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QUESTION 1

Sickle cell disease (SCD) affects millions of individuals worldwide, and the Sickle Cell Disease Association of America estimates that 70,000 to 100,000 individuals have SCD and 3 million individuals have the sickle cell trait. While SCD is known to primarily affect individuals of African American descent, individuals from South America, the Caribbean, Central America, the Middle East, and the Mediterranean can also have SCD or the SCD trait. SCD is estimated to affect 1 in 500 African American infants, and 1 in 12 African Americans are estimated to have the sickle cell trait. SCD is characterized by episodes of acute and chronic pain. By increasing awareness about SCD and promoting patient education, health care professionals can help patients and their families cope with SCD and better manage the associated pain. Recurring episodes of acute and/or severe pain are hallmarks of SCD. SCD pain can often be debilitating, and episodes of pain vary from patient to patient in both frequency and intensity. SCD pain can be classified as acute, chronic, or mixed. At some point, most SCD patients experience episodes of pain often referred to as vaso-occlusive crisis (sickle cell crisis), the duration of which may range from hours to days. Some patients seldom have a sickle cell crisis, while others may experience crises several times a year. Some episodes may be so severe that hospitalization is warranted to manage the pain. An acute pain event is the most common type of pain, and the onset is typically abrupt. It is often the result of an ischemic tissue injury, which is due to the occlusion of microvascular beds by sickled erythrocytes during an acute crisis. Acute pain episodes can also be triggered by factors including extreme temperature changes, changes in altitude, physical and emotional stress, illnesses, infections, dehydration, cold climates, menstruation, and fatigue. Chronic pain is pain that lasts for 3 to 6 months or longer. Chronic pain often results from the destruction of bones, joints, and visceral organs due to recurrent crises. Sources of chronic sickle cell pain include aseptic necrosis, leg ulcerations, and osteomyelitis. Unfortunately, acute and chronic pain associated with SCD are commonly undertreated or inappropriately managed due to patient fear of potential addiction and adverse effects. Many studies report that some health care professionals are also concerned about the potential for addiction. When appropriate, pharmacologic management of SCD pain may involve the use of 3 major pharmacologic classes: nonopioids, opioids, and adjuvants.

Which of the following is NOT a possible cause of chronic pain in SCD patients?

A. aseptic necrosis

B. leg ulcerations

C. changes in altitude

D. osteomyelitis

Correct Answer: C

"Changes in altitude" is described by the passage as a cause of acute pain, not chronic pain. The other three answer choices are all listed as possible causes of chronic pain in the passage.

QUESTION 2

John is running towards a finish line at 10 m/s and is 50 m away. Bolt is running at 14 m/s but is 75 m away. Assuming they keep their constant speed, who will reach the finish line first?

A. John

B. Bolt

C. It is a tie

D. Neither will finish

Correct Answer: A

Calculate how long it will take each runner to finish, the shorter time length indicates the first to finish. Recall that:

distance = rate ?time:

$$\frac{50\ \text{m}}{10\ \text{m/s}} = 5\ \text{s}$$

$$\frac{75\ \text{m}}{14\ \text{m/s}} \approx 5.4\ \text{s}$$

John (5 seconds) finishes before Bolt (5.4 seconds).

QUESTION 3

Rank the following compounds based on increasing acidity:

I. CH3CH2OH

II. CH3COCH3

III. CH3CH2COH

IV.

CH3CH2COOH

A.

II, III, IV, I

B.

II, IV, I, III

C.

II, III, I, IV

D.

IV, I, III, II

Correct Answer: C

QUESTION 4

For most Americans, the words "Alzheimer\\'s disease" (AD) ?often mispronounced purposefully or accidentally as "old

timers\\' disease" ?signify devastating memory loss and stigma. The information about AD ?often learned solely through the media ?may lead individuals to believe that AD is inevitable (it isn\\'t), and possibly think that all AD patients receive poor care (there are many remarkably good AD units). Many individuals may envision a future burdened with more dementia patients and fewer societal resources to help support them (a real possibility). In general, pharmacists are well aware of what AD is and isn\\'t. AD is complex and relentlessly progressive; it affects patients, loved ones, and caregivers adversely. Pharmacists can provide pertinent information about AD\\'s myths, realities, and available symptomatic treatments. AD\\'s harbinger is language difficulties, which include aphasia (language disturbance), apraxia (inability to carry out motor functions), and agnosia (failure to recognize or identify objects). Consequently, those with AD will often create new words for items. They may call a pencil a "list writer," or a key a "door turner." Clinicians stage AD as mild, moderate, or severe depending on the patient\\'s cognitive and memory impairment, communication problems, personality changes, behavior, and loss of control of bodily functions. People often dismiss mild AD as normal cognitive decline or senility ?in other words, "normal" aging. For this reason, most people don\\'t seek treatment and are diagnosed in the late-mild to early-moderate stage. In the severe stage, difficulty swallowing elevates the risk of aspiration pneumonia, which often marks the beginning of the downward spiral that ultimately ends with death; AD has no cure. A handful of pharmacologic treatments ?acetylcholinesterase inhibitors and N-methyl-D-aspartate antagonists ?alter the decline trajectory. These treatments slow disease progression, enhance cognitive function, delay cognitive decline, and decrease disruptive behaviors. Not all patients respond to these medications, but experts generally believe that those who do will show mild to moderate improvements for 6 months to a year. Although the drugs\\' effects are short-lived, they improve patients\\' quality of life and briefly enable independence. Determining when medications stop providing a therapeutic benefit and should be discontinued is challenging. Clinicians use various methods to monitor decline, including mental status tools, patient self-report, and loved ones\\' observations. Most clinicians continue drug treatment if the patient seems to tolerate the medication well, can afford it, and if there seems to be a benefit. With disease progression, specific behavioral symptoms including depression, agitation, hallucinations, and sleep disturbances become concerns. Antianxiety drugs, antipsychotics, and antidepressants are sometimes used to alleviate symptoms, but effective behavioral strategies are much preferred.

Which of the following is NOT something pharmacists can provide information about?

A. myths about AD

B. truths about AD

C. cures for AD

D. treatments for AD

Correct Answer: C

The passage states, "Pharmacists can provide pertinent information about AD\\'s myths, realities, and available symptomatic treatments." The passage mentions that Alzheimer\\'s is currently incurable.

QUESTION 5

Which of the following species cannot hydrogen bond with itself?

A. ethanol

B. acetic acid

C. ammonia

D. acetone

Correct Answer: D

Hydrogen bonds occur between hydrogen of one molecule with an electronegative atom (oxygen, nitrogen, or fluorine) of another atom. Consequently, acetone is unable to hydrogen bond with itself. The hydrogen atoms in acetone are covalently bonded to carbon atoms and not a strong electronegative atom like nitrogen, oxygen, of fluorine.