr
  - Mean total infusion rate: 0.20 mg/kg/hr

Ann Pharmacother. 2015; 49(1)14-19

Wong et al.

- Results
  - Twenty three patients qualified for inclusion
  - Median change in benzodiazepine requirements
    - 12H after infusion: -40.0 mg, p=0.110
    - 24H after infusion: -13.3 mg, p=0.330
  - Median (IQR) change in sedation scores
    - WAS (n=8): +1.0 (-4.5, +2.0)
    - SAS (n=5): +1.0 (0, +2.0)
  - Ketamine-related adverse reactions
    - Over-sedation requiring dose reduction (n=1)

Ann Pharmacother. 2015; 49(1)14-19

Wong et al.

- Limitations
  - Additional agents used
  - Sample size (n=23)
- Application
  - Who? Under what circumstances?
  - How, and for how long?
  - What next?

Ann Pharmacother. 2015; 49(1)14-19

References

- Dixit et al. Management of acute alcohol withdrawal syndrome in critically ill patients. Pharmacotherapy. 2016. epub ahead of print
- Gold et al. A strategy for escalating doses of benzodiazepines and phenobarbital administration reduces the need for mechanical ventilation in delirium tremens. Critical Care Medicine. 2007;35(3)724-30
- Kattimani et al. Clinical management of alcohol withdrawal. Industrial Psychiatry Journal. 2013 22(2): 100-108
- Longo et al. Recognition and management of withdrawal delirium (delerium tremens). New England Journal of Medicine. 2014;371(22):2019-13
- Mayo-Smith et al. Management of alcohol withdrawal delirium: an evidenced based practice guideline. Archives of Internal Medicine. 2004; 164: 1405-1412
- Wong et al. Evaluation of adjunctive ketamine to benzodiazepines for management of alcohol withdrawal syndrome. Annals of Pharmacotherapy. 2015; 49(1)14-19

Key Takeaways

- Key Takeaway #1
  - Ketamine should only be used in conjunction with standard benzodiazepine therapy after all other alternatives are exhausted
- Key Takeaway #2
  - A reasonable approach to dosing would replicate that of Wong et al
    - LD (when used): 0.3 mg/kg
    - Mean initial infusion rate: 0.21 mg/kg/hr

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Peripheral Vasopressors: A Quick Fix Worth The Risk?

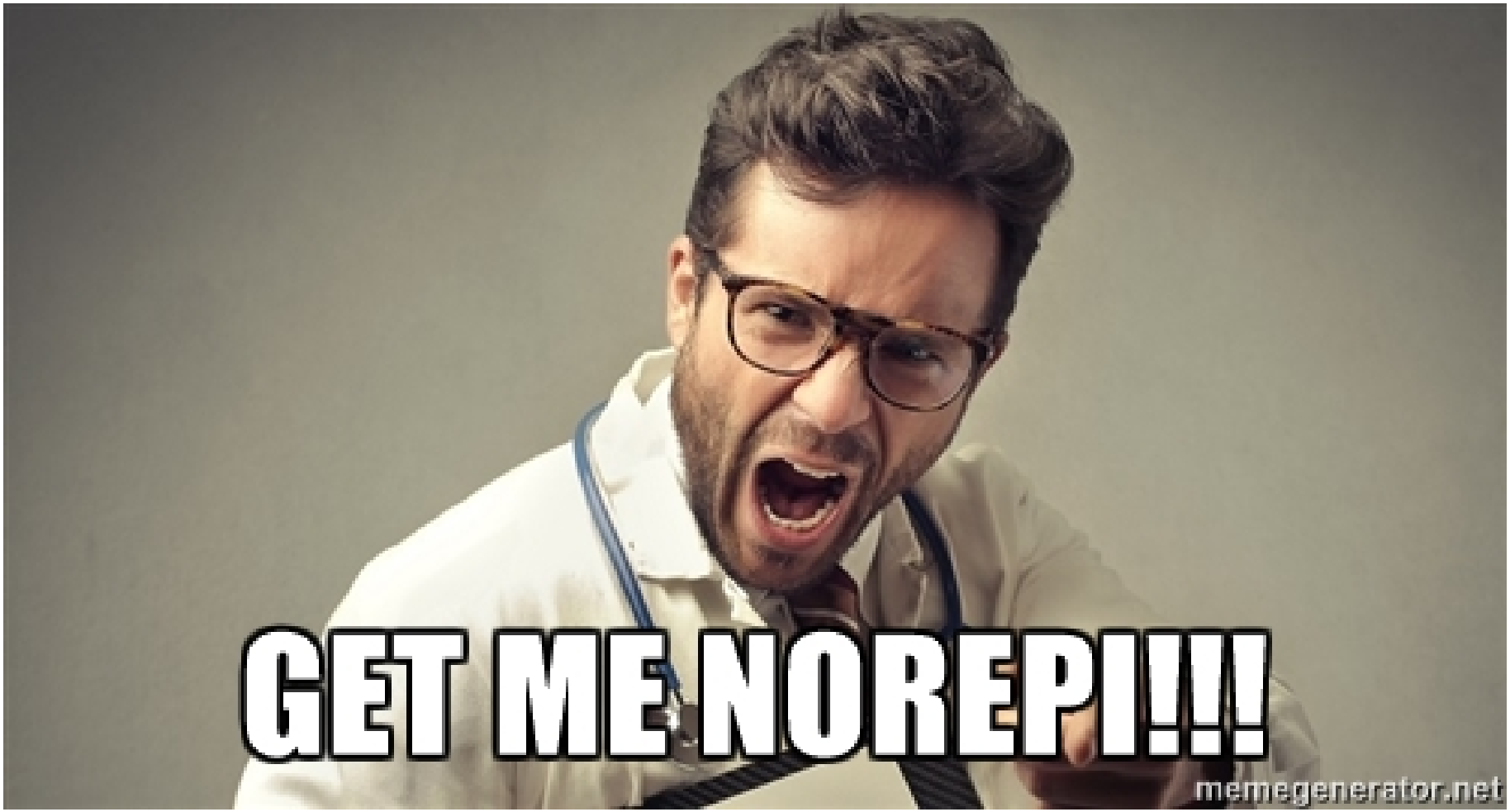
Matt Bilhimer Pharm.D.
Emergency Medicine Clinical Pharmacist
Salina Regional Health Center
Salina, KS

Objectives

- Identify concerns regarding vasopressor administration in the emergency department (ED)

- Understand current evidence describing safety of vasopressors administered via peripheral and central lines

We've All Been There…



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Issues In The Emergency Department (ED)

- Emergent Need

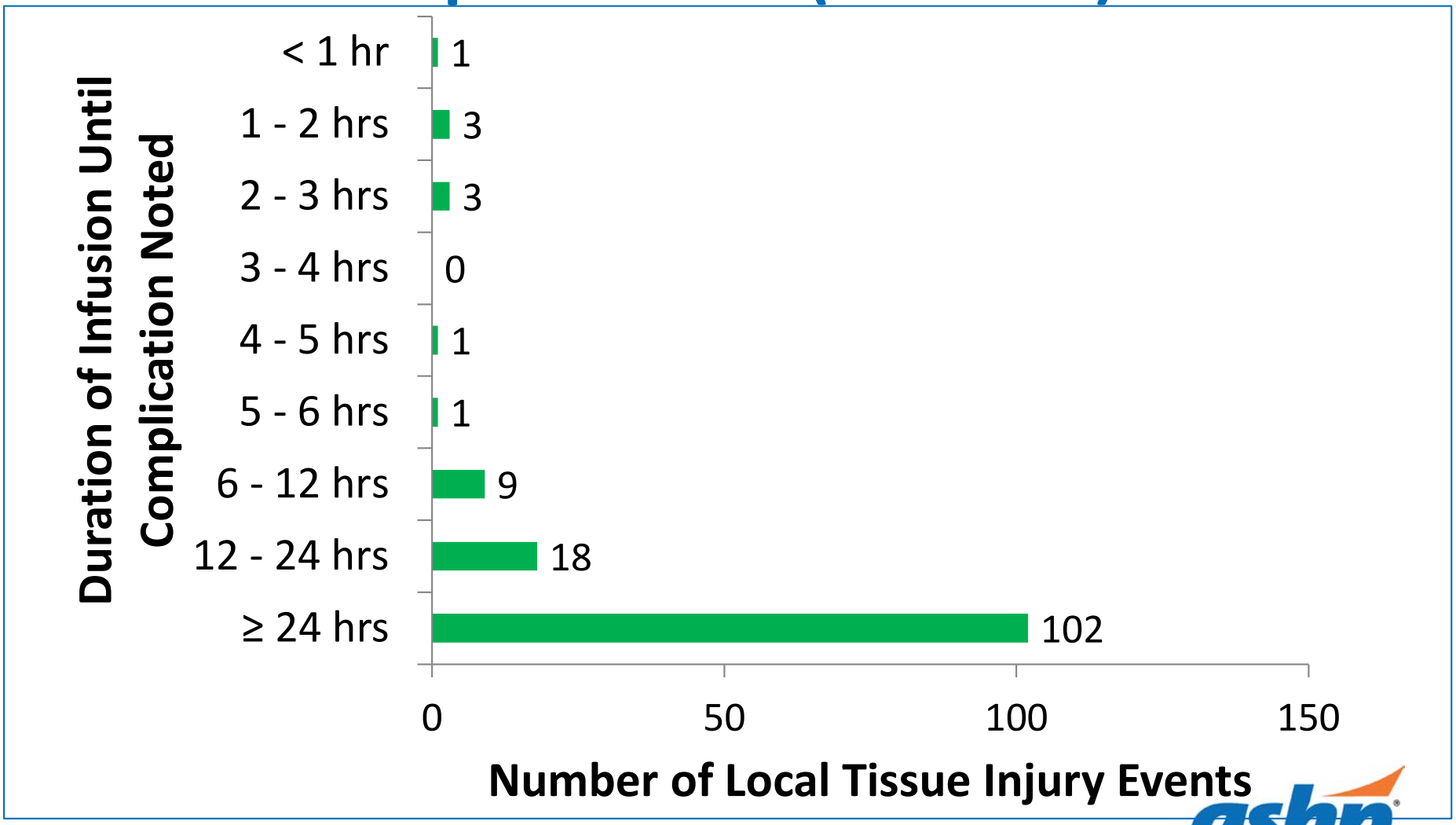
- Route of Administration
  - Central line: preferred but not always available
  - Peripheral line: easily accessible but greater risk → Extravasation

Prioritize – Perfusion vs. Extremity

Techniques to Reduce Extravasation Risk

- Avoid infusion in small diameter vessels
- Low vs. high concentration products
- Administer via Y-site with IV fluids running

Time to Local Tissue Injury with Peripheral Line (n = 138*)



*66 patients with no time to event information

Loubani OM, Green RS. J Crit Care 2015. 653.e-653e.17

Long Term Sequelae: Peripheral Vasopressors

Long-term Adverse Effect	Local Tissue Injury (n = 204*)	Extravasation (n = 114*)
None, no. (%)	77 (37.7)	90 (78.9)
Minor Disability, no. (%)	36 (17.6)	1 (0.9)
Major Disability, no. (%)	9 (4.4)	3 (2.6)
Mortality – related to pressor event, no. (%)	4 (2)	1 (0.9)

*98 patients total with mortality unrelated to pressor event or long-term sequelae not reported

Loubani OM, Green RS. J Crit Care 2015. 653.e-653e.17

Conclusion

Vasopressors may be safely administered via a peripheral line when infused for a short period (i.e., < 6 hours) through proximal sites

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You Want To Do What?!

ECMO in the ED

Giles W. Slocum, Pharm.D.
Clinical Pharmacy Specialist, Emergency Medicine
Rush University Medical Center

Learning Objectives

I. Describe the role of a clinical pharmacist when starting extracorporeal membrane oxygenation (ECMO) in the emergency department

II. Recognize the pharmacokinetic changes on commonly used medications when starting ECMO in the ED

- There has never been a medication that has shown any long term survival benefit in cardiac arrest

Okay… so what works?

