2024 ACMT
Board Review Course
Interactive Cram Session #1
June 14, 2024

PRINT MATERIALS

SHIPPING UPDATE

We apologize for the delay!

The first round of shipments should arrive to you by:

THURSDAY, JUNE 20, 2024

Interactive Cram Session

Today's goal is to be **interactive**, **engaging**, and **educational**. Agenda:

- Introductions
- 5-min "Key Takeaways"
- Q&A with Faculty Experts
- Pop Quiz

Today's session is being recorded and will be accessible on-demand.

DISCLAIMER

According to ABEM policy, the planning committee and faculty for this course are not allowed to have intimate knowledge of the exam or write exam questions. The content of this course is based on the expertise of ACMT members, who are specialists in Medical Toxicology.

We do not have direct knowledge of the exam content. ABEM test question writers are prohibited from participating in any board review or preparatory course. The study materials, including the Quiz Bank and pop quiz questions, are based on years of collective experience from the Board Review Course committee, but we do not guarantee that these questions fully represent the exam content.

CRAM SESSION TOPICS | FRI. JUNE 14, 2024

Pharmacokinetics & Toxicokinetics

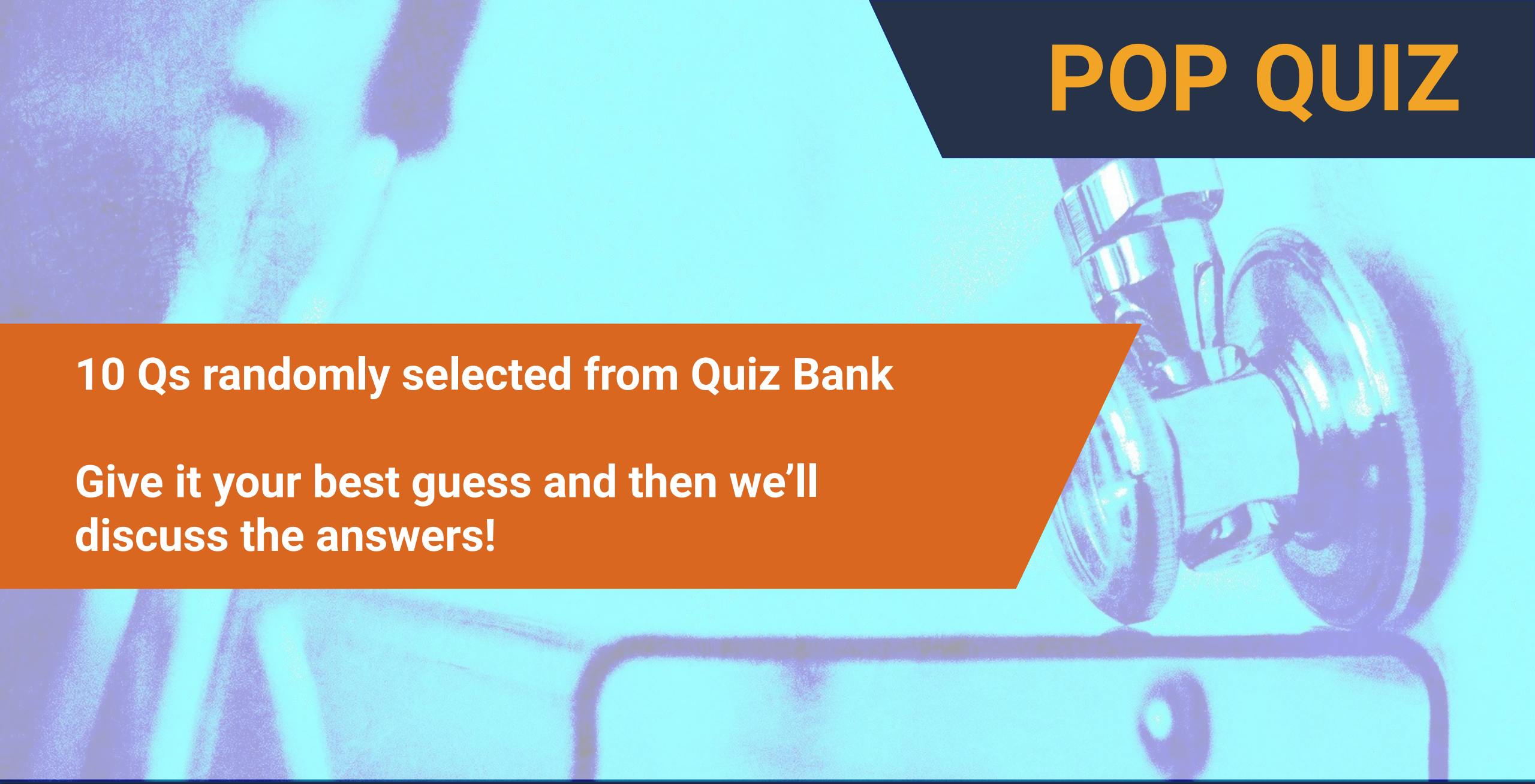
Neurotoxins & Anticonvulsants

Pediatric Toxicity

Anesthetics, NMBs & Muscle Relaxants

Analytics & Forensics

POP QUIZ



10 Qs randomly selected from Quiz Bank

Give it your best guess and then we'll discuss the answers!

Question 1

Which CYP is known to have polymorphisms with poor AND rapid metabolizer phenotypes?

A. 1A2

B. 2C9

C. 2C19

D. 2D6

E. 3A4

Question 1 - ANSWER

Which CYP is known to have polymorphisms with poor AND rapid metabolizer phenotypes?

A. 1A2

B. 2C9

C. 2C19

D. 2D6

E. 3A4

EXPLANATION: 2D6 is associated with poor AND rapid metabolizer phenotypes. Clinically this has been an issue in rapid metabolism of codeine and tramadol in children. 2C9 and 2C19 associated with poor metabolizer phenotypes.

Question 2

Which of the following most accurately describes the kinetics of a drug with both hepatic and renal excretion (Ke equals total excretion rate; Clt equals total clearance)?

