Building Skills to Succeed on Medical School Exams

Charlie Brady, MS4

Disclosures

- Employed as a tutor for UWSOM

About Me

- My dog Loo -->
- Grew up in Fall City, Washington
- Undergrad at University of Oregon, BS in business finance
- MS4, Seattle foundation site
- CPR favorite class
- Applying into anesthesia

Why This Topic?

- Personal interest in *learning how to learn*
- Always dreaded standardized tests, love tutoring now
- Step scores and clerkship grades are a major source of anxiety for medical students and have significant implications on residency opportunities

Agenda

Background

- Basics of USMLE Prep
- Multi-store model of memory
- Active vs. Passive Learning Techniques

Study skills

- 5 steps of Question Interpretation (QI)
- I&I Practice Questions
- MBB Practice Questions
- Reviewing incorrect answers

Goals of this talk

- Dismantle the belief of “the bad test-taker”
- Demonstrate the effectiveness of question interpretation theory
- Build a foundation upon which you create your own study routine and exam-taking strategies

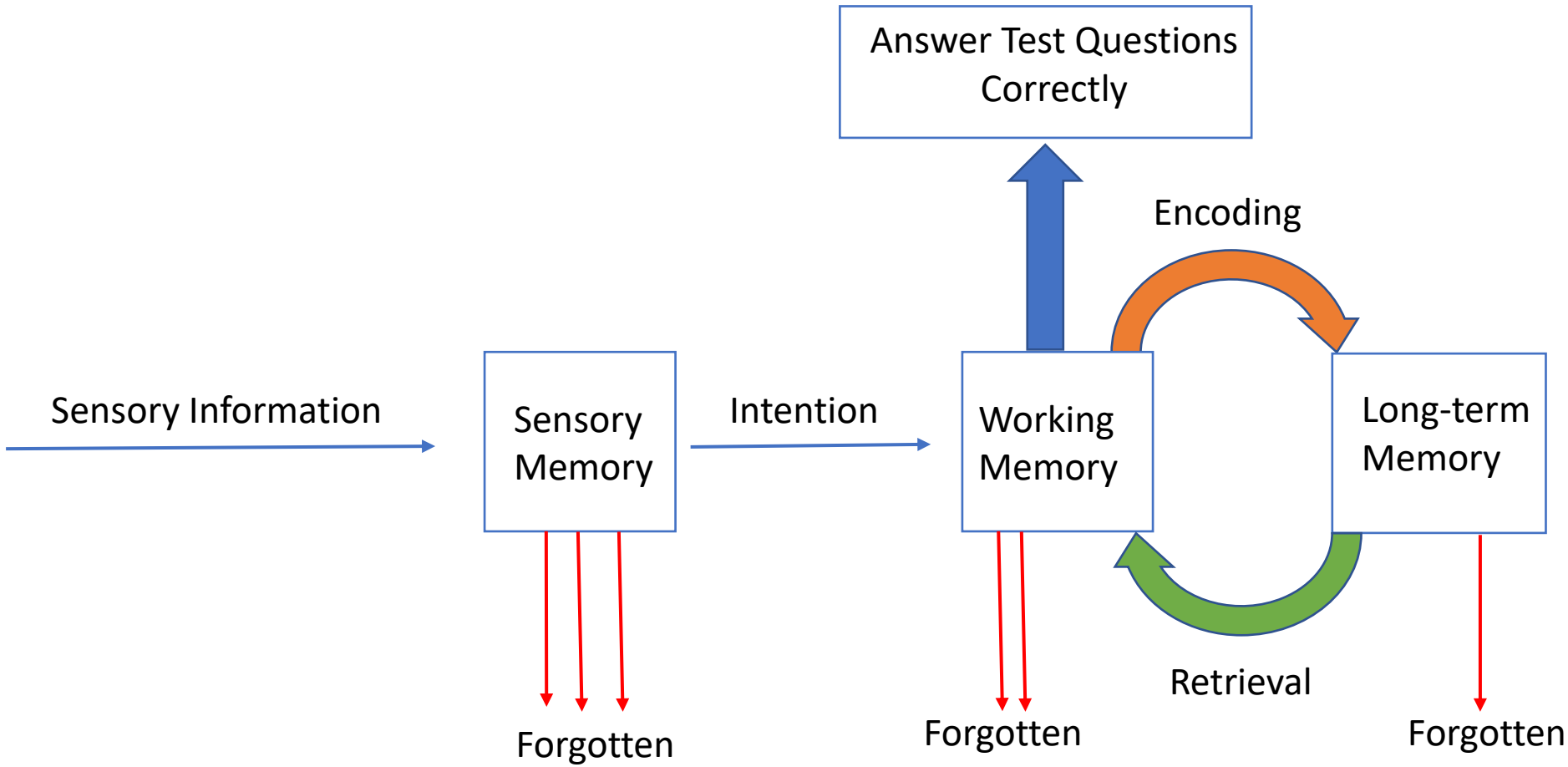
Disclaimer!