Quality chest compressions

Electrical defibrillation

…

Extracorporeal membrane oxygenation

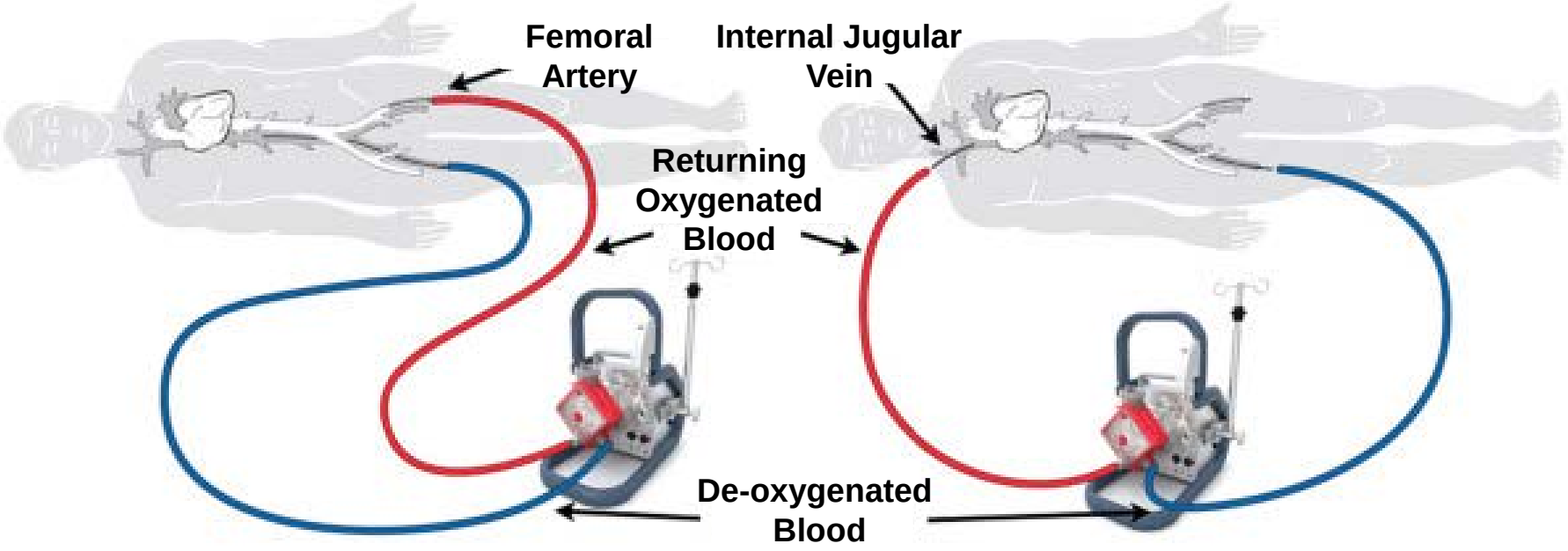
Extracorporeal cardiopulmonary resuscitation (ECPR)

Extracorporeal life support (ECLS)

Link MS, et al. Circulation. 2015 Nov 3;132(18 Suppl 2):S444-64.
SAVE-J Study Group. Resuscitation. 2014;85(6):762-8.

Venoartial-ECMO (VA)

Venovenous-ECMO (VV)



Gilotra NA, et al. Clin Med Insights Cardiol. 2015 Feb 3;8(Suppl 1):75-85.

Pharmacy role in ECMO

Anticoagulation

Pharmacokinetics

- Absorption
  - Drug sequestration
- Distribution
  - Increased volume of distribution
- Metabolism
  - Reduced bloodflow
- Elimination
  - Decreased clearance

Mousavi S, et al. Daru 2011: 19(5):312-21.
Shekar K et al. J Crit Care 2012; 27:741e9-741e18.
Buck ML. Clin Pharmacokinet 2003; 42(5): 403-417.

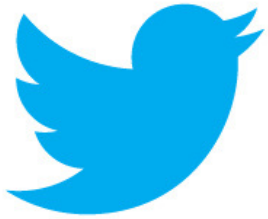
Final thoughts

We may see an increase in ECLS as medications are removed from our ACLS algorithms

Ensure appropriate and adequate anticoagulation

Monitor patient and adjust medications as necessary to account for pharmacokinetic changes

Tweet Your Questions



@PharmERToxGuy

Q & A Part 1

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True or False Statement

All broad-spectrum antibiotics, e.g. piperacillin-tazobactam, tigecycline, daptomycin - have a role in treating valproic acid toxicity.

A TRUE

B FALSE

True or False Statement

All broad-spectrum antibiotics, e.g. piperacillin-tazobactam, tigecycline, daptomycin - have a role in treating valproic acid toxicity.

A TRUE

B **FALSE**

(True or False) Prothrombin time prolongation is the most specific indicator of the presence of dabigatran

A TRUE

B FALSE

(True or False) Prothrombin time prolongation is the most specific indicator of the presence of dabigatran

A TRUE

B **FALSE**

Which of the following pathophysiologic mechanisms of alcohol dependence does ketamine target?

A Down-regulation of inhibitory GABA receptors

B Up-regulation of excitatory NMDA receptors

Which of the following pathophysiologic mechanisms of alcohol dependence does ketamine target?

A Down-regulation of inhibitory GABA receptors

B **Up-regulation of excitatory NMDA receptors**

Which of the following may *increase* your patient's risk of experiencing local tissue injury or extravasation when receiving vasopressors through a peripheral IV?

A. IV sites proximal to the antecubital vein or popliteal fossa
B. Infusion duration greater than 24 hours
C. Administration of lower concentration products
D. All of the above

Which of the following may *increase* your patient's risk of experiencing local tissue injury or extravasation when receiving vasopressors through a peripheral IV?

A. IV sites proximal to the antecubital vein or popliteal fossa

B. **Infusion duration greater than 24 hours**

C. Administration of lower concentration products

D. All of the above

ECMO changes the pharmacokinetic properties of medications in these ways, EXCEPT:

A. Increased absorption

B. Decreased elimination

C. Increased volume of distribution

D. Decreased metabolism

ECMO changes the pharmacokinetic properties of medications in these ways, EXCEPT:

A **Increased absorption**

B Decreased elimination

C Increased volume of distribution

D Decreased metabolism


Patrick Bridgeman @Bridgeymon
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Colleen Martin @C0lleen_Martin
Jennifer Koehl @jlkoehl
Greta Astrup @GretaAstrup

Part 2

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Burnout Syndrome

Patrick Bridgeman PharmD, BCPS
Clinical Assistant Professor
Program Director PGY-2 Emergency Medicine Pharmacy Residency
Ernest Mario School of Pharmacy

Learning Objective

- Identify strategies to help reduce the possibility of burn out

What is Burnout Syndrome (BOS)

- Maslach Burnout Inventory (MBI)
  - Diagnosed when exceed cut off
- Depersonalization
- Emotional exhaustion
- Decreased sense of accomplishment

Maslach C, Jackson S, Letter M. Maslach Burnout Inventory Manual. 3rd edn. Palo Alto: Consulting Psychologists Press, 1996

Risk Factors for Developing BOS

- Four categories
  - Personal characteristics
  - Organizational factors
  - Quality of working relationships
  - Exposure to end of life issues

Moss M, Good VS, Gozal D, et al. An Official Critical Care Societies Collaberative Statement – Burnout Syndrome in Critical Care Health-Care Professionals. *Chest* 2016; 150(1): 17-26

Consequences of BOS

- Decreased performance
- Poor patient outcomes
- Poor patient satisfaction
- Poor personal health(obesity, substance abuse)

Halbesleben JR, Rathert C. Linking physician burnout and patient outcomes: Exploring the dyadic relationship between physicians and patients. Health Care Manage Rev. 2008;33(1):29–39
Buss J. Associations between obesity and stress and shift work among nurses. Workplace Health Saf. 2012;60:453-458.

Preventing Burnout

- Be responsible for yourself
- Adequate Rest
- Exercise
- Meditation
- Hobbies
- Find a Buddy

Concluding Points

- BOS is a common occurrence in the health professions
- It is your responsibility
- Be aware of causes of burnout

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Red Out, Red In

Cyanide toxicity in the ED

Hina Patel, PharmD, BCPS
Senior Clinical Specialist, Emergency Medicine
PGY1 Pharmacy Residency Program Director
NorthShore University HealthSystem

Objective

- Review the use of hydroxocobalamin for acute cyanide toxicity and its impact on laboratory analyses of fluid samples

The presentation

28 yo otherwise healthy male firefighter presents to the ED after prolonged smoke inhalation during a multi-unit residential fire.

<u>Initial symptoms:</u>

Cough/SOB

Headache

Pulse ox 88%

Soot in upper airway

Tachycardia

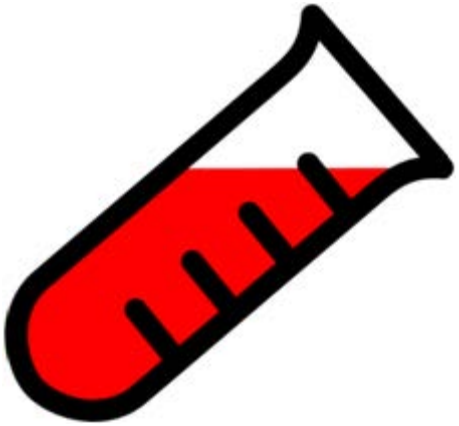
Nausea

The presentation

- Carboxyhemoglobin levels:
  - Time zero (at site): 12%
  - 15 minutes later (at hospital): 3%
  - 30 minutes later : < 1.5%

- Chest radiograph reveals mild pulmonary edema
- Normal skin appearance
- Initial ABG reveals respiratory acidosis
- Supplemental oxygen 100% administered
- NS started at 200 ml/hr

Initial laboratory results



Notable:

Anion gap: 28 ↑

Lactic acid: 8.5 mmol/L ↑

Methemoglobin: 2.8% ↔

BMP, CBC WNL

Nurse noted that venous blood draw was unusually bright red.

Suspected diagnoses and treatment

- Potential for acute cyanide toxicity
- Hydroxocobalamin 5 grams IV STAT ordered
- RN mixes and begins 200 ml infusion over 15 minutes
- MD requests additional blood to be drawn to check liver and coagulation panels, second ABG, UA

Next lab results

Lab results post for additional tests

- Liver panel: ALT = 2 (↓); total bilirubin 4.1 (↑)
- PT/INR: POC test resulted in ‘error’; blood pending
- Repeat ABG: pH 7.52 (↑) (compared to initial pH 7.38)
- UA: WNL except for “pink tinged”

Question: Is the patient sicker than we thought?

Hydroxocobalamin

- Chelates cyanide
  - Exchanges 1:1 CN- with hydroxo ligand bound at cobalt ion
  - Cyanocobalamin excreted in urine
- Side effects
  - Transient hypertension, pink discoloration of skin, mucous membranes, urine, feces
- Light absorption characteristics affect laboratory assays that use colorimetric or reduced NAD or NADP reactions

Laboratory interferences

Laboratory Parameter	No Interference Observed	Artificially Increased *	Artificially Decreased *	Unpredictable	Duration of Interference
Clinical Chemistry	Calcium Sodium Potassium Chloride Urea GGT BUN	Creatinine Bilirubin Triglycerides Cholesterol Total protein Glucose Albumin Alkaline phosphatase Magnesium	ALT Amylase	Phosphate Uric Acid AST CK CKMB LDH	24 hours with the exception of bilirubin (up to 4 days)

* ≥10% interference observed on at least 1 analyzer

Cyanokit® package insert. Columbia, MD: Meridian Medical Technologies, Inc.; 2011.
Beckerman N, Leikin SM, Aitchinson R. Semin Diagn Pathol. 2009 Feb;26(1):49-52.

Laboratory interferences

Laboratory Parameter	No Interference Observed	Artificially Increased *	Artificially Decreased *	Unpredictable	Duration of Interference
Hematology	Erythrocytes Hematocrit MCV Leukocytes Lymphocytes Monocytes Eosinophils Neutrophils Platelets	Hemoglobin MCH MCHC Basophils			12 – 16 hours
Coagulation				aPTT PT (Quick or INR)	24 – 48 hours

* ≥10% interference observed on at least 1 analyzer

Cyanokit® package insert. Columbia, MD: Meridian Medical Technologies, Inc.; 2011.
Beckerman N, Leikin SM, Aitchinson R. Semin Diagn Pathol. 2009 Feb;26(1):49-52.

Laboratory interferences

Laboratory Parameter	No Interference Observed	Artificially Increased *	Artificially Decreased *	Unpredictable	Duration of Interference
Urinalysis		pH (with all doses) Glucose Protein erythrocytes Leukocytes Ketones Bilirubin Urobilinogen Nitrite	pH (with equivalent doses of <5 g)		48 hours up to 8 days; color changes may persist up to 28 days
Cooximetry		Oxyhemoglobin Carboxy-hemoglobin		Total hemoglobin Methemoglobin	N/A

* ≥10% interference observed on at least 1 analyzer

Cyanokit® package insert. Columbia, MD: Meridian Medical Technologies, Inc.; 2011.
Beckerman N, Leikin SM, Aitchinson R. Semin Diagn Pathol. 2009 Feb;26(1):49-52.
Livshits Z, Lugassy DM, Shawn LK, Hoffman RS. N Engl J Med. 2012 Sep;367(13):1270-1.
Carlsson CJ, Hansen HE, Hilsted L, Malm J, Odum L, Szecsi PB. Scand J Clin Lab Invest. 2011 Sep;71(5):378-86

Back to the patient

- Intubated for airway protection
- Some improvement in oxygenation post hydroxocobalamin
- Transferred to tertiary burn center for further management
- Received call from receiving center to inquire exact time of antidote administration
- Full recovery and discharge 2 days later

Key Takeaways

- Suspecting cyanide toxicity? Collect all bodily fluid samples before administering hydroxocobalamin
- Re-evaluate unexpected results relative to administration of antidote
- Don’t forget to tell the next provider

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Lopesick

Colleen Martin, PharmD, BCPS
Clinical Pharmacist, Emergency Medicine
Nyack Hospital, Nyack, NY

Learning Objective

- Describe the presentation and management of loperamide toxicity

MF is a 30 yo male, presents to ED after syncopal episode at work

ECG shows sinus rhythm, with prolonged QT and QRS

Patient reports “I sometimes take loperamide, nothing else, really.”

