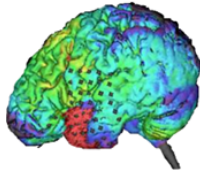


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Preface

- The idea to undertake such a large Flashcard review spawned from watching my wife Roxanne study for her Physician Assistant Boards. Diligently every day she would create a set of 7-10 flashcards from her study material that she would take with her to work. Later on, when I was studying for my written Neurosurgery Board examination, I gleaned information from various texts and other study guides and wrote down the most relevant material on cards for quick review while at work. It was amazing how much time during the day would be available to review these cards. If there was a delay in a OR case, a long lunch-line, a traffic jam (especially the i94 on a Friday afternoon) or waiting for my wife at her OB/GYN appointment -these little cards were specially handy. Always ambitious in life, the thought of giving this study tool to the busy neurosurgery resident was captivating. My expectation is to enable the resident with a quick yet informative review of basic neuroscience principles. With positive encouragement from my fellow residents on the 1st edition, I cautiously proceed here with updating information, adding new images, improved illustrations and clarification of neuroscience concepts. May this endeavor serve to better our wonderful science inherited through the legacy of Harvey Cushing, Neurosurgery.



The Colen Flash-Review

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To my parents Joseph and Leila, educators of true dedicated quality, and to whom I owe my homeschooling education and self-motivation. Lastly to my wife Roxanne, whose patience with my ambitiousness knows no boundaries.

Thank you All,
Chaim

September 9, 2008



How to use this Flashcard review

- These cards are intended to cover most of the aspects of the Neurosurgery Board Examination. They are not a COMPLETE review and therefore they are not intended to replace textbooks. We would advise using these cards during the last couple of weeks before your board exam except for the pathology section which you should go through all year to better remember the photographs in it (heavily encountered during the boards!). **BOARD FAVORITE** questions are of extreme importance and most likely to bump into during the boards, so make you sure you know how to answer them right.
- Good luck!
- Chaim B. Colen, M.D., Ph.D.



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Forward

- With ever increasing scope and complexity of knowledge base, the current day trainee or practitioner of neurosurgery finds it difficult to keep up with the explosion of neurosurgical information. This is compounded by a healthy growth in specialization in various branches of neurosurgery.
- Chaim has made an attempt to make life simpler by incorporating small quanta of knowledge on flashcards accompanied by clear and simple illustrations. The user may review as few or as many cards as his/her time will allow. Although not meant to be substitutes for standard comprehensive texts and atlases, these cards help to refresh the information learned from the bedside, operating room and standard books. Each card represents a mini-examination with instant access to appropriate answers.
- This is a fun way to recall neurosurgical information especially before an upcoming test.

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Neuropharmacology Section



Q?

Neuropharmacology

- A young man is brought to your clinic who has a history of seizures. He stopped taking his medication for a while, but then decided to “double up” after having a seizure recurrence a few months ago. Upon physical exam, you notice ataxia, slurred speech, and gingival proliferation.
- Which of the following seizure drugs is associated with the side effects mentioned above?
 - A. Carbamazepine
 - B. Phenytoin
 - C. Valproate
 - D. Zolpidem
 - E. Phenobarbital



A.

Neuropharmacology

- The correct answer is B, Phenytoin.
 - Phenytoin acts by stabilizing the inactive state of calcium channels.
 - Although the other agents mentioned cause various cognitive shifts, only phenytoin causes gingival proliferation.
 - Carbamazepine toxicity may cause hyponatremia, ataxia, nystagmus, slurring of speech, dystonia, and varying degrees of CNS depression.
 - Valproate toxicity may cause coma, confusion, somnolence, and cerebral edema.
- Zolpidem toxicity may cause psychosis, distortion in visual perception, and lethargy.
- Phenobarbital toxicity can cause fatal respiratory depression, nystagmus, and ataxia.



Q?

Neuropharmacology

- A 61 year-old woman presents to your office complaining of shooting pains on the left side of her face. The attacks of pain are so severe that she avoids brushing her teeth on the left side, and describes multiple attacks throughout the day.
- Which of the following drugs would be considered first line treatment for her condition?
 - A. Oxycodone
 - B. Phenytoin
 - C. Ethosuximide
 - D. Carbamazepine
 - E. Phenobarbital



A.

Neuropharmacology

- The correct answer is D, Carbamazepine.
- The patient is suffering from trigeminal neuralgia, which is best treated with carbamazepine.
- Carbamazepine is related to the structure of tricyclic antidepressants.
- The method of action of this drug is related to the inhibition of voltage sensitive calcium channels and the stabilization of sodium channels.
- Trigeminal neuralgia is a debilitating disease characterized by neuropathy of the fifth cranial nerve (trigeminal nerve).
- Intense pain is experienced in the jaw, scalp, forehead, eyes, and nose.
- Most patients who develop trigeminal neuralgia are over 40 years-old.
- None of the other drugs listed are considered first line therapy for this condition.



Q?