- Rage against comparison
  - Don’t measure yourself against an impossible standard
  - You are more than a number
  - Your best is enough
- You cannot possibly learn everything in one pass
  - lifelong students, nourish a **growth mindset**

Basics of USMLE Prep

- Study Skills
  - Healthy routine (generally 6 days on 1 off, 5&2 if prolonged dedicated)
  - Time-sensitive plan (mock blocks/day)
    - Step 1: 2-3
    - Step 2: 3-4
  - Practice encoding (**active learning techniques**) and retrieving information (practice questions/**anki**)
  - Learning aids (Sketchy/Pixorize, Uworld, Amboss)
- Test Taking skills
  - **Question interpretation** ability & **review of incorrect choices**
  - Anxiety management techniques (DRS office)

Multi-store Model of Memory



Active vs Passive Learning Techniques

Learning is most efficient when studying is "**desirably difficult**"

Active Learning

1. Create your own syllabi (coursepacks) Summarize difficult concepts in language you understand (paragraphs or flashcards)
2. **Create and practice your own Anki decks**
3. Watch sketchy AND do the relevant flashcards daily
4. **Create and practice recalling disease concept maps**
5. Make your own mnemonics
6. **Practice problems with review**
7. Structured group discussion (working through cases/practice problems)
8. **Turning SLO into your own practice questions**

Passive Learning

1. Lectures
2. Reading syllabi (course pack)
3. Watching videos (esp. Sketchy)
4. Prolonged anki sessions > 30 minutes
5. "Memorizing FirstAid"
6. Unorganized group discussion

Working Memory & The Gifted Test Taker

- What is working memory?
  - The number of “things” or pieces of information we can hold in our mind at any given time
- What makes a naturally gifted test taker?
  - Postulate that increased working memory helps greatly, in addition to a strong work ethic
- "I'm a terrible test-taker“ ☹
  - Significant source of stress for many medical students
  - Test anxiety, ADHD/ADD, dyslexia --> All decrease working memory

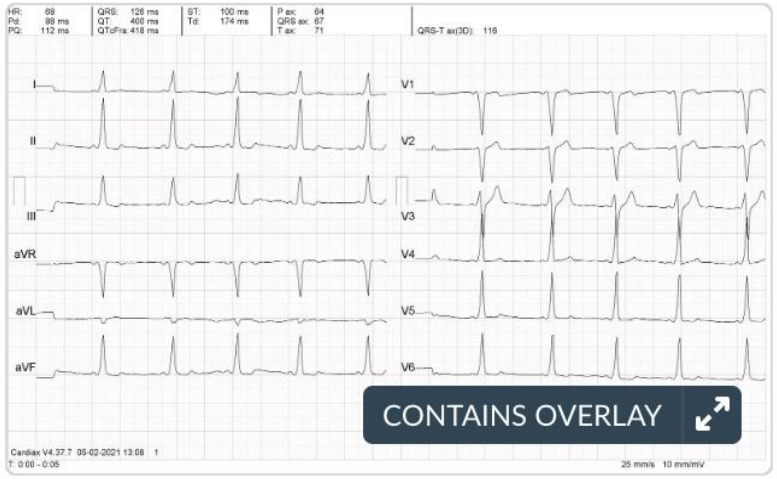
THE DRS OFFICE IS HERE FOR YOU

Question Interpretation Theory

- You are more than your working memory
- We now turn our attention to **question interpretation** (QI)
- You can seriously benefit from the **practice** of QI
  - However, you will need to apply QI over hundreds if not thousands of question to see the benefit on Test Day
- The purpose of learning this 5-step strategy is to provide a foundation for you to build your own test-taking strategies and procedures

Example Step I Question

A previously healthy 20-year-old woman is brought to the emergency department because of severe palpitations and lightheadedness that started 30 minutes ago. She has had similar episodes of lightheadedness in the past. Ten minutes after arrival, she is asymptomatic. She takes an oral contraceptive pill. Her current pulse is 94/min and blood pressure is 123/70 mm Hg. Physical examination shows warm extremities and palpable pulses. ECG recorded at the time of admission is shown. Which of the following is the most likely underlying cause of this patient's ECG findings?



KEY INFO ATTENDING TIP LABS ...

A Ectopic arrhythmogenic foci within the ventricles

B Accessory atrioventricular pathway

C Pulmonary artery occlusion

D Atrioventricular nodal dysfunction

E Congenital potassium channelopathy

Test Taking Skills – 5 Steps of Question Interpretation

1) **Read the prompt first**
2) Reduce and summarize the stem
3) Develop a Stand-Alone Question
4) Eliminate incorrect answers by proving the pathology
5) Select the best answer and MOVE ON

1) Question Interpretation: Read the Prompt First

- Nothing is more important in a question than the prompt, don't abuse it by skimming over it
- By reading the prompt first you can:
  - Possibly skip the entire stem
  - Key into **crucial descriptors**
    - "initial"
    - "screening"
    - "diagnostic"
    - "imaging findings”
    - “physical exam findings”
    - "underlying cause of”

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2) Question Interpretation: Reduce and Summarize the Stem

- Goal is to translate each hint in a stem into a narrative that YOU understand
  - Convert medical jargon to easy-to-understand language "laymen's terms"
  - Worst thing you can do is skim a question stem without making cognitive effort to decode the hints

"A 65-year-old man with hypertension, diabetes and hyperlipidemia presents to the emergency department with one hour of tearing substernal chest pain that radiates to the back. His vitals are significant for blood pressure of 85/61 mmHg, heart rate of 124 BPM, respiratory rate of 18/min and temperature of 98.9F."