Should I be worried about

loperamide?

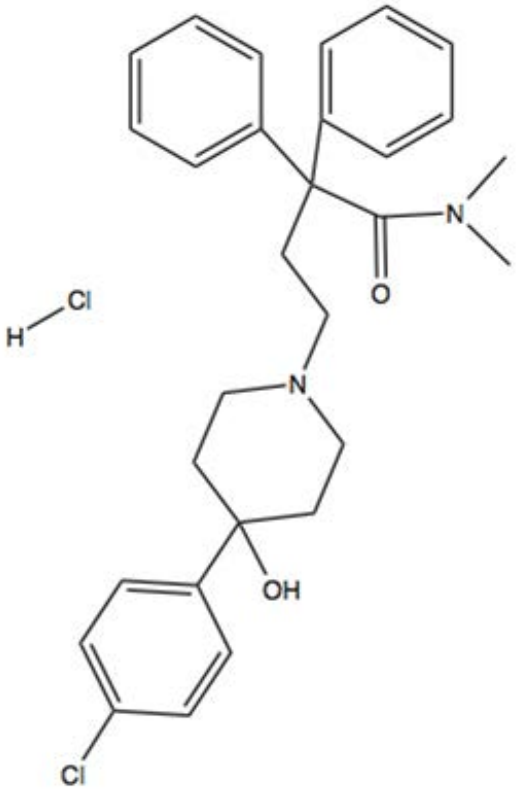
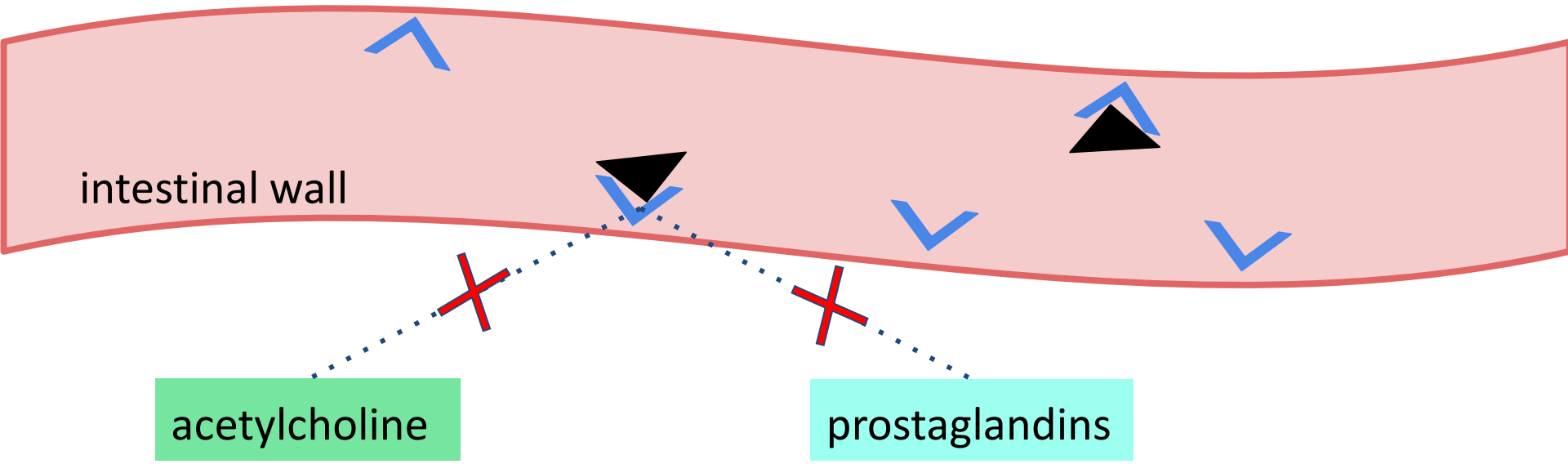


Illustration: ChemDraw ®

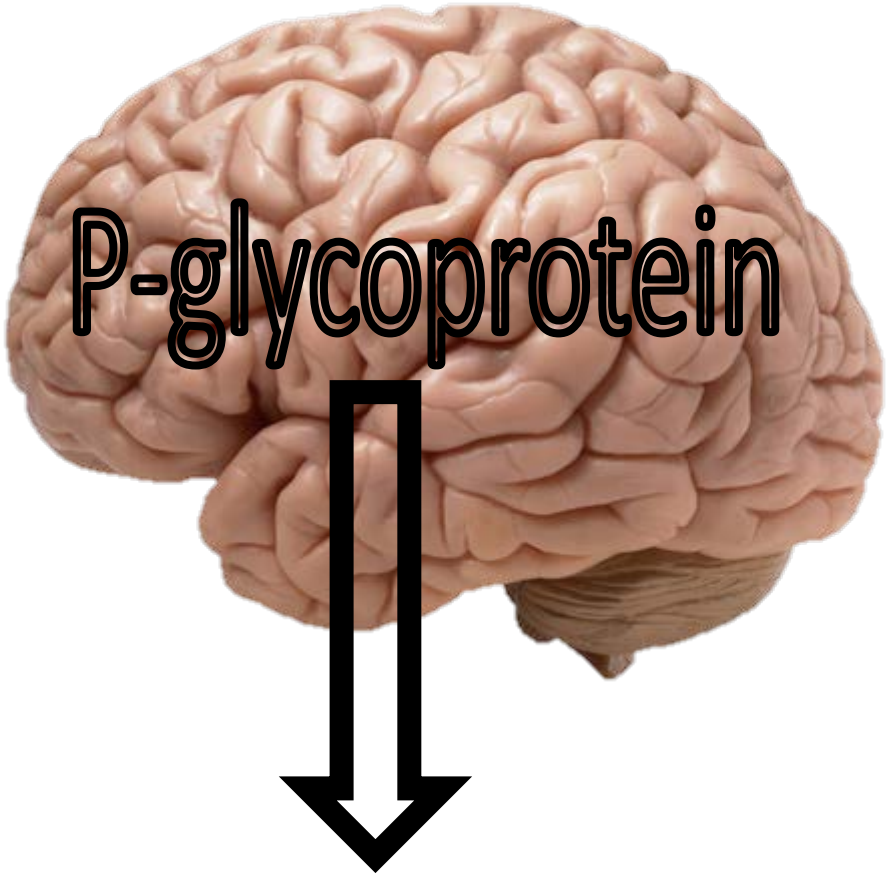
Mechanism of Loperamide



Legend
μ receptor
loperamide

Loperamide [package insert]. Morgantown, WV: Mylan Pharmaceuticals Inc.; July 2006.

Abuse Potential



Jaffe JH, et al. Clin Pharmacol Ther. 1980 Dec;28(6):812-9.
Ericsson CD, et al. Am J Med. 1990 Jun 20;88(6A):10S-14S.
Sadeque AJ, et al. Clin Pharmacol Ther. 2000 Sep;68(3):231-7.

"...200mg of lope (100 pills) will make me almost 100[%] again" "If you take a sh**load of lope like 10 - 20 pills at once in withdrawal, you'll get relief..."

"I just went out and bought a ton of loperamide and Tagamet* because I've been reading how much it helps"

"I started taking 100 mgs of loperamide...taken orally with 800mg of Tagamet*"

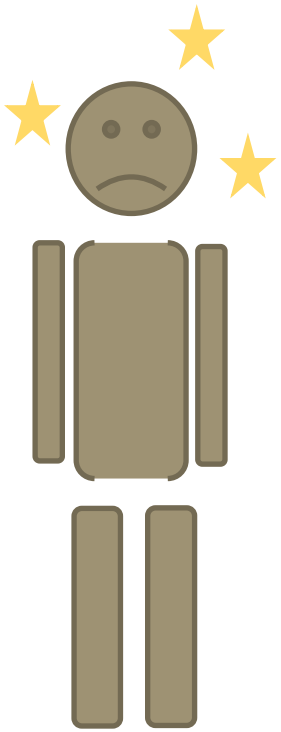
Daniulaityte R, et al. Drug Alcohol Depend. 2013 Jun 1;130(1-3):241-4.
Basic Drug Discussion.http://www.bluelight.org/vb/archive/index.php/t-790856.html Accessed July 13, 2016.

*cimetidine

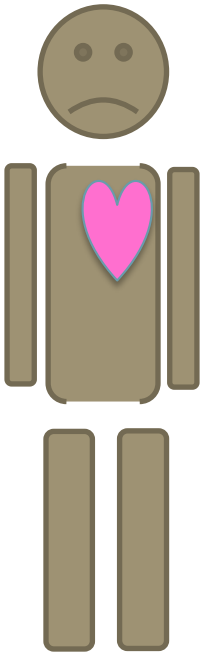
FDA Drug Safety Communication: FDA warns about serious heart problems with high doses of the antidiarrheal medicine loperamide (Imodium), including from abuse and misuse

U.S. Food and Drug Administration. June 2016.

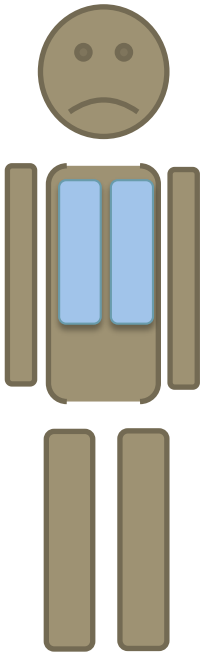
Clinical Presentation



Syncope



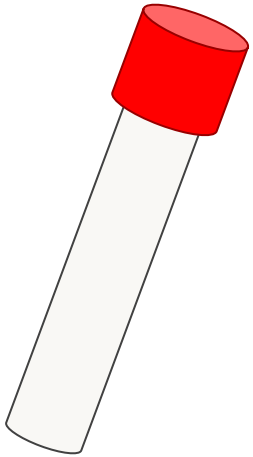
QRS and QT prolongation
Ventricular arrhythmias
Cardiac arrest

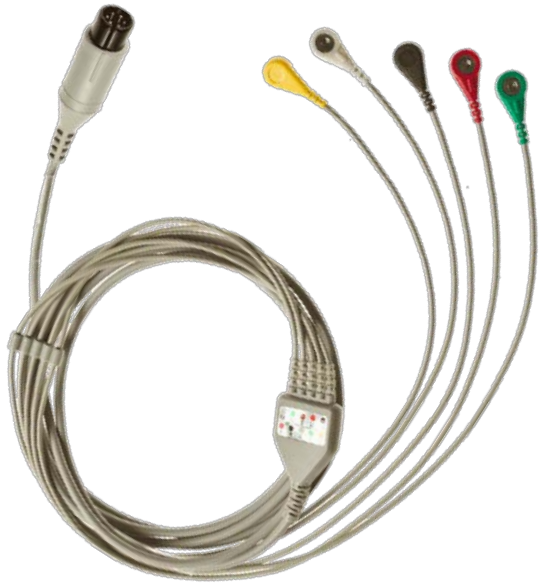


Shortness of breath

Marraffa JM, et al. Clin Toxicol (Phila). 2014 Nov;52(9):952-7.
Spinner HL, et al. Pharmacotherapy. 2015 Feb;35(2):234-8.
Wightman RS, et al. Clin Toxicol (Phila). 2016 Jun;54(5):454-8.