A. Clt = Clr + Clh

B. Clt = Clr + Clh - Kr + Kh

C. Clt = Kr + Kh + Clr + Clh

D. Ke = Kr + Kh

E. Ke = the root-mean square of Kr and Kh

Question 2 - ANSWER

Which of the following most accurately describes the kinetics of a drug with both hepatic and renal excretion (Ke equals total excretion rate; Clt equals total clearance)?

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B. Clt = Clr + Clh - Kr + Kh

C. Clt = Kr + Kh + Clr + Clh

D. Ke = Kr + Kh

E. Ke = the root-mean square of Kr and Kh

EXPLANATION: Clearance is additive; excretion constants are not additive.

Question 3

Which neurotransmitter does not undergo reuptake?

A. Acetylcholine

B. Adenosine

C. Dopamine

D. Serotonin

Question 3 - ANSWER

Which neurotransmitter does not undergo reuptake?

A. Acetylcholine

B. Adenosine

C. Dopamine

D. Serotonin

EXPLANATION: Acetylcholine undergoes enzymatic degradation by acetylcholinesterase forming choline and acetic acid. The other neurotransmitters all undergo reuptake

Question 4

A 42 year old male with a history of seizures developed a severe rash that required hospitalization several weeks ago. His doctor took him off his phenytoin but wants to know what medications would be safe for him to take in the future. Which medication could the patient be safely started on for his seizure disorder?

A. Carbamazepine

B. Lamotrigine

C. Phenobarbital

D. Primidone

E. Valproic Acid

Question 4 - ANSWER

A 42 year old male with a history of seizures developed a severe rash that required hospitalization several weeks ago. His doctor took him off his phenytoin but wants to know what medications would be safe for him to take in the future. Which medication could the patient be safely started on for his seizure disorder?

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E. Valproic Acid

EXPLANATION: Anticonvulsant hypersentivity syndrome occurs with a high incidence in anticonvulsants with an aromatic moiety and they should be avoided when placing the patient on a new anticonvulsant. Valproic acid is the only medication on the list that does not have an aromatic ring.