"An older gentleman with significant risk factors for atherosclerotic vascular disease is presenting with acute tearing chest pain and hemodynamic instability (given low BP and tachycardia) which are signs concerning for **acute aortic dissection**

Test Taking Skills – 5 Steps of Question Interpretation

1) Read the prompt first
2) Reduce and summarize the stem
3) **Develop a Stand-Alone Question**
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3) Question Interpretation: Develop a Stand-Alone Question

- What is a Stand-Alone Question (SAQ)?
- It is the most succinct and salient question that we formulate after reading the prompt, summarizing the question stem and then briefly looking at the answer choices.

"A 65-year-old man with hypertension, diabetes and hyperlipidemia presents to the emergency department with one hour of tearing substernal chest pain that radiates to the back. His vitals are significant for blood pressure of 85/61 mmHg, heart rate of 124 BPM, respiratory rate of 18/min and temperature of 98.9F. Which of the following is the best next step in **diagnosing** this patient's condition?"

SAQ: "What is the best imaging study to **diagnose** acute aortic dissection"

a) Chest radiograph
b) CT-angiogram with contrast
c) Transthoracic echocardiogram
d) Cardiac MRI
E) MR-angiogram with and without contrast

Test Taking Skills – 5 Steps of Question Interpretation

1) Read the prompt first
2) Reduce and summarize the stem
3) Develop a Stand-Alone Question
4) **Eliminate incorrect answers by "proving the pathology"**
5) Select the best answer and MOVE ON

4) Question Interpretation: Eliminate Incorrect Answers

- With our SAQ in mind is time to eliminate incorrect answers
  - •Use the ~~strikethrough function~~ for **every incorrect** answer choice
- How do we know what answers to cross out?
  - •Prove the pathology of each incorrect answer choice
  - •Narrow down until two choices remain
  - •50/50 chance of getting the question right

"A 65-year-old man with hypertension, diabetes and hyperlipidemia presents to the emergency department with one hour of tearing substernal chest pain that radiates to the back. His vitals are significant for blood pressure of 85/61 mmHg, heart rate of 124 BPM, respiratory rate of 18/min and temperature of 98.9F. Which of the following is the best next step in **diagnosing** this patient's condition?"

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Test Taking Skills – 5 Steps of Question Interpretation

1) Read the prompt first
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5) **Select the best answer and MOVE ON**

5) Question Interpretation: Choose and MOVE ON

- Once you make a selection, MOVE ON and don't come back to the question. There 👏 will 👏 not 👏 be 👏 enough 👏 time 👏 to 👏 come 👏 back 👏.
- Use the "Flag" function sparingly, if at all
    - •Exception are questions with math/formula use like biostats

"A 65-year-old man with hypertension, diabetes and hyperlipidemia presents to the emergency department with one hour of tearing substernal chest pain that radiates to the back. His vitals are significant for blood pressure of 85/61 mmHg, heart rate of 124 BPM, respiratory rate of 18/min and temperature of 98.9F. Which of the following is the best next step in **diagnosing** this patient's condition?"

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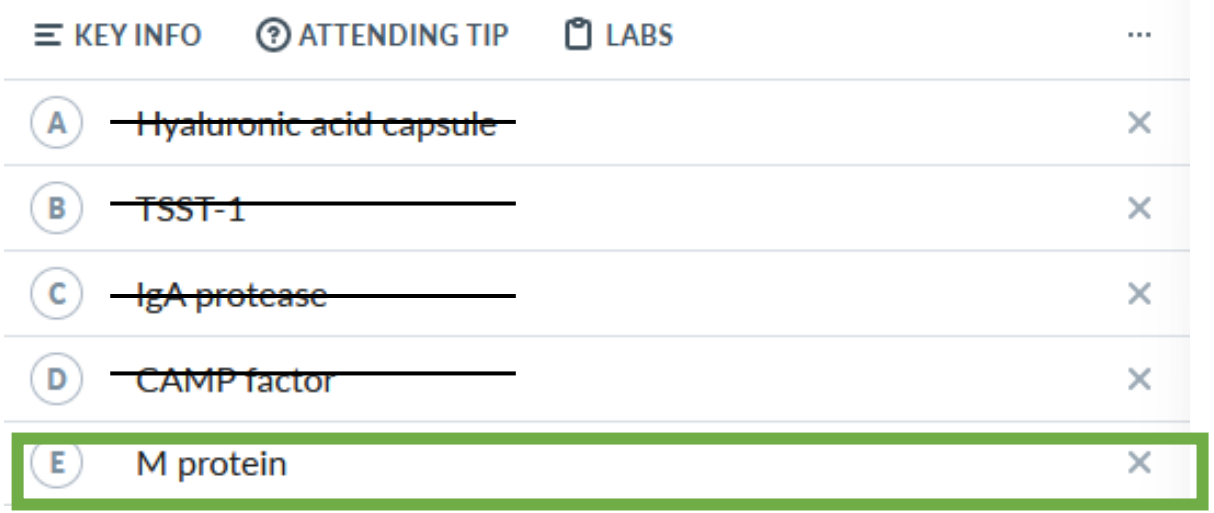
~~e) MR-angiogram with and without contrast~~

I&I Practice 1

A 7-year-old boy is brought to the physician because of a 5-day history of fever, malaise, and joint pain. He had a sore throat 4 weeks ago that resolved without treatment. His temperature is 38.6°C (101.5°F) and blood pressure is 84/62 mm Hg. Physical examination shows several firm, painless nodules under the skin near his elbows and the dorsal aspect of both wrists. Cardiopulmonary examination shows bilateral basilar crackles and a blowing, holosystolic murmur heard best at the cardiac apex. Both knee joints are warm. Laboratory studies show an erythrocyte sedimentation rate of 129 mm/h. The immune response seen in this patient is most likely due to the presence of which of the following?