Evaluation





Comprehensive metabolic panel

Continuous cardiac monitor

Loperamide level

Management

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Key Takeaways

- Loperamide has the potential for abuse
- Loperamide abuse can lead to cardiac toxicity

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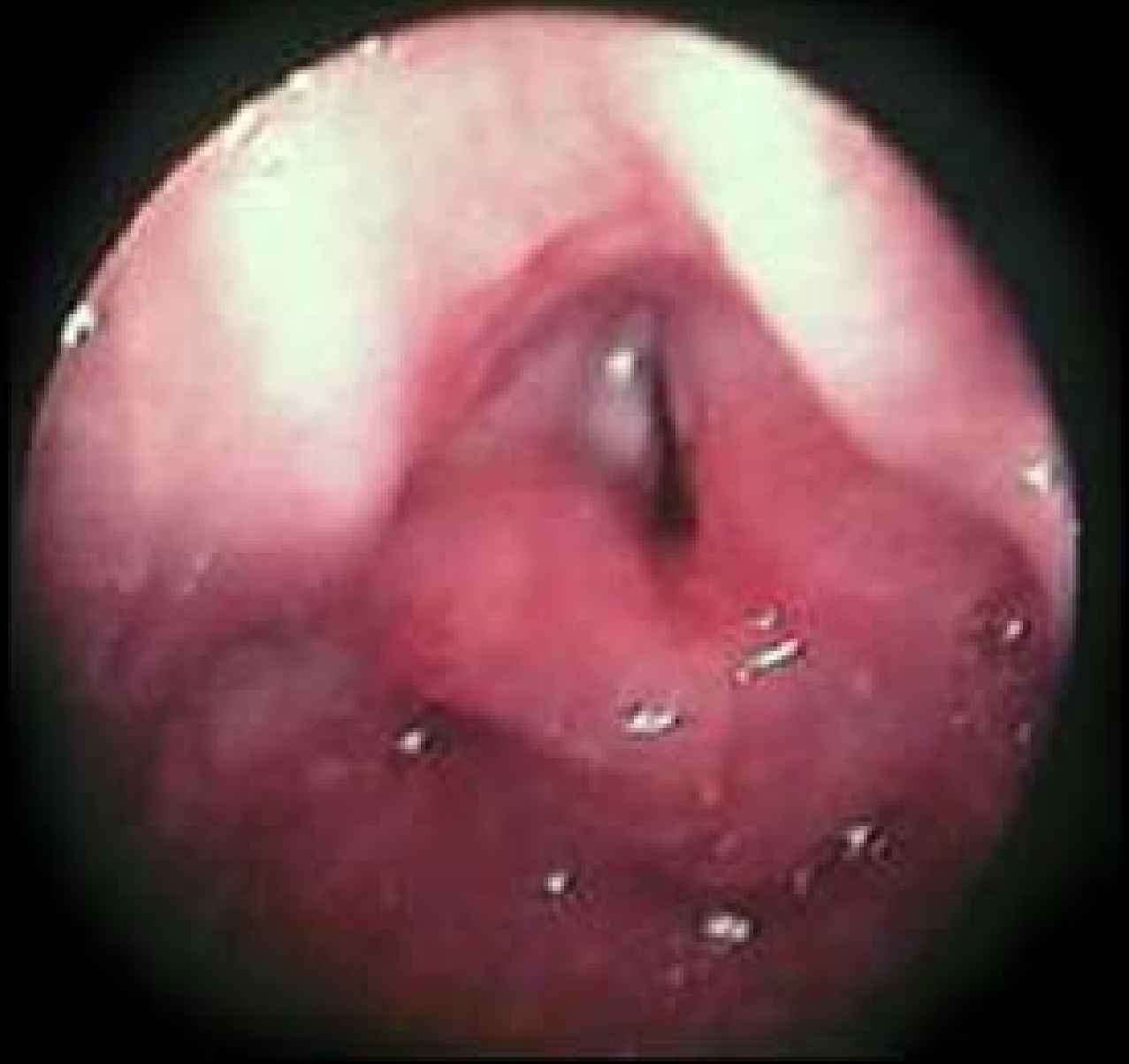
Give Me Some Suga!

Jenny Koehl, Pharm.D.
PGY2 Emergency Medicine Resident
UW Health
Madison, WI

Learning Objective:

- Describe the utility of sugammadex for reversing rocuronium in the emergency department



Urgent Reversal of Rocuronium

Sugammadex

2007 FDA Rejected → 2012 FDA Rejected → 2015 FDA Approved

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Potential Uses of Sugammadex in the Emergency Department

- Unexpected difficult airway / can't intubate, can't ventilate situations
- Reversal for physical exams
- Reversal in status epilepticus
- Allergic reaction to rocuronium or vecuronium

Administration Feasibility

2.7 minute time difference

100 kg patient = 1,600 mg

200mg/2 mL vial: **8 vials**

500mg/5 mL vial: **4 vials**

Lee C. Anesthesiology. 2009;110(5):1020-1025

Side Effects

Side effect risk:

- Nausea 10.6%
- Pruritus 7.3%
- Urticaria 6%
- **Anaphylaxis 0.024-0.33%**
- **Bradycardia – has led to cardiac arrest**

Bridion [package insert] Whitehouse Statin NMC, Inc: December 2015

- Doesn’t the patient still need an airway?

NMBA Re-administration Following 16mg/kg Sugammadex Reversal	
	Minimum waiting time
Rocuronium (any dose)	24 hours
Vecuronium (any dose)	24 hours

Bridion [package insert] Whitehouse Statin NMC, Inc: December 2015

Key Takeaways

- 16mg/kg sugammadex can rapidly reverse high-dose rocuronium
- More drug cost, more medication exposure, more side effects
- Do not reverse paralysis in patients who require paralysis
- Utility in the emergency department is limited

Jenny Koehl, Pharm.D.
PGY2 Emergency Medicine Resident
UW Health
Madison, WI

jkoehl@uwhealth.org

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IV Olanzapine: An atypical option for acute agitation?

Greta Astrup, Pharm.D.
PGY2 Emergency Medicine Pharmacy Resident
University of New Mexico Hospital
December 7th, 2016

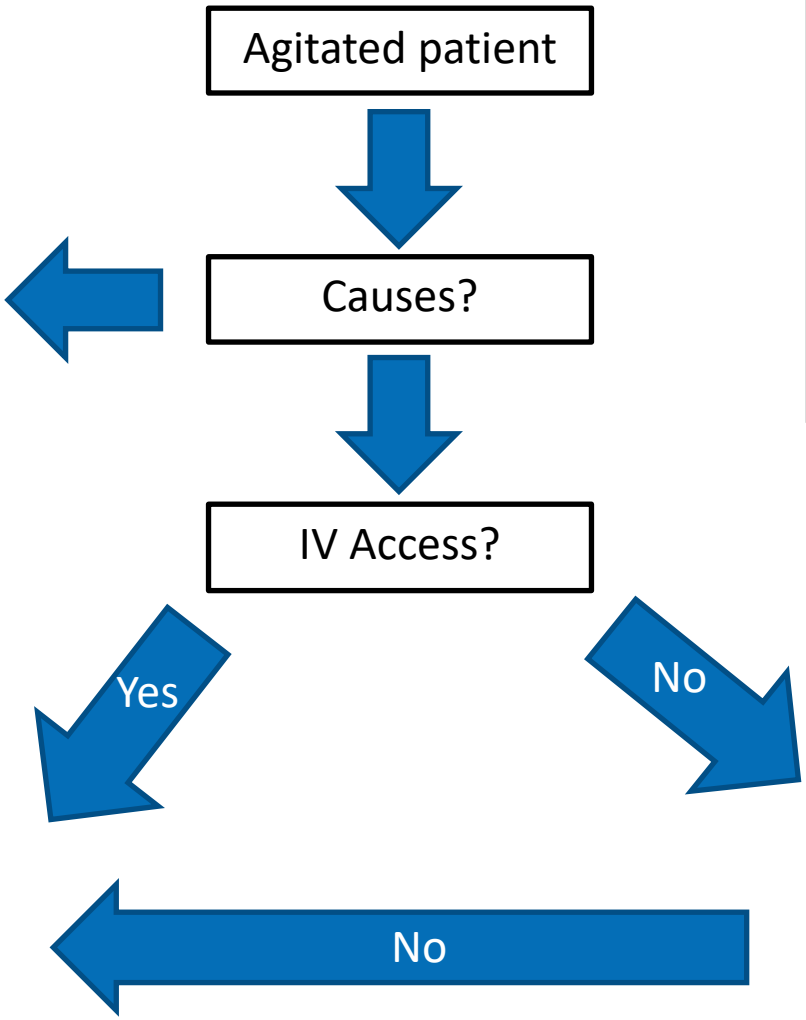
Learning Objective

- Understand the evidence and recognize special considerations for the use of IV olanzapine as an alternative agent for the treatment of acute agitation in the Emergency Department

Treatment

Causes of Agitation:

- Alcohol ingestion/ withdrawal
- CNS infection
- Dementia
- Drug use/ overdose
- Electrolyte abnormalities
- Hypoglycemia
- Hypoxia
- ICH/tumor
- Pain
- Seizure



IM Options:

haloperidol
ketamine
lorazapam/midazolam
olanzapine
ziprasidone

IV Options:

haloperidol
ketamine
lorazapam/midazolam
IV olanzapine

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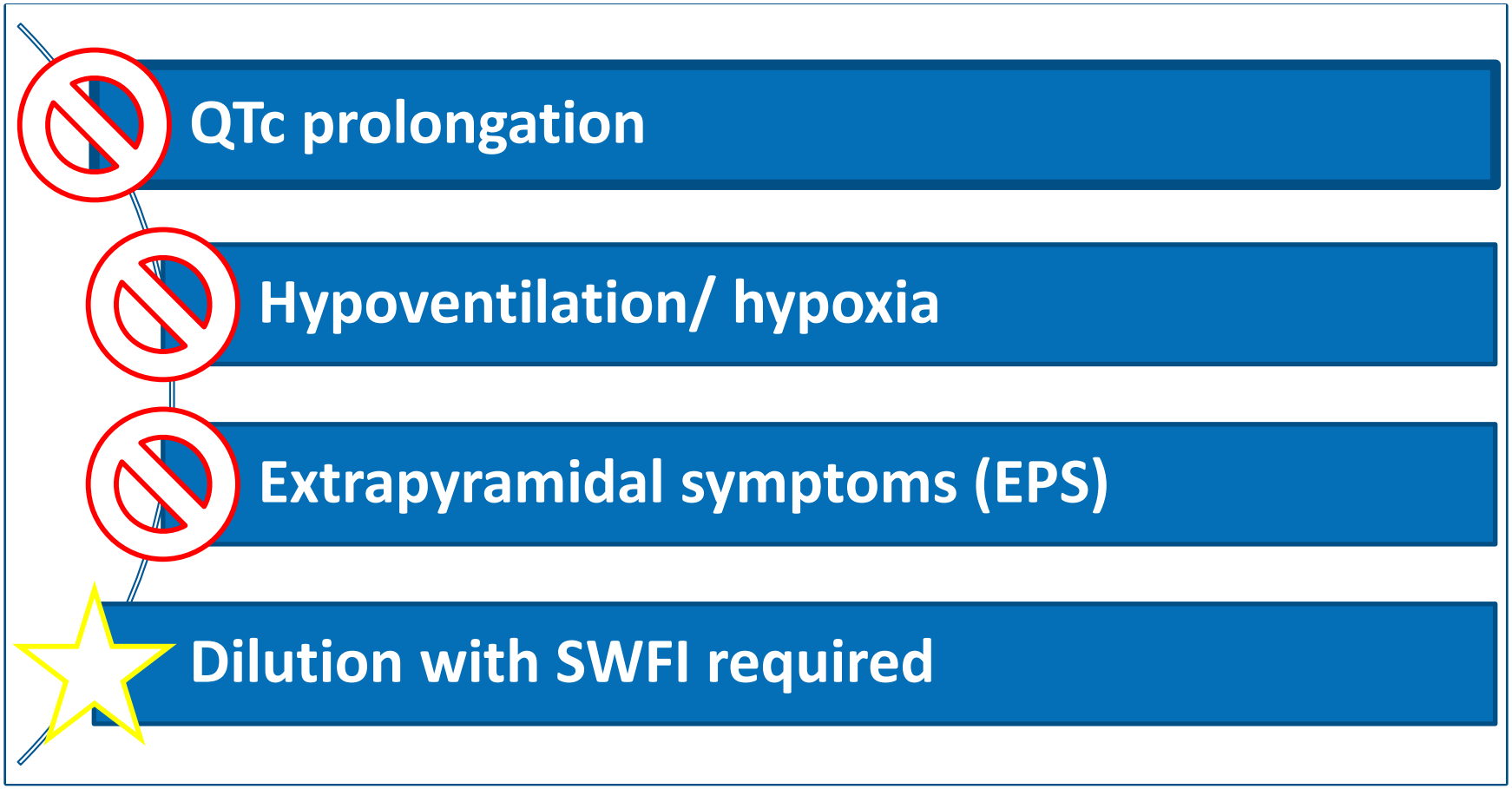
Evidence

Study	n	Design	Treatment	Outcomes
Chan EW et al. (2011)	4	Case reports	▪ IV olanzapine 5-10 mg	Limited Sedation documented w/in ~30 min
Chan EW et al. (2013)	336	Randomized, double-blind, placebo-controlled, double-dummy	▪ IV droperidol 5 mg, ▪ IV olanzapine 5 mg, or ▪ Placebo + IV midazolam 2.5-5 mg	IV droperidol/olanzapine with midazolam is effective and decreases time to sedation
Martel ML et al. (2016)	713	Retrospective review	▪ IV olanzapine 1.25-10 mg	Safe in various ED indications

Chan EW et al. *J Pharm Pract Res.* 2011; 41:135-7.
Chan EW et al. *Ann Emerg Med*. 2013;61(1):72-81.
Martel ML et al. *Acad Emerg Med*. 2016;23(1):29-35.