Question 5

Which fetal syndrome results in microcephaly, small palpebral fissures, a thin upper lip with smooth philtrum, flat cheeks, short nose, digit anomalies, and fine motor dysfunction?

A. Fetal alcohol syndrome

B. Fetal hydantoin syndrome

C. Fetal isoretinoin syndrome

D. Fetal lead syndrome

E. Fetal smoking syndrome

Question 5 - ANSWER

Which fetal syndrome results in microcephaly, small palpebral fissures, a thin upper lip with smooth philtrum, flat cheeks, short nose, digit anomalies, and fine motor dysfunction?

A. Fetal alcohol syndrome → **EXPLANATION:** Fetal alcohol syndrome results in approximately 4% of mothers consuming ethanol above 2 g/kg/d (typically 6 oz/d) in the first trimester. There may be a threshold for effects, but a safe exposure limit has not been identified. Neonatal GABA withdrawal and premature delivery/stillbirth have also been described.

B. Fetal hydantoin syndrome

C. Fetal isoretinoin syndrome

D. Fetal lead syndrome

E. Fetal smoking syndrome

Question 6

Which of the following congenital cardiac defects is associated with maternal lithium exposure?

A. Atrial septal defect

B. Total anomalous pulmonary venous return

C. Transposition of the great arteries

D. Tricuspid valve leaflet displacement toward the right ventricular apex

E. Ventricular septal defect

Question 6 - ANSWER

Which of the following congenital cardiac defects is associated with maternal lithium exposure?

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B. Total anomalous pulmonary venous return

C. Transposition of the great arteries

D. Tricuspid valve leaflet displacement toward the right ventricular apex

E. Ventricular septal defect

EXPLANATION: The Ebstein abnormality is associated with maternal lithium use, and is characterized by “atrialization” of the right ventricle due to tricuspid valve leaflet displacement toward the apex of the right ventricle. While frequently tested on examinations, lithium exposure is considered low-risk for the development of this abnormality by most authorities.

Question 7

Which of the following factors is the primary determinant of the onset of action for local anesthetics?

A. Affinity for sodium channels
B. Dose
C. Length of the intermediate chain
D. pKa
E. Protein binding

Question 7 - ANSWER

Which of the following factors is the primary determinant of the onset of action for local anesthetics?

A. Affinity for sodium channels
B. Dose
C. Length of the intermediate chain
D. pKa
E. Protein binding

EXPLANATION: pKa is the primary determinant of the onset of action of local anesthetics.

Question 8

What are the typical first symptoms seen in lidocaine toxicity?

A. Cardiac and respiratory arrest
B. Coma and convulsions
C. Muscular twitching
D. Numbness of tongue and lightheadedness
E. Unconsciousness

Question 8 - ANSWER

What are the typical first symptoms seen in lidocaine toxicity?

A. Cardiac and respiratory arrest
B. Coma and convulsions
C. Muscular twitching
D. Numbness of tongue and lightheadedness
E. Unconsciousness

EXPLANATION: Systemic lidocaine toxicity in humans typically presents with CNS abnormalities. Tongue numbness and lightheadedness typically occur at a serum concentration of approximately 4 mcg/mL. Symptoms progress to include visual/auditory disturbances and muscle twitching at approximately 8 mcg/mL. Unconsciousness, convulsions, and cardiorespiratory arrest are the most significant signs of toxicity.

Question 9

From the studies of gastrointestinal decontamination, which of the following xenobiotics should have a serologic assessment in all cases of intentional self-poisoning?

A. Acetaminophen
B. Digoxin
C. Ethanol
D. Salicylate
E. Tricyclic antidepressants

Question 9 - ANSWER

From the studies of gastrointestinal decontamination, which of the following xenobiotics should have a serologic assessment in all cases of intentional self-poisoning?

A. Acetaminophen

B. Digoxin

C. Ethanol

D. Salicylate

E. Tricyclic antidepressants

EXPLANATION: Between 1 in 300 and 1 in 500 patients who present with intentional self-harm behavior will have a detectable, treatable serum acetaminophen concentration whether or not they have indicated that this is one of the substances ingested. In addition, significant ingestions can be asymptomatic unlike salicylate ingestions where a toxidrome can be associated with an acute ingestion. As such, it is actually cost-effective to order an acetaminophen concentration in all cases of self-poisoning.