Neuropharmacology

- An eight year old boy is brought to your clinic. His mother mentions that her son often drifts off in space, and has memory lapses during this period. EEG reveals a 3/second spike and wave pattern.
- You prescribe ethosuximide for this patient. Which of the following is the most likely mechanism of action for this drug?
 - A. Reduces current in T-type calcium channels on primary afferent neurons
 - B. Activates a hyperpolarizing potassium current and reduces voltage gated sodium currents
 - C. Inhibits neuronal and glial uptake of GABA
 - D. Enhances the inhibitory action of the GABA receptor.

A.

Neuropharmacology

- The correct answer is A, reduces current in T-type calcium channels on primary afferent neurons.
- This patient is presenting with classic absence seizures.
- Ethosuximide is a first line treatment for absence seizures. It reduces current in T-type calcium channels on primary afferent neurons. Adverse effects include lethargy and GI problems.
- Topiramate activates a hyperpolarizing potassium current, reduces voltage gated sodium current, and increases postsynaptic GABA-A receptor currents.
- Tiagabine inhibits neuronal and glial uptake of GABA. It is used for treatment of partial seizures.
- Phenobarbital increases the inhibition of the GABA channel by increasing the length of time the chloride channel remains open.



Q?

Neuropharmacology

- A young mother brings her one year old baby to the emergency room. The baby has an elevated temperature of 102°F, has been vomiting, and just had a seizure. The baby has received no immunizations. A spinal tap is performed. The CSF is cloudy and the following lab values are obtained:
 - CSF glucose: 30
 - CSF protein: 80
 - Opening pressure: 220
- Microbiology reports gram negative coccobacilli that are beta lactamase positive. Which is the most appropriate antibiotic regimen to begin in this patient?
 - A. Vancomycin
 - B. Moxifloxacin
 - C. Ceftriaxone
 - D. Penicillin G



A.

Neuropharmacology

- The correct answer is C, Ceftriaxone.
 - This child has **Haemophilus B (HiB)** meningitis.
 - Although infection with HiB is declining due to the widespread use of the vaccine, children who have not received the vaccine are still susceptible.
- Ceftriaxone is a third generation cephalosporin with coverage for **HiB**.
- Vancomycin is used against gram positive organisms. Haemophilus is a gram negative organism.
- Quinolones could be used to treat HiB, but they are not recommended for use in children due inhibition of growth at the epiphyseal plate in some studies.
- Penicillin G would not be used as lab reports indicated the bacteria, beta lactamase resistant, was present. In addition, penicillin G does not have HiB coverage.



Q?

Neuropharmacology

- An eight year-old boy is taken by his father to the emergency room. An aseptic meningitis is diagnosed by the ER physician. Physical exam shows sores in the mouth located on the tongue and gums and a skin rash present on the palm of the patient's hands and the soles of his feet. What treatment is most appropriate?
 - A. Amantadine
 - B. Acyclovir
 - C. Tenofovir
 - D. No treatment needed

A.

Neuropharmacology

- The correct answer is D, no treatment needed.
- This patient has hand-foot-mouth disease, often caused by coxsackie virus A16, which is a subgroup of the enteroviruses.
- Currently there is no specific treatment available for any of the enteroviruses.
- The clinical course of coxsackie A16 is relatively mild.
- Amantadine is indicated for treatment of type A influenza. It is also used in Parkinson's disease.
- Acyclovir is the agent of choice in herpes simplex and herpes zoster infections.
- Tenofovir is a nucleotide analogue reverse inhibitor used in HIV.



Q?

Neuropharmacology

- A 35 year-old man has suffered from severe asthma attacks for most of his life. Which of the following agents could cause a life threatening bronchospasm for this patient?
 - A. Phenoxybenzamine
 - B. Terazosin
 - C. Acebutolol
 - D. Propanolol



A.

Neuropharmacology

- The correct answer is D, Propanolol.
 - Propanolol is a non-selective beta blocker.
 - Alpha mediated bronchoconstriction ($\alpha 1$) could thus take precedence over $\beta 2$ relaxation.
- Phenoxybenzamine is a non selective α -blocker primarily used for treatment of pheochromocytoma. It causes no adverse effects in asthmatics.
- Terazosin is an α -1 adrenergic receptor antagonist for treatment of hypertension and BPH. It is not associated with any adverse effects in asthmatics.
- Acebutolol is a β -1 antagonist with sympathomimetic activity. It is especially indicated for patients who have asthma or diabetes.



Q?

Neuropharmacology

- Which of the following drugs is given by intravenous infusion, has a very short half life, and is used primarily during hypertensive crises?
 - A. Esmolol
 - B. Prazosin
 - C. Carvedilol
 - D. Yohimbine



A.

Neuropharmacology

- The correct answer is A, Esmolol.
 - Esmolol is a β -1 receptor antagonist for use in hypertensive crises.
 - It can also be used during episodes of acute supraventricular tachycardia.
- Prazosin is used for hypertension and benign prostatic hyperplasia. It is not indicated for control of acute episodes of hypertension, however.
- Carvedilol is an alpha and beta antagonist. At this time it is used to treat heart failure. It is not given to control a hypertensive crisis.
- Yohimbine is an α -2 agonist. At this time its clinical use is limited.