Considerations



Comparison

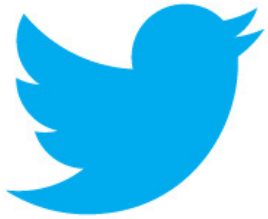
	Haloperidol	Olanzapine	Ziprasidone
Dosing	**IV**: 0.5-10 mg **IM**: 2.5-10 mg (Max: 20-30 mg/day)	**IV**: 2.5-5 mg **IM**: 5-10 mg (Max: 30 mg/day)	**IM**: 10-20 mg (Max: 40 mg/day)
Onset	**IV**: 5-10 min **IM**: 30-60 min	**IV**: unknown **IM**: 15-45 min	**IM**: 15-20 min
Adverse effects	▪ Sedation ▪ Hypotension ▪ Dysrhythmias and QTc prolongation ▪ High EPS potential	▪ Sedation ▪ HA ▪ Hypotension ▪ QTc prolongation ▪ EPS	▪ Nausea ▪ HA ▪ Dose related dysrhythmias and QTc prolongation ▪ EPS

Key Takeaways

- Key Takeaway # 1
  - IV olanzapine may be a potential option for acute agitation in the ED
    - Especially in patients at higher risk for QTc prolongation

- Key Takeaway # 2
  - Dosing: 2.5-5 mg IV
  - Requires reconstitution with SWFI

Tweet Your Questions



@PharmERToxGuy

Q & A Part 2

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Which of the following are appropriate strategies to help prevent or treat burnout?

A. Exercise

B. Ensuring adequate sleep

C. Eating healthy

D. All of the above

Which of the following are appropriate strategies to help prevent or treat burnout?

A. Exercise

B. Ensuring adequate sleep

C. Eating healthy

D. **All of the above**

Assessment Question (True or False)

Presence of hydroxocobalamin can affect laboratory analyses of some clinical chemistries, hematology panels, and urinalyses?

A TRUE

B FALSE

Assessment Question (True or False)

Presence of hydroxocobalamin can affect laboratory analyses of some clinical chemistries, hematology panels, and urinalyses?

A **TRUE**

B FALSE

MF is a 30 yo male, presents to ED after syncopal episode at work

ECG shows sinus rhythm, with prolonged QT and QRS

Patient reports “I sometimes take loperamide, nothing else, really.”

Based on the patient's history and presentation, what would be your next step(s)?

- A Review comprehensive metabolic panel
- B Monitor patient with continuous cardiac monitor
- C Interview patient regarding loperamide use
- D All of the above

Based on the patient's history and presentation, what would be your next step(s)?

- A Review comprehensive metabolic panel
- B Monitor patient with continuous cardiac monitor
- C Interview patient regarding loperamide use
- D **All of the above**

What is the Most Common Side Effect of Sugammadex?

A Bradycardia

B Urticaria

C Nausea/vomiting

D Anaphylaxis

What is the Most Common Side Effect of Sugammadex?

A Bradycardia

B Urticaria

C **Nausea/vomiting**

D Anaphylaxis

Can Rocuronium be Re-administered Immediately After Sugammadex is Given?

A YES

B NO

Can Rocuronium be Re-administered Immediately After Sugammadex is Given?

A YES

B **NO**

Assessment Question

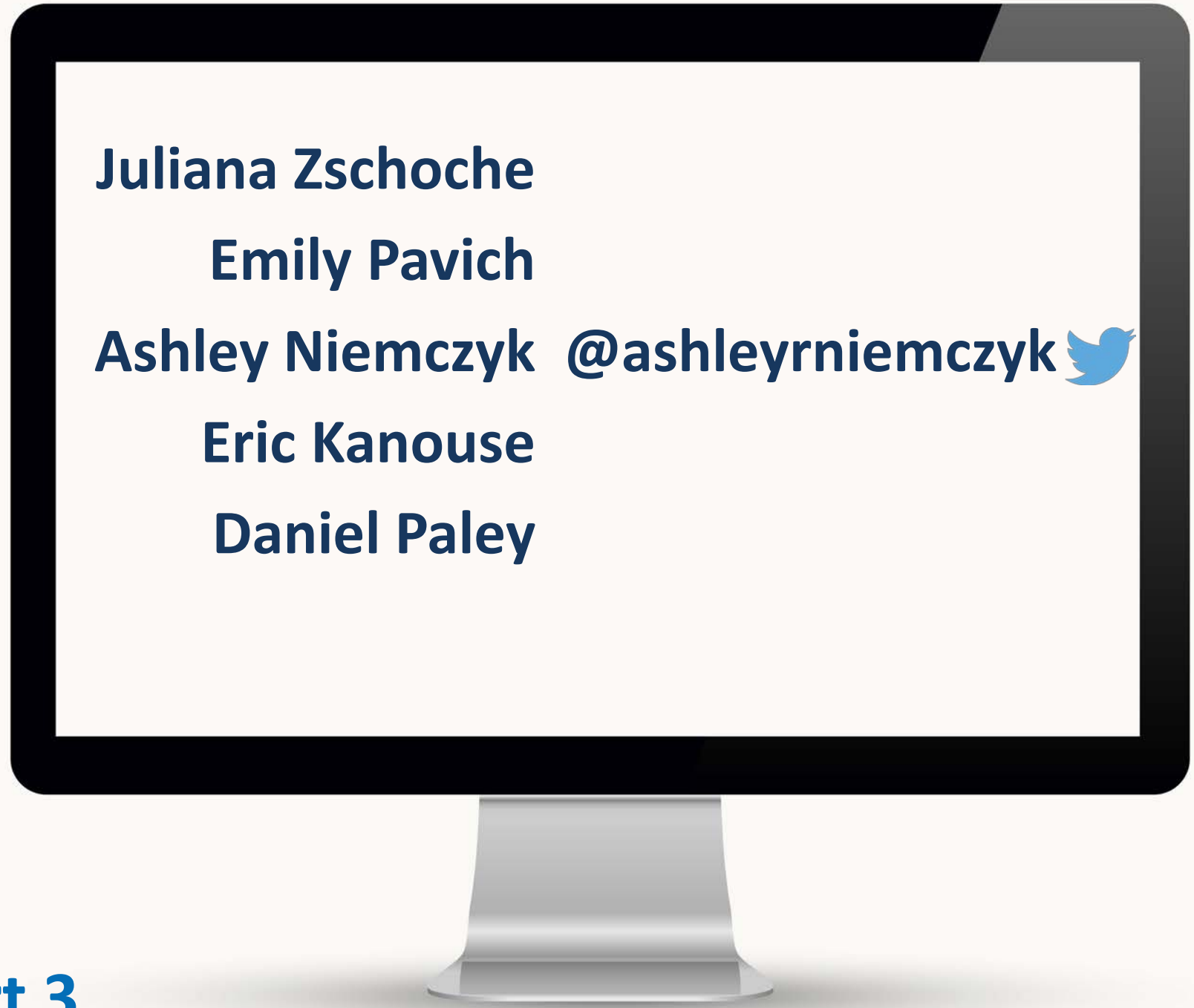
Which of the following are TRUE?

A. Haloperidol is only FDA approved for IM administration
B. IV olanzapine has been used safely and effectively in multiple case reports
C. Olanzapine has less associated QTc effects compared to haloperidol
D. All of the above

Assessment Question

Which of the following are TRUE?

A. Haloperidol is only FDA approved for IM administration
B. IV olanzapine has been used safely and effectively in multiple case reports
C. Olanzapine has less associated QTc effects compared to haloperidol
D. **All of the above**


Juliana Zschoche
Emily Pavich
Ashley Niemczyk @ashleyrniemczyk
Eric Kanouse
Daniel Paley

Part 3

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Should we say goodbye to succinylcholine use in traumatic brain injury patients?

Juliana Zschoche, PharmD
Clinical Pharmacy Specialist – Emergency Medicine
The Johns Hopkins Hospital
Baltimore, Maryland

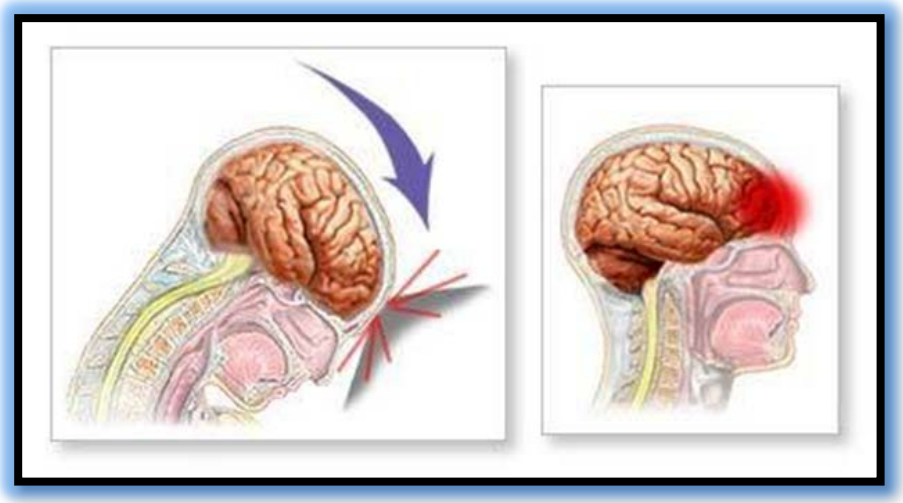
Learning Objective

- Discuss the evidence and clinical implications of the use of succinylcholine as a paralytic in patients with traumatic brain injuries.

Traumatic Brain Injury

- Traumatic brain injury (TBI)
  - Craniocerebral trauma associated with neurological or neuropsychological abnormalities, skull fracture, intracranial lesions or death

- Injuries
  - Concussion
  - Skull Fracture
  - Contusion
  - Subdural Hematoma
  - Subarachnoid Hemorrhage



Langlois JA, Rutalnd-Brown W, Thomas KE. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. 2004.

Intracranial Pressure (ICP)

Causes of elevated ICP in trauma

- Increase in volume of any or all of the intracranial components
- Excessive cerebral blood flow
- Hypercapnia or hypoxia causing vasodilation and increase cerebral blood flow
- Herniation, brain swelling, or subarachnoid hemorrhage

$$CPP = MAP - ICP$$

CPP = Cerebral Perfusion Pressure, MAP = Mean Arterial Pressure, ICP = Intracranial Pressure

Treatment of TBI

- Initial Stabilization
  - Airway Management
    - Adequate Ventilation
      - Rapid Sequence Intubation
  - Circulatory Support
- Elevated ICP Management
- Hemodynamic Support
- Analgesia and Sedation
- Seizure Prophylaxis

Succinylcholine

- Depolarizing neuromuscular blocking agent
- Quick onset, short duration of action
- Adverse Drug Reactions
  - Hyperkalemia
  - Muscle fasciculation
  - Bradycardia/hypotension
  - Malignant hyperthermia
  - Increase in ICP
- Avoid use in burn patients, patients with crush injuries, and patients with renal failure or on dialysis

Succinylcholine increase ICP?