Question 10

Which of the following quantitative serum tests were recommended by the National Academy of Clinical Biochemists to aid in the management of poisoned patients that present to the emergency department?

A. Caffeine
B. Lamotrigine
C. Levetiractem
D. Propylene glycol
E. Theophylline

Question 10 - ANSWER

Which of the following quantitative serum tests were recommended by the National Academy of Clinical Biochemists to aid in the management of poisoned patients that present to the emergency department?

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B. Lamotrigine
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D. Propylene glycol
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EXPLANATION: The NACB recommends that APAP, salicylates, carbamazepine, cooximetry, digoxin, ethanol, iron, lithium, phenobarbital, theophylline, and valproic acid quantitative assays be available. They also recommended ethylene glycol and methanol with the caveat that they are not needed in all settings.

FEEDBACK SURVEY

Before you leave, please fill out the feedback survey.

This survey should appear in your browser when the meeting ends.

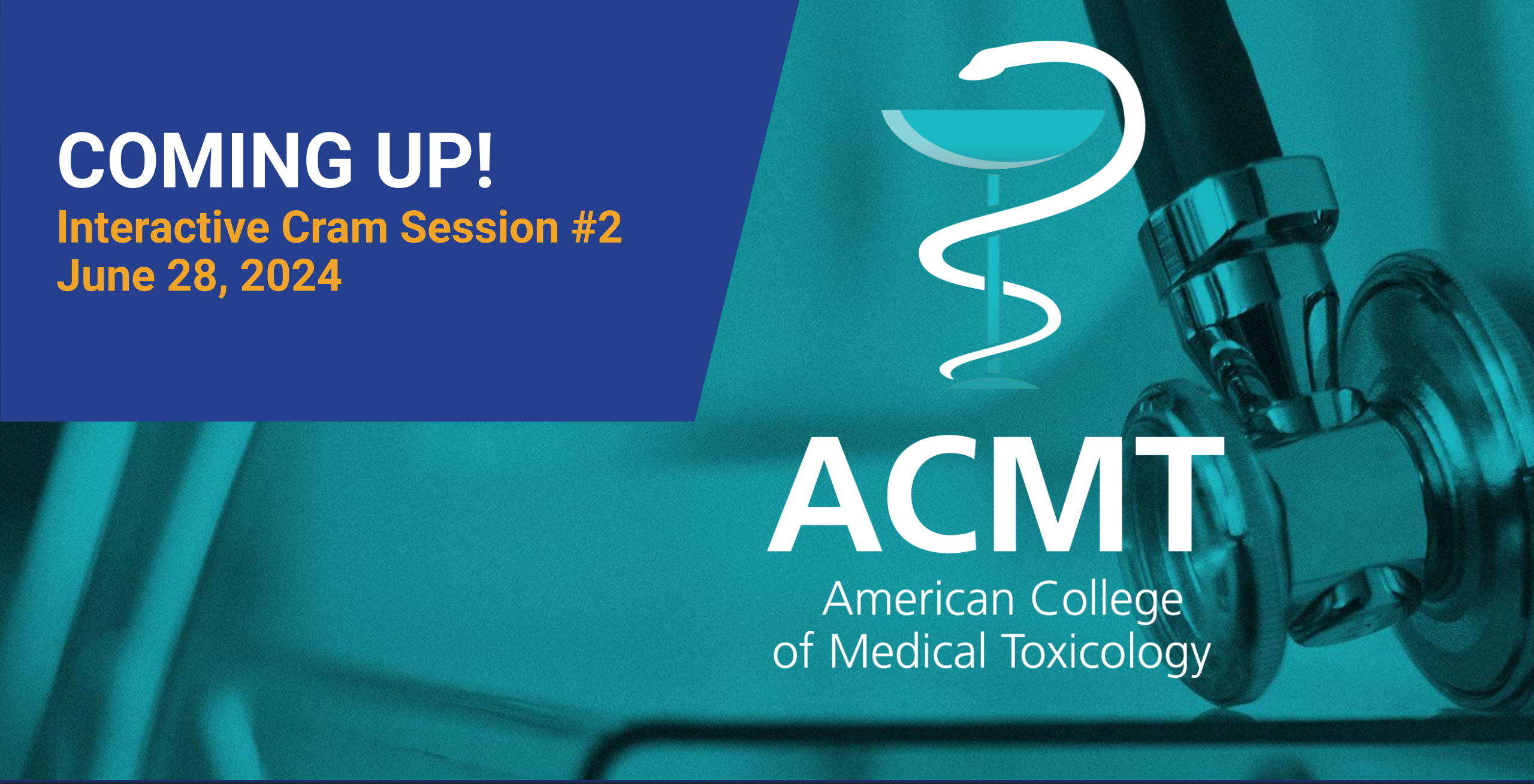
This is ACMT's first time doing a flipped classroom format, so your input is very important.