Step 1: protein implicated in a type of immune response

Step 2: “Sore throat 4 weeks ago”, “painless nodules under the skin”, “holosystolic murmur head best at the cardiac apex” → mitral valve regurgitation and rheumatic fever

Step 3: SAQ - What protein underlies the immune response seen in acute rheumatic fever 2/2 GAS?

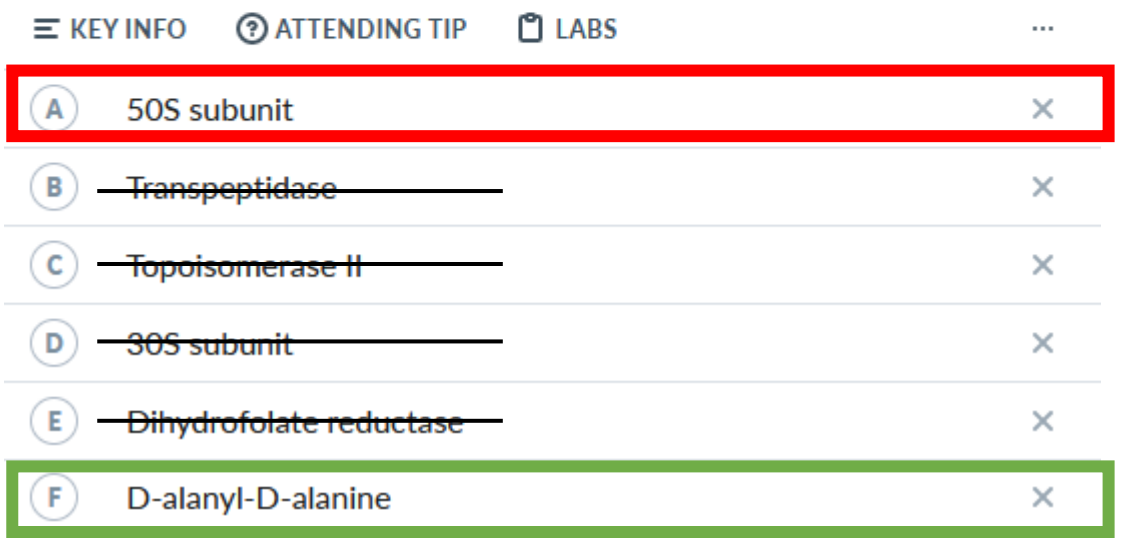
Step 4: Prove the pathology of each incorrect answer

Step 5: Choose and move on

M protein is a virulence factor produced by GAS which **prevents phagocytosis** and **inhibits** the **alternative pathway** of the **complement system**. Plays an important role in autoimmune response that manifests with rheumatic fever. Without abx formation of **antibodies** to **streptococcal M protein** causes a **type II hypersensitivity** reaction where these antibodies cross-react with proteins of the heart, joint, and nerves causing acute rheumatic fever → **JONES** mnemonic on sketchy

I&I Practice 2

A 37-year-old man comes to the emergency room with fever, chills, and left lower leg pain for 2 days. He was recently discharged from the hospital after arthroscopic knee surgery. Physical examination shows an erythematous lesion with poorly defined margins over the left shin but no fluctuance. Treatment with an intravenous antibiotic is begun. Shortly after starting the infusion, the patient develops flushing, erythema, and pruritus of the upper body. The symptoms resolve after discontinuation of the infusion. Before the next dose with the same agent, the patient is given diphenhydramine and ranitidine and the antibiotic is subsequently given at a slower infusion rate without complications. The patient was most likely treated with an antibiotic that binds to which of the following?



Step 1: Antibiotic mechanism of action question

Step 2: “recent hospital stay, arthroscopy” → Staph aureus, “IV abx + bad systemic symptoms + skin infection” → MRSA → Vancomycin?, “Benadryl and ranitidine given and no longer having reaction” → vancomycin flushing reaction 2/2 IV administration