- May be associated with a transient increase in ICP
  - FDA Labeling

- Mechanism: Unknown
  - Hypothesis: Mediated via an increase in afferent spinal neural traffic origination from muscle spindle fibers, followed by an increased in cerebral blood flow

Sandoz Inc. Succinylcholine chloride injection solution package insert. Princeton, NJ; 2011

Previous Studies

- Anesth Analg 1974;53(6):985-92
  - Succinylcholine caused a significant elevation in ICP during induction in 8 adult patients who were to undergo craniotomy

- Anesth Analg 1994; 78:469-73
  - Succinylcholine use caused no change in cerebral perfusion pressure, mean arterial pressure, or intracranial pressure in 10 mechanically ventilated patients being treated for elevated ICP

Succinylcholine vs Rocuronium

Succinylcholine Is Associated with Increased Mortality When Used for Rapid Sequence Intubation of Severely Brain Injured Patients in the Emergency Department	
Population	233 patients with TBI who underwent RSI with succinylcholine (n = 149 pts) or rocuronium (n = 84 pts) Subjects were stratified based upon on severity of injury using head abbreviated injury scores
Primary Outcome	In-hospital mortality
Intervention	Retrospective cohort study: succinylcholine versus rocuronium as NMBA in patients from October 2010 to October 2014
Results	

Intervention	Mortality (%)
Succinylcholine	23
Low-severity TBI (14/103)	14
High-severity TBI (20/46)	44
Rocuronium	23
Low-severity TBI (12/54)	22
High-severity TBI (7/30)	23

Pharmacotherapy 2016;36(1):57–63

Succinylcholine vs Rocuronium

- Significant statistical interaction was noted between head AIS and NMBA choice
  - OR 4.10, 95% CI 1.18–14.12
- Effect of succinylcholine on mortality was significant only in patients with severe or critical TBI
- Head abbreviated injury score is a subjective assessment that cannot be performed in real time prior to intubation
- Cannot correlate GCS to head abbreviated injury score
- Other limitations

Pharmacotherapy 2016;36(1):57–63

Key Takeaways

- Key Takeaway #1
  - Succinylcholine may cause a mild increase in intracranial pressure, but the clinical significance is unknown
- Key Takeaway #1
  - Succinylcholine use for RSI in patients with severe traumatic brain injury may be associated with increased mortality
- Key Takeaway #3
  - It is difficult to discriminate reliably which patients are likely to benefit from avoidance of succinylcholine at the time of intubation in the emergency department

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An NIHSS of 2 for confusion: Did the ischemic stroke guidelines change?

Emily Pavich, PharmD
Emergency Medicine Clinical Pharmacist
Indiana University Health Bloomington Hospital

Learning objective

- Compare the American Heart Association/American Stroke Association (AHA/ASA) scientific statement of rationale for inclusion and exclusion criteria for intravenous alteplase in acute ischemic stroke (AIS) with key changes made in the alteplase package insert (PI)

A patient case

BS is a 75 yo M presenting to the ED with acute onset of dizziness, inability to walk, and nausea. Onset was 1.5 hours ago.

NIHSS = 2 for limb ataxia

Blood glucose 92 mg/dL

Blood pressure 150/68 mm Hg

No anticoagulant use at home

CT scan shows no acute intracranial hemorrhage (ICH)

PMH: Patient was diagnosed with posterior circulation stroke at outside facility 3 weeks ago, where he received alteplase

Stroke Guy
@StrokeGuy42

Follow

That's why I keep the PI in my pocket! #micdropboom #winning #alteplaseconquersall #clotbusted

10:30 PM – 26 Jan 2016

154 161

Disclaimer: This is not or was not ever an actual Tweet

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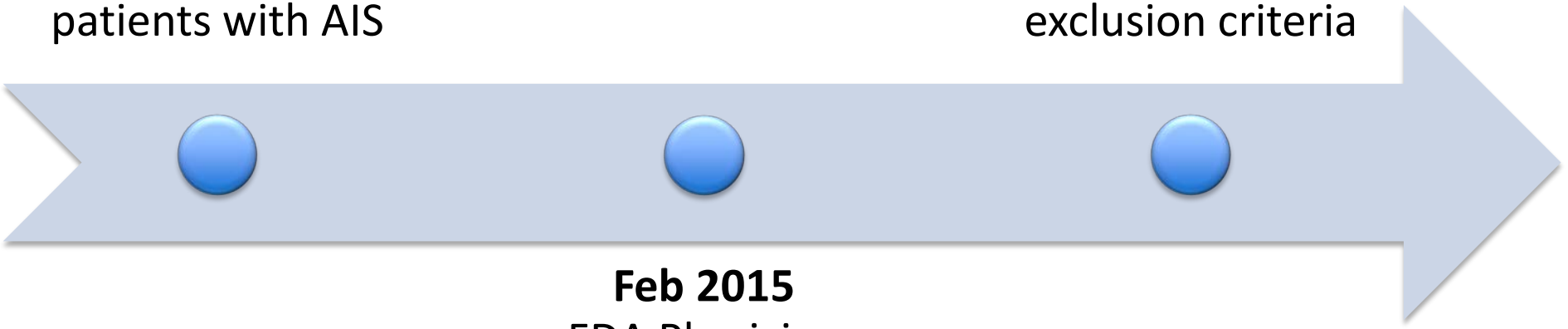
Timeline of alteplase in stroke updates



2013
AHA/ASA guidelines for patients with AIS

Feb 2015
FDA Physician Labeling Rule (PLR) changes made to alteplase PI

Dec 2015
AHA/ASA rationale for IV alteplase inclusion and exclusion criteria

Jaunch EC, et al. *Stroke* 2013.
Genentech Medical Communications, e-mail; September 2015.
Demaerschalk BM, et al. *Stroke* 2016;47(2):581-641.

Alteplase PI contraindication section changes

Absolute contraindications removed
Previous stroke in the preceding 3 months
History of ICH
Arterial puncture at non-compressible site in previous 7 days
CT demonstrates multilobar stroke
Blood Glucose < 50 mg/dL

Absolute contraindications changed
Symptoms suggestive of SAH
BP ≥ 185 / ≥ 110 mm Hg
Anticoagulant use and INR > 1.7 or PT > 15 seconds
Heparin or LMWH use and aPTT > 40 seconds
Platelet count > 100,000/mm^3
Current use of DTIs or FXaIs w/ elevated sensitive tests

- All relative contraindications were removed from the PI contraindications

Activase® [package insert]. South San Francisco, CA: Genentech, Inc; 2015.
Genentech Medical Communications, e-mail; September 2015.

Hashtag worthy?

- Physician Labeling Rule (PLR):

"Only known hazards, and not theoretical possibilities, can be the basis for a contraindication"

- 2015 AHA/ASA Scientific Rationale Statement:

"…The PI changes were made by the FDA in the context of no substantial new information…"

Genentech Medical Communications, e-mail; September 2015.
Demaerschalk BM, et al. *Stroke* 2016;47(2):581-641.

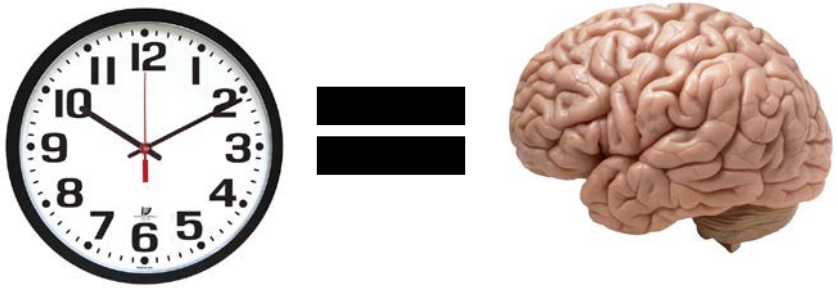
AHA/ASA scientific statement for removed and amended contraindications

Absolute contraindication removed or changed in the PI	AHA/ASA 2015 statement & evidence level	
Multilobar infarction (hypodensity > 1/3 cerebral hemisphere)	**No threshold evidence, these patients have poor prognosis**	**A**
Stroke in the preceding 3 months	**May be harmful; ICH potential**	**B**
Blood Glucose < 50 mg/dL	**Not for nonvascular issues**	**B**
Examples removed for BP	**Safe when BP < 185/110**	**B**
Examples removed for coagulopathy	**Not recommended/harmful**	**B/C**
Symptoms suggestive of SAH	**Contraindicated**	**C**
History of ICH	**Potentially harmful**	**C**
Arterial puncture at non-compressible site in previous 7 days	**Uncertain**	**C**

Demaerschalk BM, et al. *Stroke* 2016;47(2):581-641.

Key takeaways

- Key Takeaway #1
  - The alteplase package insert and the AHA/ASA guidelines for alteplase use in stroke have significant differences
- Key Takeaway #2
  - The 2015 AHA/ASA evidence statement for alteplase inclusion and exclusion criteria is a great resource
- Key Takeaway #3
  - Address any issues in your institution early



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- Demaerschalk BM, Kleindorfer DO, Adeoye OM, et al. Scientific rationale for the inclusion and exclusion criteria for intravenous alteplase in acute ischemic stroke: A statement for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke* 2016;47(2):581-641.
- Jaunch EC, Saver JL, Adams HP, et al. Guidelines for the early management of patients with acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2013;44(3):870-947.

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Fosfomycin: You CAN teach an old drug new tricks

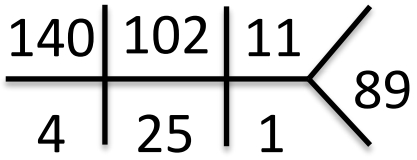
Ashley Niemczyk, PharmD, BCPS
Emergency Medicine Pharmacist
Fairview Ridges Hospital
Burnsville, Minnesota

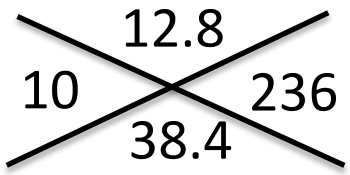
Learning Objectives

- Review pharmacology of fosfomycin
- Describe the potential place in therapy for fosfomycin
- Understand the role fosfomycin may play in preventing admissions for ED patients

Meet AB

- 49 year old female presents to the ED
  - Increased urinary frequency, urgency, dysuria
- PMH: HTN, fibromyalgia, depression
- Objective data:
  - HR: 75 bpm
  - BP 124/74 mmHg
  - Temp: 98.4°F
  - UA: (+) nitrite, moderate leukocyte esterase, bacteria





Meet AB

Drug Allergy/Intolerance	Reaction
Amphotericin B	Unknown
Azithromycin	Hives
Aztreonam	Leukopenia
Cefdinir	Hives
Cephalexin	Hives
Gentamicin	Burning sensation of face
Levofloxacin	Weakness/dystonia
Nitrofurantoin mononitrate	Rash
Penicillins	Respiratory/rash/hives
Sulfa	Respiratory/rash/hives
Vancomycin	Rash/swelling

Meet AB

- You get this call from one of your ED residents:
  - “Hi Ashley, I’m calling about a patient with a complex allergy history who has a UTI. We think we’re going to have to admit her for IV antibiotics.”

- How many of you have gotten this type of call??

Fosfomycin Pharmacology

- **Mechanism of Action**
  - Inhibits bacterial cell wall synthesis
  - Decreases bacterial adherence to uroepithelial cells
- **Dosing**
  - 3 g mixed in 3-4 ounces of water PO once
- **Uses**
  - Uncomplicated urinary tract infection
  - ESBL UTI?
- **Spectrum of Activity**
  - E.coli, P.mirabilis, K.pneumoniae, Enterobacter, Citrobacter, Serratia, MSSA/MRSA, VRE

Fosfomycin tromethamine. Micromedex 2.0. Truven Health Analytics, Inc. Greenwood Village, CO. http://www.micromedexsolutions.com. Accessed 2016 Jun 2.
Michalopoulos AS, Livaditis IJ, Gougoutas V. The revival of fosfomycin. *Int J Infect Dis. 2011 Nov;15(11).732-739.*

Fosfomycin Hypersensitivity

- Fosfomycin structure not related to other antimicrobials
- Very few case reports reporting anaphylaxis with fosfomycin
  - No cases in patients with previously noted drug allergies

Rosales M, Vega F. Anaphylactic shock due to fosfomycin. *Allergy.* 1998;53:905-907
Sánchez-Morillas L. Rojas P, Riaño-Martín, et al. Anaphylaxis induced by fosfomycin. *Ann Allergy Asthma Immunol.* 2010;105:241
Gamboa PM, Antepara I, Jauregui I, et al. Two patients with anaphylactic shock due to fosfomycin. *Ann Allergy Asthma Imunnol.* 2011;106:260-261

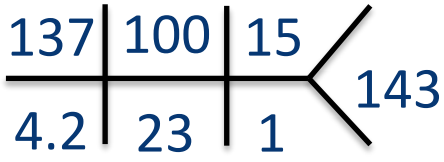
Back to AB…

- AB was given the dose of fosfomycin 3 g PO once in the ED
- Monitored and discussed signs and symptoms of allergic reaction
- Discharged to home

- ADMISSION PREVENTED!!!

Meet YZ

- 67 year old female sent to ED from clinic
  - IV antibiotics for ESBL UTI
  - Anxious and tearful about pending admission
- PMH: HTN, atrial fibrillation, hyperlipidemia, DM II
- Objective data:
  - HR: 86 bpm
  - BP: 136/82 mmHg
  - Temp: 99.2°F
  - Urine culture: ESBL E.coli



Meet YZ

- You get a call from the attending…
  - “Hey Ash, we have this patient who we’re admitting for ESBL E.coli UTI. What ‘penem’ would you like to use?”

- How many of you have gotten this call?