Let us know how we can improve the next interactive cram session!

COMING UP!

Interactive Cram Session #2

June 28, 2024



ACMT

American College
of Medical Toxicology

CRAM SESSION TOPICS | FRI. JUNE 28, 2024

The Toxic House

Poisonous Plants

Warfare/Terrorism

Chemotherapeutics

Pesticides

SOCIAL MEDIA
@acmtmedtox

Stay Connected

ONLINE

acmt.net
toxicregistry.org
acmt.net/mtf

CONTACT

events@acmt.net

ACMT BOARD REVIEW COURSE

Anesthetics, Neuromuscular Blockers & Muscle Relaxants

Sarah Shafer, MD

ACMT

Local Anesthetics (LA)

- How it works at sodium channel (in general, know openers vs. closers)
- Recognize esters vs. amides
- Know how pKa, protein binding, and lipophilicity affect drug action
- Adverse effects and how it relates to structure

Local Anesthetics (LA) Toxicity

- Methemoglobinemia and what agents associated
- Signs of toxicity and relationship between dose, CNS effects, CV effects
- Mechanism of cardiac toxicity
- Treatment of toxicity and IFE therapy, contraindications

Neuromuscular Blockers: Depolarizer

- Succinylcholine effect at NMJ/receptor level
- General drug characteristics and metabolism
- Clinical effects, pupillary effect
- Adverse effects: IgE-mediated reaction, prolonged duration of effect, hyperkalemia

Neuromuscular Blockers: Non-depolarizer

- Mechanism of action at NMJ/receptor and metabolism
- Reversal agents and adjunctive therapy
- Drug-Drug interactions

Inhalational Anesthetics: General

- Understand MAC, lipid solubility, blood/gas partition coefficient and the relationship between the three concepts

- Understand the characteristics of an ideal inhaled anesthetic

Inhalational Anesthetics: Specific Agents

- Halogenated hydrocarbons: Mechanism of toxicity of halothane hepatitis, nephrotoxicity, cardiotoxicity and agents implicated
- CO generation and how it is affected by CO_2 absorbents
- Xenon: Mechanism of action, pros/cons of use
- Nitrous Oxide: Details of mechanism of toxicity with chronic use, symptoms of toxicity, workup/expected findings, and management

Inhalational Anesthetics: NMS

- Mechanism of condition and risk factors
- Earliest sign of NMS
- Dantrolene: mechanism, extravasation consequences, adverse drug interaction with verapamil, recrudescence timing

Sedatives & Dissociative Agents

- Etomidate: GABA A receptor binding at beta-2, beta-3 subunit; adrenal suppression

- Propofol: postsynaptic $GABA_A$ agonist and induces presynaptic release of GABA, NMDA receptor antagonist

- Ketamine: NMDA antagonist that noncompetitively inhibits Ca^+ influx; hemorrhagic cystitis; esketamine and noresketamine use in treatment for depression

“General Muscle Relaxants”

- All information high yield
- Know basic mechanism
- Know relevant side effects/toxicity
- Know any notable metabolites (carisoprodol, methocarbamol)