Q?

Neuropharmacology

- A 32 year-old soccer player injures his knee playing in the European World Cup. After surgery to repair a torn ligament, he develops osteoarthritis two years later. He has a history of allergy to sulfa drugs. Which of the following NSAIDs would not be recommended in this patient?
 - A. Aspirin
 - B. Ibuprofen
 - C. Sulindac
 - D. Piroxicam



A.

Neuropharmacology

- The correct answer is C, Sulindac.
- Sulindac is an NSAID that contains a sulfa moiety, and thus produces an allergic reaction in those who are allergic to sulfa drugs.
- None of the other choices contain a sulfa moiety.

Q?

Neuropharmacology

- Which of the following drugs is used for treatment of myasthenia gravis?
 - A. Edrophonium
 - B. Pyridostigmine
 - C. Echothiophate
 - D. Parathion
 - E. Donezipil

A.

Neuropharmacology

- The correct answer is B, Pyridostigmine.
 - Pyridostigmine is a carbamate which acts as a pseudo-reversible inhibitor of acetylcholinesterase.
 - It is rapidly hydrolyzed after carbamoylating the active site of the acetylcholinesterase enzyme.
 - It is used extensively in the treatment of myasthenia gravis.
- Edrophonium is a reversible inhibitor of AchE. Used for the diagnosis of myasthenia gravis, but not for treatment due to an extremely short half life.
- Echothiophate is an irreversible inhibitor of AchE. Primarily utilized for glaucoma.
- Parathion is an irreversible inhibitor of AChE. Primarily utilized for insect control.
- Donezipil is a reversible inhibitor of AChE. Primarily utilized for treatment of Alzheimer's disease.



Q?

Neuropharmacology

- Which variables alter the mechanism of intrathecal drug distribution?
 - A. Age
 - B. Weight
 - C. Viscosity
 - D. Patient position
 - E. All of the above.

A.

Neuropharmacology

- The correct answer is E, all of the above.
- Factors that influence the distribution of intrathecally administered medication include:
 1. **Characteristics of the injected solution:** baricity, volume/dose/concentration, temperature of injectate, viscosity, additives
 2. **Clinical technique:** patient position, level of injection, needle type/alignment, intrathecal catheters, fluid currents, epidural injection
 3. **Patient characteristics:** age, height, weight, sex, intra-abdominal pressure, spinal anatomy, lumbosacral CSF volume, pregnancy



Q?

Neuropharmacology

- A 76 year-old male presents to your clinic in consultation with results of a recent angiogram that suggest carotid stenosis 45% by NASCET criteria. He denies current visual changes, headaches or weakness, but says that 2 weeks ago he did have “loss of sight” in the left eye for one day . You would recommend:
 - A. Medical therapy (ie, antiplatelet agents and cardiovascular risk factor control/prevention).
 - B. Recommend carotid endarterectomy after consider patient's risk factor profile and comorbidities.
 - C. Recommend endarterectomy without considering patient's risk factor profile and comorbidities.
 - D. Carotid endarterectomy plus antiplatelet therapy and cardiovascular risk factor control/prevention.



A.

Neuropharmacology

BOARD FAVORITE!

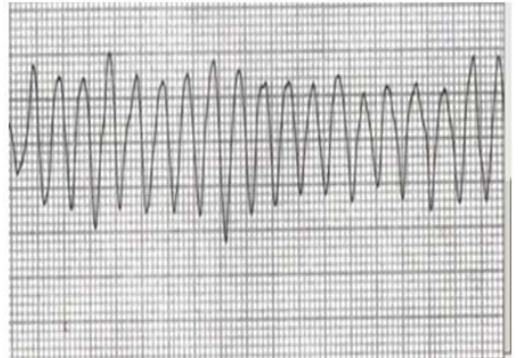
- The correct answer is A, medical therapy.
- NASCET criteria for carotid stenosis:
 - Symptomatic (TIA or minor stroke)
 - Lower-grade carotid stenosis (<50% by NASCET criteria) -medical therapy (ie, antiplatelet agents and cardiovascular risk factor control/prevention)
 - Moderate-grade symptomatic carotid stenosis (50% to 69% by NASCET criteria) walk a finer line. Consider patient's risk factor profile and comorbidities.
 - High-grade symptomatic carotid stenosis (70% to 99% by NASCET criteria) -CEA plus antiplatelet therapy and cardiovascular risk factor control/prevention is the treatment of choice.
- Asymptomatic
 - >60% carotid stenosis (NASCET criteria) walk a fine line. If surgical complications exceed 3%, CEA would be harmful to the patient.



Q?

Neuropharmacology

- A 75-year old man who had just suffered an acute myocardial infarction one week previously now presents to clinic with tachycardia. His EKG is shown here. An appropriate treatment regimen would include which of the following drugs?
 - A. Magnesium
 - B. Procainamide
 - C. Amiodarone
 - D. Verapamil
 - E. Lidocaine



A.

Neuropharmacology

- The correct answer is....
- To obtain the answer to this question and to view over 250 more comprehensive neuropharmacology questions please purchase the full product [here](#) !