Fosfomycin for ESBL UTI

Study	ESBL Isolates (N)	ESBL Isolates Susceptible to Fosfomycin (%)
Sabharwal, 2015	78 (*E.coli* + *K.pneumoniae*)	95
Yeganeh-Sefidan, 2016	75 (*E.coli* + *K.pneumoniae*)	97.3

Sabharwal, ER, Sharma R. Fosfomycin: an alternative therapy the treatment of UTI amidst escalating antimicrobial resistance. *J Clin Diagn Res.* 2015 Dec;9(12):DC6-DC09.
Yeganeh-Sefidan F, Ghotaslou R, Akhi MT, et al. Fosfomycin, interesting alternative drug for treatment of urinary tract infections created by multiple drug resistant and extended spectrum β-lactamase produsing strains. *Iran J Microbiol.* 2016 Apr;8(2): 125-131.

Fosfomycin for ESBL UTI

- Systematic review

Bacteria	Median ESBL Isolates N (range)	Median ESBL Isolates Susceptible to Fosfomycin Range (%)
E.coli	272 (42-6644)	95 (81-100)
Klebsiella	63 (28-509)	63 (46.0-94.7)
Proteus	50 (32-85)	50 (50-72)

Vardakas KZ, Legakis NJ, Triarides N, Falagas ME. Susceptibility of contemporary isolates to fosfomycin: a systematic review of the literature. *Int J Antimicrob Agents.* 2016 Apr;47(4):269-285.

Fosfomycin for ESBL UTI

Study	Patients with ESBL Isolates (N)	Doses of Fosfomycin (mean)	Cure Rate (%)
Sastry, 2015	7	1-3	71.4
Seroy, 2016	20 (*E.coli*)	3	75
	8 (*K.pneumoniae*)	4.6	62
	6 (*P.mirabilis*)	2	100

Sastry S, Clarke LG, Alrowais H, et al. Clinical appraisal of fosfomycin in the era of antimicrobial resistance. *Antimicrob Agents Chemother.* 2015 Dec;59(12):7355-7361.
Seroy JT, Grim SA, Reid GE, et al. Treatment of MDR urinary tract infections with oral fosfomycin: a retrospective analysis. *J Antimicrob Chemother.* 2016 May. Epub ahead of print.

Back to YZ…

- Received one dose of fosfomycin in the ED
- Discharged with two additional doses of fosfomycin to take every 48 hours
- Follow up in ID clinic one week later showed resolution of symptoms and a clean UA

- ADMISSION PREVENTED!!

Key Takeaways

- Key Takeaway #1
  - Fosfomycin may be an option for patients with multiple drug allergies
- Key Takeaway #2
  - Multiple-dose regimen of fosfomycin has been effective in treating ESBL UTI's
- Key Takeaway #3
  - Proper selection of fosfomycin use may preserve its activity while preventing admissions

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Is There Additional Risk of Thrombolytic Therapy During Pregnancy?

Eric Kanouse, Pharm.D.
Emergency Medicine Clinical Staff Pharmacist
University of Rochester Medical Center
Rochester, NY

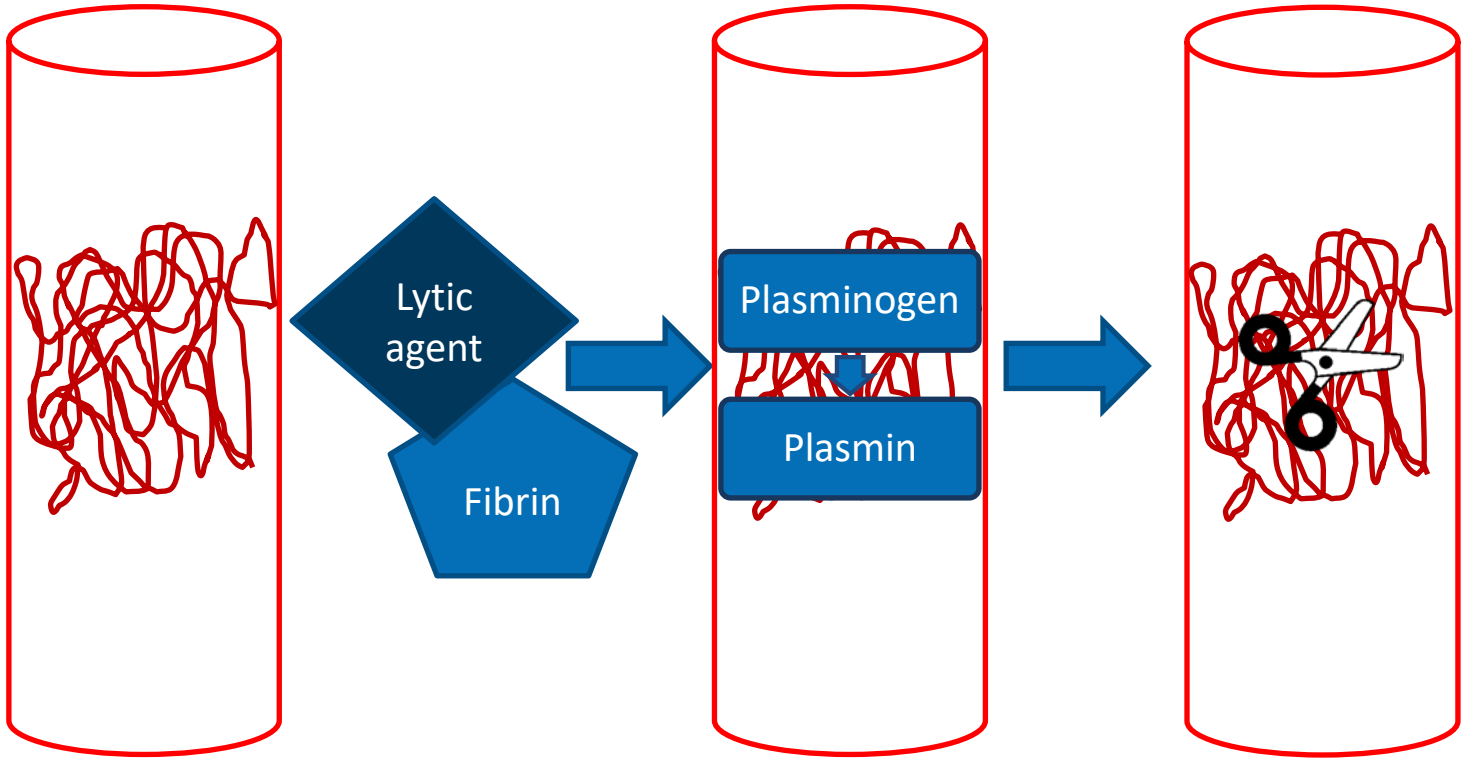
Objective

- Describe the available evidence surrounding the use of thrombolytic therapy during pregnancy

I can't breathe…

- 28 year-old female presents with dyspnea, pleuritic pain and cough
- Vitals:
  - Temp: 38.5˚C
  - HR: 110 bpm
  - BP: 80/48 mm Hg
  - RR: 30 bpm
- PMH – 16 weeks pregnant
- EM physician orders:
  - STAT Chest CT

Thrombolysis

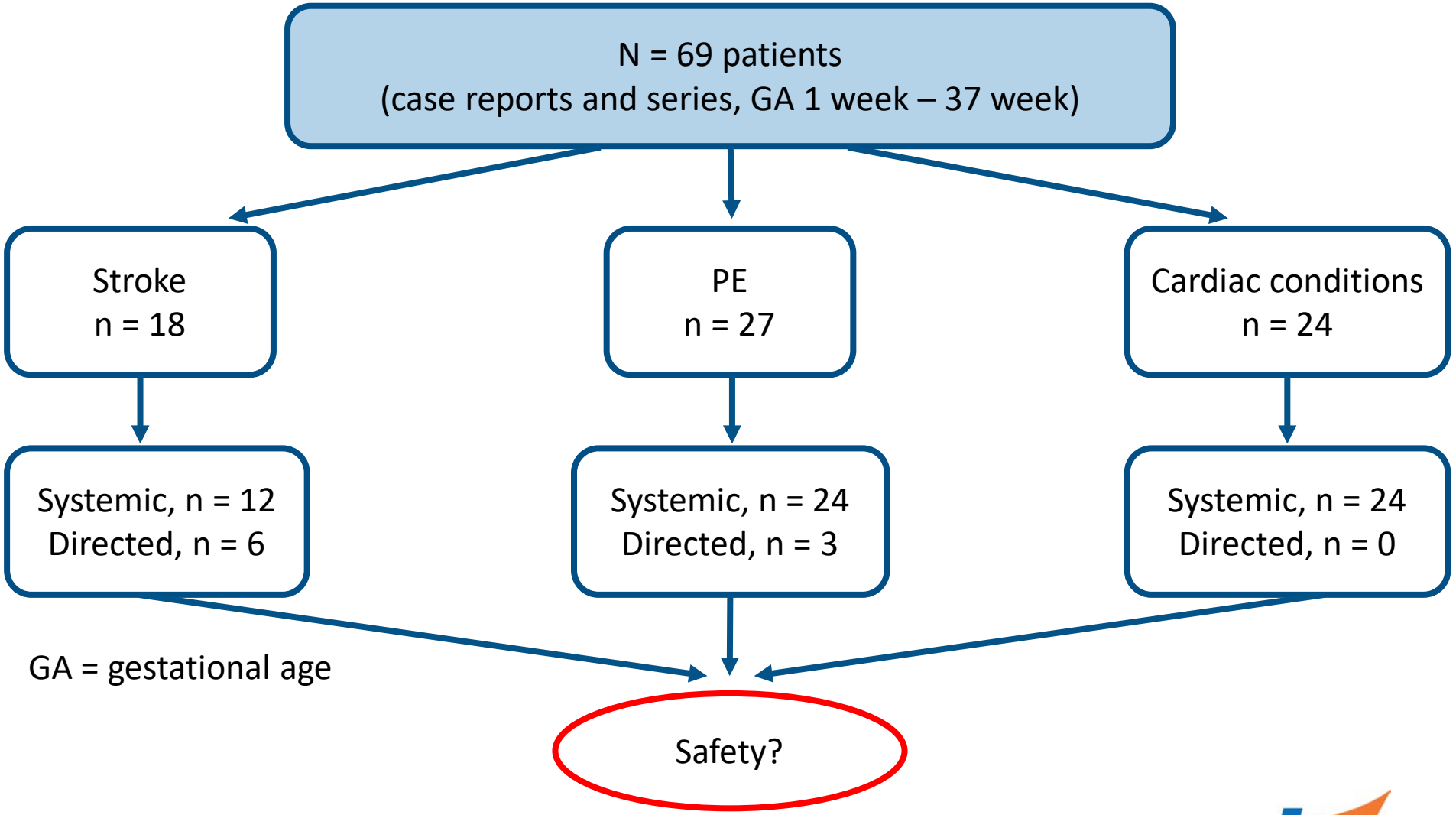


- Indications:
  - Stroke
  - Pulmonary Embolism (PE)
  - Myocardial infarction
- Adverse events
  - Hemorrhage

Pregnancy Considerations

- Hypercoagulable state
- Risk/benefit of thrombolytic to fetus and mother
  - Factors that influence drug entry into placenta
- American College of Chest Physicians:
  - "The use of thrombolytic therapy is best reserved for life-threatening maternal thromboembolism"
- Quality of evidence?

Bates SM, et al. Chest 2012 141(2_suppl): e691S-e736S



Murugappan A, et al. Neurol 2006; 66(5): 768-770
Gartman EJ. Obst Med 2013; 6(3): 105-111
Del Zotto E, et al. Stroke Res Treat 2011
Tversky S, et al. J Stroke Cerebrovasc Dis 2016 (article in press)

Stroke
(n=18)

- Major maternal complication ~ 6%
- Minor maternal complication ~ 22%
- Fetal complication ~ 22%

PE
(n=27)

- Major maternal complication ~ 4%
- Minor maternal complication ~ 15%
- Fetal complication ~ 4%

Cardiac Conditions
(n=24)

- Major maternal complication ~ 17%
- Minor maternal complication ~ 8%
- Fetal complication ~ 21%

Overall:
(N=69)

- **Major maternal complication ~ 9%**
- **Minor maternal complication ~ 14%**
- **Fetal complication ~ 14%**

Murugappan A, et al. Neurol 2006; 66(5): 768-770
Gartman EJ. Obst Med 2013; 6(3): 105-111
Del Zotto E, et al. Stroke Res Treat 2011
Tversky S, et al. J Stroke Cerebrovasc Dis 2016 (article in press)

Key Takeaways

- Inclusion/exclusion criteria assessment
- Complication rate appears to be higher in pregnancy based on reviewed case reports and series
  - Carefully evaluate risk vs. benefit
  - Interdisciplinary approach warranted

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Some Like it Hot!
Capsaicin for Cannabinoid Hyperemesis Syndrome

Daniel Paley, Pharm.D.
Emergency Medicine Clinical Pharmacist
Mercy Hospital – part of Allina Health
Coon Rapids, MN

Learning Objectives

- Describe common findings in cannabinoid hyperemesis syndrome (CHS).
- Understand the role of capsaicin in treating CHS.

