



# USMLE-STEP-1<sup>Q&As</sup>

United States Medical Licensing Step 1

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**QUESTION 1**

A 27-year-old man was treated with penicillin for gonorrhea. Thirty-five days later he was reinfected with the same germ, and his physician administered an intramuscular dose of penicillin. Two minutes following the injection of penicillin, the patient experienced hypotension and shock and became unconscious. This reaction was most likely mediated by which of the following?

- A. activation of the alternate complement pathway
- B. activation of the classical complement
- C. IgD
- D. IgE
- E. IgG

Correct Answer: D

Section: Microbiology/Immunology Anaphylaxis triggered by penicillin is an immediate hypersensitivity reaction, which is typically mediated by IgE antibodies. IgE antibodies bind to specific Fc receptors on the surface of mast cells and basophils. Upon cross-linking of the IgE antibodies with their specific antigen (penicillin in this case), mast cells and basophils release histamine within minutes along with other pharmacologically active shock mediators which produce the characteristic symptoms of anaphylaxis. Activation of either the classical (choice B) or the alternate complement pathway (choice A) does not play any meaningful role in anaphylaxis. IgD (choice C) and IgG (choice E) are not involved in anaphylactic reactions.

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**QUESTION 2**

Within hours after being bitten by a cat trapped in a flood drain, a member of the rescue team develops redness, swelling, and intense pain at the site of the bite. Laboratory results indicate the presence of mixed flora in the wound, including a gram-negative rod that is frequently associated with cat and dog bites and that often leads to complications such as osteomyelitis if untreated. Which of the following is most likely to be this organism?

- A. *B. canis*
- B. *C. coli*
- C. *Francisella tularensis*
- D. *Pasteurella multocida*
- E. *P. aeruginosa*

Correct Answer: D

Section: Microbiology/Immunology *Pasteurella* species are primarily animal pathogens, but they can produce a range of human diseases. All *Yersinia* and *Francisella* were formerly classified under this genus. *P. multocida* (choice D) occurs worldwide in the respiratory and GI tracts of many domestic and wild animals. It is the most common organism in humans inflicted by bites from cats and dogs. It may produce human infections in many systems and may, at times, even be part of the normal/usual human flora. A history of animal bite, pain and pus drainage at the bite site, gram-negative bipolar rods, and culture of the organism would confirm the diagnosis. *B. canis* (choice A) may cause mild reticuloendothelial disease in humans. *F. tularensis* (choice C) can be transmitted by direct contact with infected animal



tissues or by inhalation or ingestion, seldom if ever by bites. *C. coli* (choice B), along with *C. jejuni*, are common human pathogens, causing mainly enteric infections. *P. aeruginosa* (choice E) is widely distributed in nature and in moist environments in hospitals. It can cause opportunistic diseases in immunocompromised humans. Such infections may present with bluegreen pus and are difficult to treat with antimicrobials.

### QUESTION 3

A patient has been treated for bipolar disorder for several months. Which of the following is a common adverse effect of lithium carbonate?

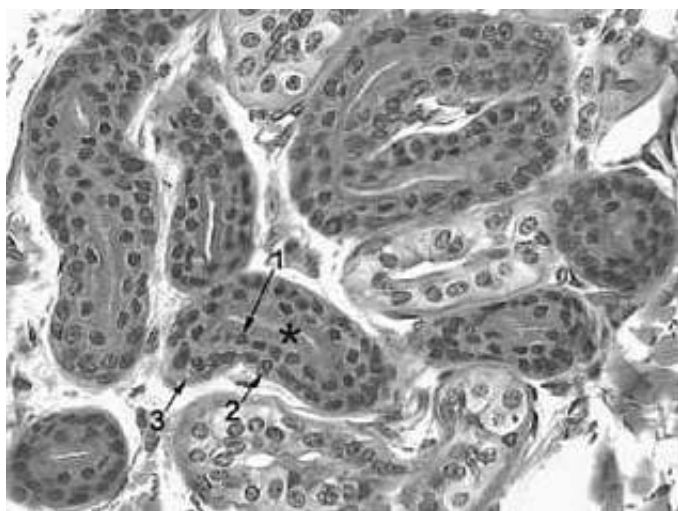
- A. dry mouth
- B. hyperthyroidism
- C. leucopenia
- D. nephrogenic diabetes insipidus
- E. parkinsonian extrapyramidal symptoms

Correct Answer: D

Section: Pharmacology Nephrogenic diabetes insipidus is a common adverse effect of lithium at therapeutic dosage. Dry mouth (choice A) and other anticholinergic toxicities are common with tricyclic antidepressants and some phenothiazines. Lithium may induce hypothyroidism, but not hyperthyroidism (choice B). Similarly, lithium increases rather than decreases white blood cell count (choice C). Finally, lithium often causes tremor, but not parkinsonism (choice E).

### QUESTION 4

The histological structure marked by the asterisk in Fig. 1-4 is which of the following structures from the integumentary system?



- A. apocrine sweat gland
- B. dermal papilla



C. eccrine sweat gland

D. hair follicle

E. sebaceous gland

Correct Answer: C

Section: Anatomy This is the secretory portion of the eccrine sweat gland, recognizable by its three cell types. The apical dark cells (arrow 1) are closest to the lumen. The clear or basal cells (arrow 2) and the myoepithelial cells (arrow 3) are located against the basal lamina. Characteristically, these cells are large and the lumen is small. The apocrine sweat gland (choice A) is lined with simple cuboidal epithelium and thus has a large lumen. The dermal papilla (choice B) is formed by fibroblasts, not epithelia. The hair follicle (choice D) is formed by three concentric zones of keratinized cells and does not have a lumen. The sebaceous glands (choice E) are appendages of the hair follicle and their lumen is lined by stratified squamous epithelium.

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### QUESTION 5

A 54-year-old insulin-dependent diabetic notes that her insulin requirements have gone up dramatically in the past year (from 50 U to nearly 200 U of recombinant human insulin) and her blood glucose is still poorly controlled. A possible explanation for the worsening of her diabetes includes which of the following?

A. a high titer of anti-insulin antibodies

B. an improved diet

C. an improved exercise program

D. progression of macrovascular disease

E. weight loss

Correct Answer: A

Section: Physiology The patient clearly has an increase in her state of insulin resistance. Given the magnitude of her increased insulin requirements, she most likely developed a high titer of antiinsulin antibodies that are preventing the injected insulin from lowering blood glucose effectively. A good choice of lifestyle, including an improved diet (choice B), an improved exercise program (choice C), or weight loss (choice E) each are shown to beneficially affect her insulin requirements. Progression of macrovascular disease (choice D) is largely irrelevant to her insulin requirements, except to the extent that it might decrease her ability to exercise.

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