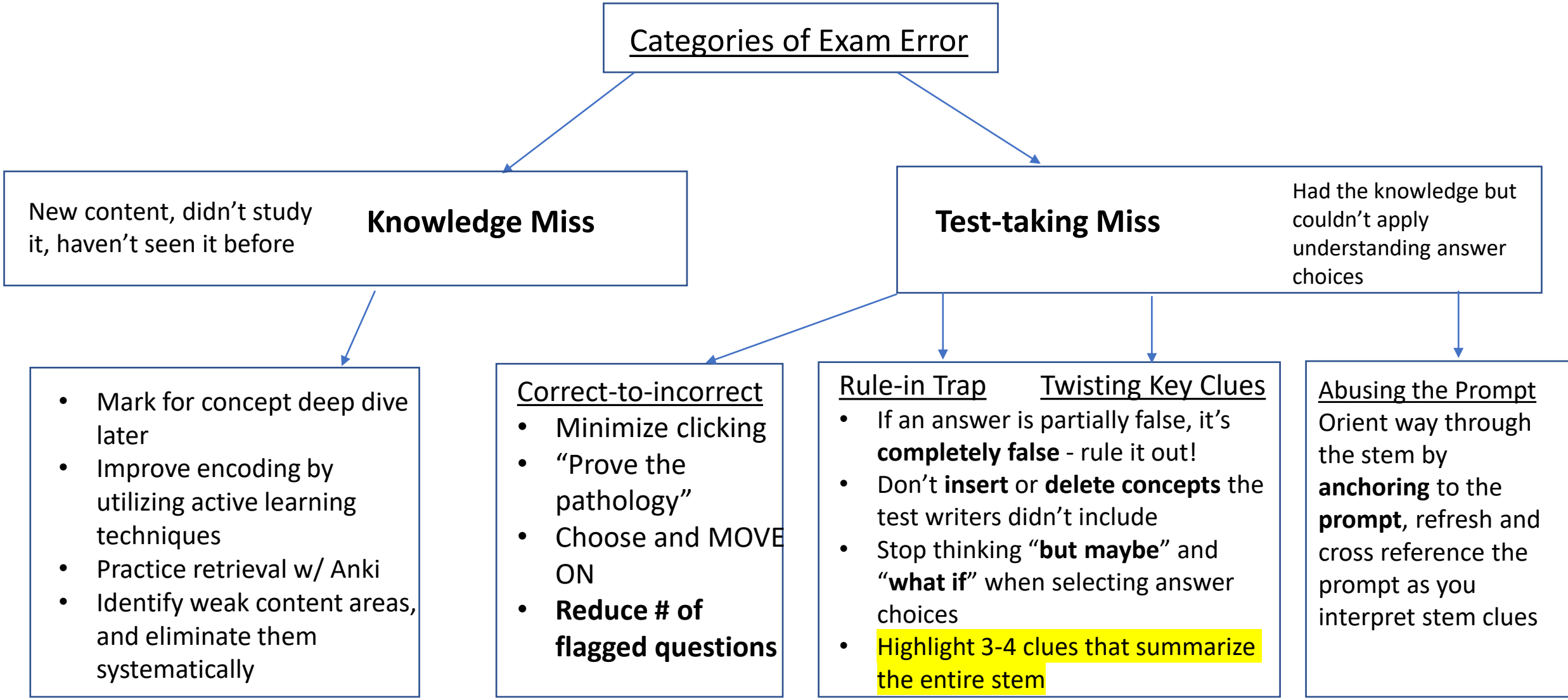
Step 3: SAQ - What is the molecular target of vancomycin on MRSA?

Step 4: Prove the pathology of each incorrect answer

Step 5: Choose and move on

D-alanyl-D-alanine residues are bacterial cell wall precursors and the molecular target of vancomycin. Targeting of this highly conserved sequence is responsible for the broad spectrum of vancomycin activity against gram-positive species (including MRSA), which are the most common cause of cellulitis. Vancomycin flushing reaction is an infusion rate-dependent effect and is a result of IgE-independent mast cell degranulation

Reviewing Incorrect Answers



I&I Practice 2 – Review

A 37-year-old man comes to the emergency room with fever, chills, and left lower leg pain for 2 days. He was recently discharged from the hospital after arthroscopic knee surgery. Physical examination shows an erythematous lesion with poorly defined margins over the left shin but no fluctuance. Treatment with an intravenous antibiotic is begun. Shortly after starting the infusion, the patient develops flushing, erythema, and pruritus of the upper body. The symptoms resolve after discontinuation of the infusion. Before the next dose with the same agent, the patient is given diphenhydramine and ranitidine and the antibiotic is subsequently given at a slower infusion rate without complications. The patient was most likely treated with an antibiotic that binds to which of the following?

KEY INFO | ATTENDING TIP | LABS | ...

- A 50S subunit
- B Transpeptidase
- C Topoisomerase II
- D 30S subunit
- E Dihydrofolate reductase
- F D-alanyl-D-alanine

Front

What is the molecular target of vancomycin on MRSA?

OR

What is the MOA of the antibiotic that this patient was most likely treated with? A 37y/M with fever, chills, LLE pain with rash x2 days. Recent discharge from hospital after arthroscopic knee surgery. Tx w/ IV abx started, develops flushing/erythema/itching which is improved with Benadryl and a slower infusion rate.

Back

D-alanyl-D-alanine

D-alanyl-D-alanine residues are **bacterial cell wall molecules** that are highly conserved among G+ species (including **MRSA**) and are the molecular target of vancomycin, which is used to treat cellulitis. Vancomycin **flushing reaction** is **an infusion rate-dependent effect** and is caused by mast cell degranulation.