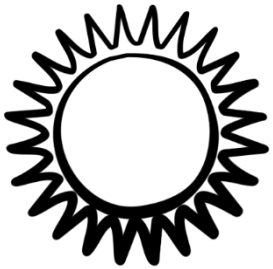
Cannabinoid Hyperemesis Syndrome

- Cyclic episodes of nausea, vomiting, and epigastric pain associated with chronic marijuana use.

  Allen JH, et al. Gut. 2004; 53:566-70

L  K for:

Morning symptoms



Long-term history of cannabis use

Compulsive bathing

Image accessed: http://remedybarcelona.com/category/Barcelona. .July 1, 2016.

CHS: Coming to a State Near You?

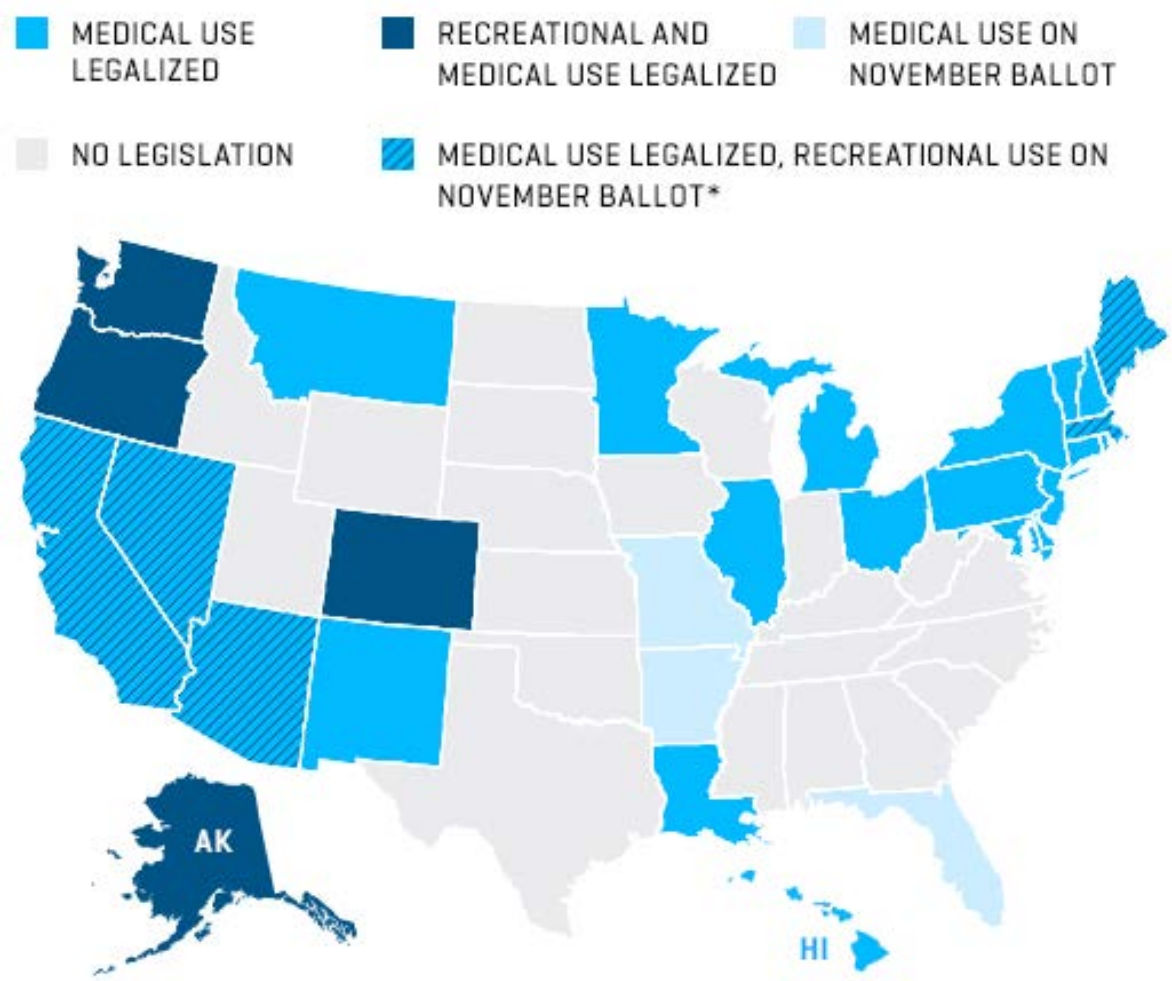


Image accessed: http://fortune.com/2016/06/29/legal-marijuana-states-map. September 4, 2016

Extra Spicy: A New Therapy for CHS

Capsaicin 0.025% - 0.075% cream applied directly to the abdomen, arms, and/or back.

Relief of nausea, vomiting, and GI pain within 30 minutes.

Biary R at al. Clinical Toxicology 2014; 52: 787

Lapoint J. Clinical Toxicology 2014; 52: 707

Capsaicin Mechanism of Action

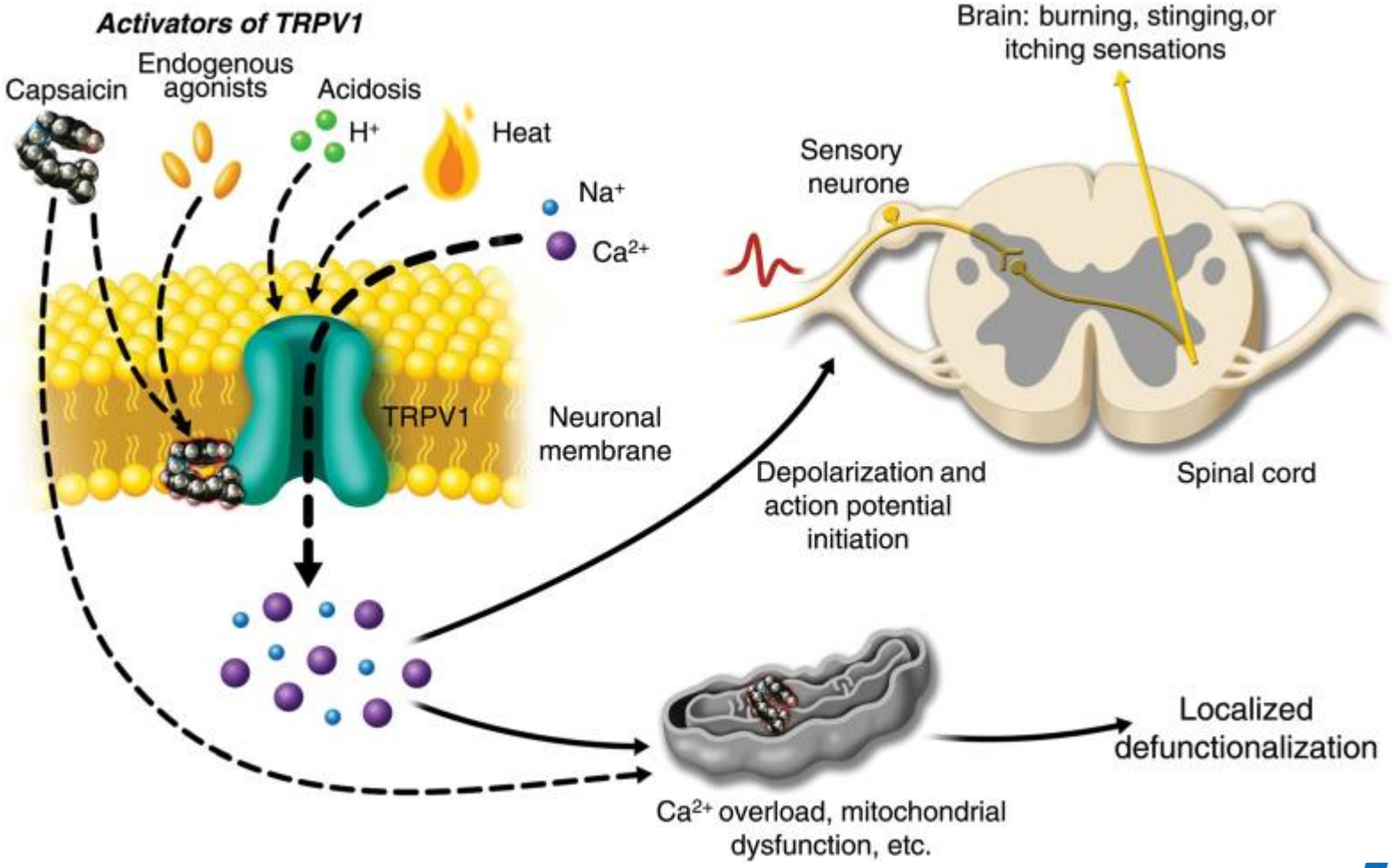


Image from: Anand P and Bley K. British Journal of Anesthesia 2011. 107; 4: 490-502

Evidence

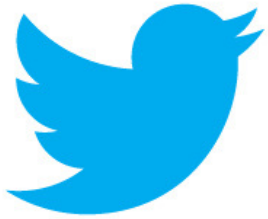
Abstract (1) NACCT 2014	Abstract (2) NACCT 2014	Poster (3) ACMT 2016
• N=5 • 0.075% cream • Success	• N=1 • 0.025% cream • Success	• N=3 • 0.075% cream • Success

1. Lapoint J. Clinical Toxicology 2014; 52: 707
2. Biary R at al. Clinical Toxicology 2014; 52: 787
3. Spyres et al. Poster presented at ACMT Annual Meeting. March 2016

Key Takeaways

- Cannabinoid hyperemesis syndrome is characterized by vomiting associated with heavy and long-term marijuana use.
- Clues: marijuana use history, compulsory showering behavior.
- Capsaicin cream applied to the abdomen/back/arms can relieve symptoms within 30 minutes.

Tweet Your Questions



@PharmERToxGuy

Q & A Part 3

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(True or False) The use of succinylcholine leads to a significant increase in ICP, which then increases mortality, in all patients with TBI.

A TRUE

B FALSE

(True or False) The use of succinylcholine leads to a significant increase in ICP, which then increases mortality, in all patients with TBI.

A TRUE

B **FALSE**

Question

Of the following contraindications removed or amended in the PI, which has the highest rated evidence to support it as an exclusion criteria for alteplase in stroke?

A. Arterial puncture at non-compressible site in previous 7 days
B. Previous stroke in preceding 3 months
C. History of ICH
D. Symptoms of SAH

Question

Of the following contraindications removed or amended in the PI, which has the highest rated evidence to support it as an exclusion criteria for alteplase in stroke?

A. Arterial puncture at non-compressible site in previous 7 days

B. **Previous stroke in preceding 3 months**

C. History of ICH

D. Symptoms of SAH

Use fosfomycin with caution in patients with which drug allergy?

A Penicllins

B Sulfa

C Tetracyclines

D None of the above

Use fosfomycin with caution in patients with which drug allergy?

A Penicllins

B Sulfa

C Tetracyclines

D **None of the above**

A 28 yo pregnant female presents to the ED with dyspnea, pleuritic pain and cough. Her vitals reveal the following: Temp 38.5˚C, HR 110 bpm, BP 80/48, RR 30 bpm. CT scan shows large pulmonary embolism. As the pharmacist working in the ED, what would you do?

- A Carefully assess the risks vs. benefits of thrombolytic therapy
- B Review contraindications to thrombolytic therapy
- C Help determine dose of thrombolytic agent
- D All of the above

A 28 yo pregnant female presents to the ED with dyspnea, pleuritic pain and cough. Her vitals reveal the following: Temp 38.5˚C, HR 110 bpm, BP 80/48, RR 30 bpm. CT scan shows large pulmonary embolism. As the pharmacist working in the ED, what would you do?

A. Carefully assess the risks vs. benefits of thrombolytic therapy
B. Review contraindications to thrombolytic therapy
C. Help determine dose of thrombolytic agent
D. **All of the above**

Which of the following characteristics of CHS is NOT correct?

A. Occurs only in teenaged marijuana users
B. Associated with heavy marijuana use
C. Morning predominance of symptoms
D. Relieved by hot showers

Which of the following characteristics of CHS is NOT correct?

A **Occurs only in teenaged marijuana users**

B Associated with heavy marijuana use

C Morning predominance of symptoms

D Relieved by hot showers

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Emergency Medicine Pearls

Section Advisory Group on Emergency Care
Section of Clinical Specialists and Scientists
American Society of Health-System Pharmacists (ASHP)