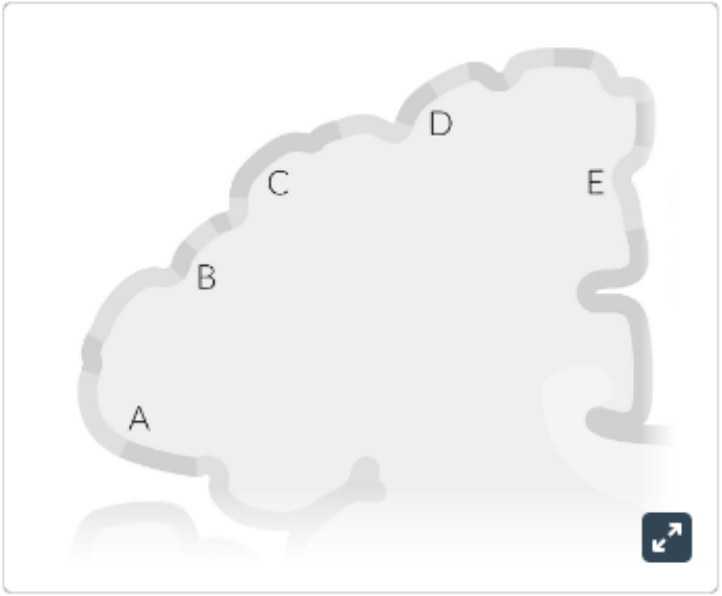
Rule In Trap: I ruled in the 50s subunit, which is the molecular target of clindamycin, not vancomycin because I wasn't able to identify this was an infusion-rate-dependent flushing reaction and though it was anaphylaxis, but there was no mention of hemodynamic instability or wheezing and further, clinda toxicity is usually related to *C. difficile* colitis, not a flushing reaction. Partially false, completely false.

How To Use Anki

- Studying pre-made decks without first encoding is low-yield
- Pre-made decks often lead to the overwhelming feeling of “too many cards to review”
- Create your own decks, use pre-made decks to supplement
- **No Anki sessions > 30-40 min**
- Goal 2-3 timed Anki sessions per-day
- If you have reviews unfinished at end of day, so be it

MBB Practice 1

A 71-year-old man with hypertension and hyperlipidemia is brought to the emergency department after the sudden onset of slurred speech 1 hour ago. Physical examination shows drooling and hypernasal speech. His face is symmetric and strength is 5/5 in all extremities. This patient's presentation is most consistent with injury to which of the labeled areas of the primary motor cortex?



KEY INFO | ATTENDING TIP | LABS | NOTES | MARK | SAVE | SHARE | ...

- A A
- ~~B B~~
- ~~C C~~
- ~~D D~~
- ~~E E~~

Step 1: Primary motor cortex

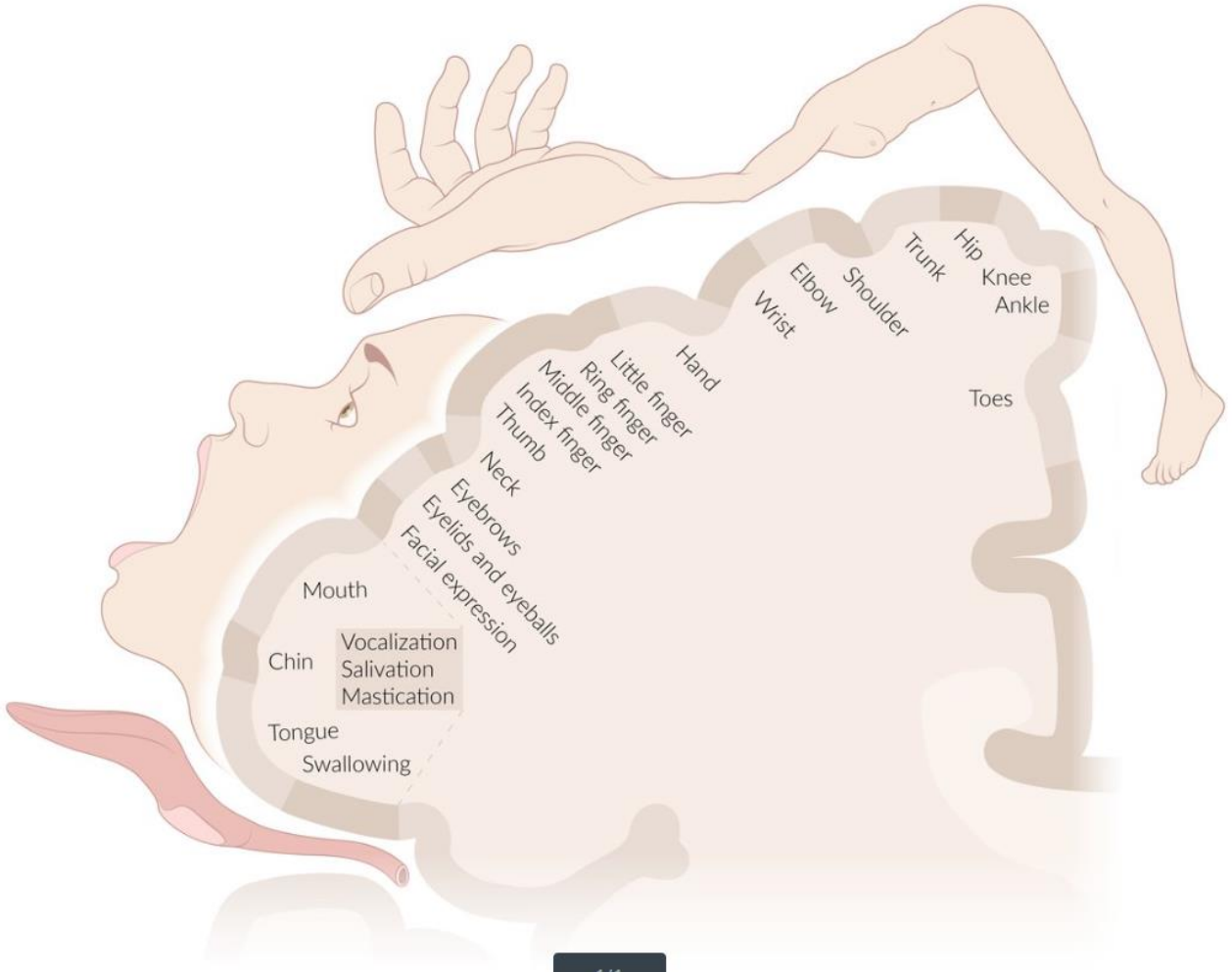
Step 2: dysarthric with preserved facial strength

Step 3: SAQ – A stroke in which area of the brain would cause isolated dysarthric speech with preserved facial strength?

Step 4: C, D, E are all incorrect. Between B and A

Step 5: A is more lateral, and I remember the tongue innervation is lateral after facial innervation

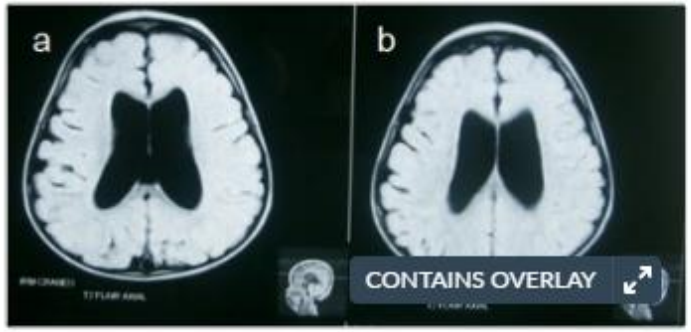
Motor Homunculus



1/1

MBB Practice 2

A 2-year-old boy is brought to the physician by his parents several weeks after the family immigrated from Russia. The parents are worried because the child appears to have trouble seeing and has not started walking. The child was born at home and has never been evaluated by a physician. During the pregnancy, the mother had a week of fever, myalgia, diffuse rash, and bilateral nontender cervical adenopathy after the family adopted a cat. The patient is lethargic and irritable when aroused. Vital signs are within normal limits. The eyes deviate inferiorly and the eyelids are retracted. Ophthalmologic examination shows inflammation of the choroid and the retina in both eyes. An MRI of the head is shown. Which of the following additional findings is most likely in this patient?



KEY INFO | ATTENDING TIP | LABS | NOTES | MARK | SAVE | SHARE | ...

A. Continuous machinery murmur

~~B. Maculopapular rash on palms and soles~~

C. Spasticity of bilateral lower extremities

~~D. Tuft of hair over the lumbosacral area~~

~~E. Loss of pain sensation in the cervicothoracic dermatomes~~

Step 1: Additional findings (physical exam)

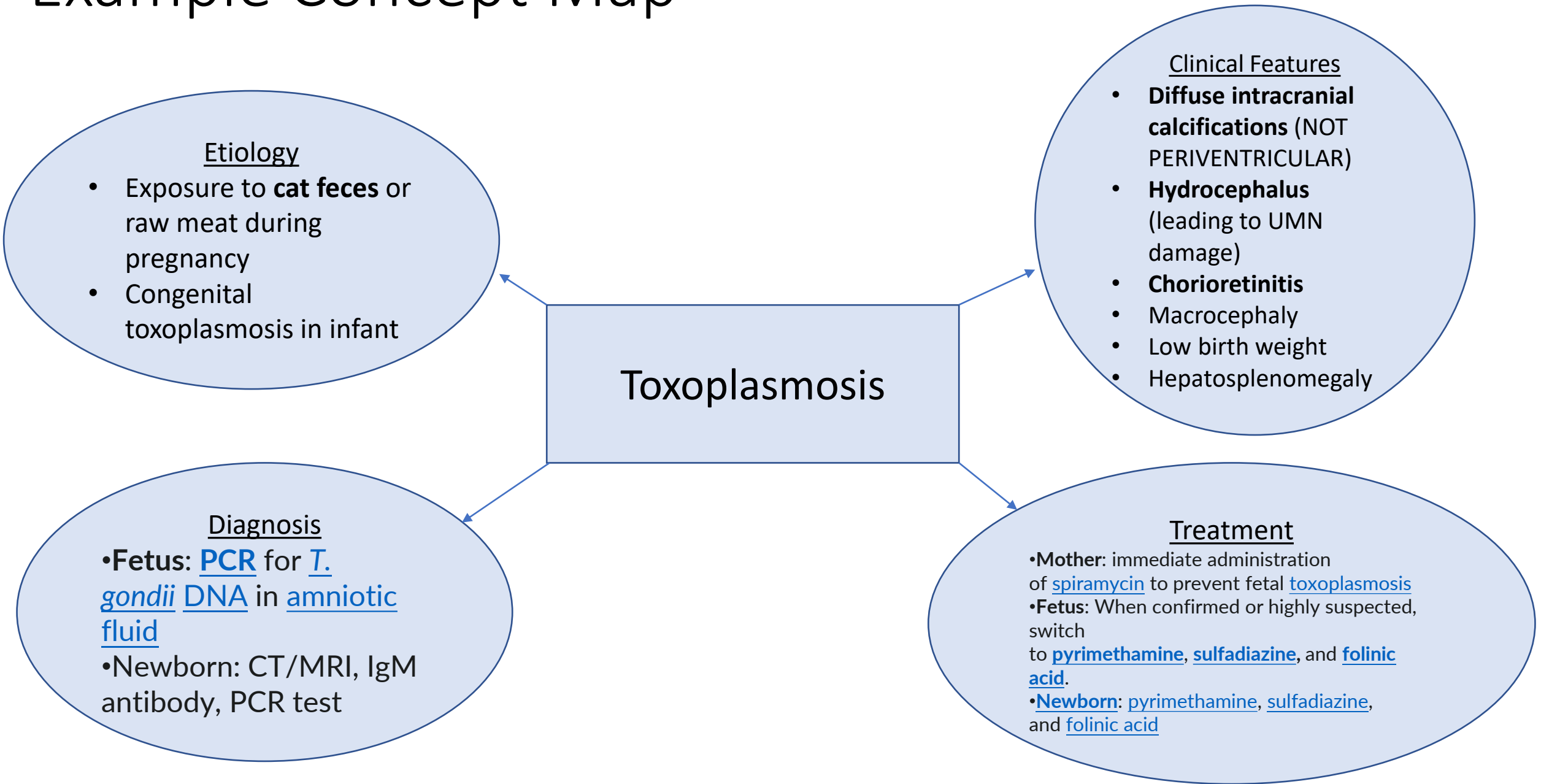
Step 2: Pregnant person exposure to cat and systemic infection symptoms exposure. Child with dilated ventricles (hydrocephalus) & choroid inflammation → toxoplasmosis

Step 3: SAQ – What is a likely physical exam finding seen in hydrocephalus 2/2 toxo infection?

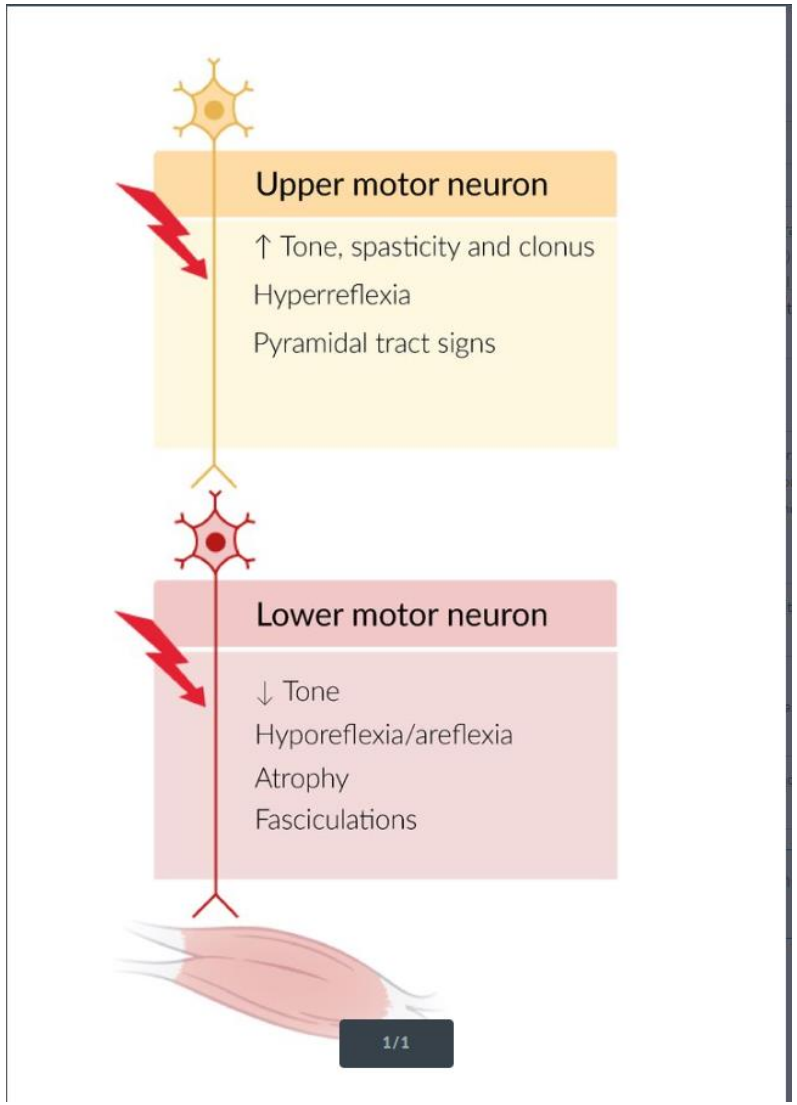
Step 4: Prove the pathology

Step 5: Hydrocephalus → stretching of the mortor corticies and pyramidal tracts → UMN damage → spasticity

Example Concept Map



UMN vs LMN Symptoms



Questions?

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Citations for this talk

- STATmedlearning.com for YouTube videos
- Amboss.com for Qbank and library
- Osmosis.org for Time-spaced repetition video
- Dr. Justin Sung on YouTube

Study Skills – Daily Routine

Time	Plan
0530 - 0630	Wake up, breakfast, plan for day, respond to emails
0630 – 0700	30-minute Anki session
0700 – 0930	Review previous day material (watch videos, syllabi, take notes, make flashcards)
0930 - 1000	Break
1000 – 1200	Targeted practice questions with review
1200 – 1330	Lunch break +/- exercise
1330 – 1700	Lecture
1700 - 2000	Relax, connect with family, unwind
2000 - 2030	30 min anki session on phone instead of scrolling Instagram
2100-2130	Bed time :)