

Chapter 2: Tissue Response to Injury

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. What is the most common symptom for which an individual seeks medical attention?
 - A. Trauma to soft tissues
 - B. Obesity
 - C. Pain
 - D. Depression

- _____ 2. Pain has sensory and psychological components that can complicate its accurate quantification. Which of the following percentage relationships most accurately demonstrates the composition of sensory and psychological components of pain?
 - A. 50% sensory and 50% psychological
 - B. 80% sensory and 20% psychological
 - C. 20% sensory and 80% psychological
 - D. There is no accurate relationship between the sensory and psychological components.

- _____ 3. Which of the following criteria is *inconsistent* with chronic pain?
 - A. The cause is well defined.
 - B. Medical treatments have been ineffective.
 - C. The painful symptoms have persisted for more than 3 months.
 - D. The cause is not correctable or is uncertain.

- _____ 4. Which of the following terms best describes the phenomenon experienced by the patient when painful symptoms are perceived in areas remote from the site of the original tissue damage?
 - A. Acute pain
 - B. Chronic pain
 - C. Referred pain
 - D. Phantom pain

- _____ 5. Prior to an individual being aware of pain, the painful input to the dorsal horn of the spinal cord must travel to the brain. Which of the following scenarios is *most accurate* in describing the path to the brain?
 - A. The axons of most of the transmission cells cross over and ascend via the spinothalamic tract.
 - B. The axons of most of the transmission cells ascend ipsilaterally via the spinothalamic tract.
 - C. The axons of most of the transmission cells cross over and descend via the lateral spinothalamic tract.
 - D. The axons of all of the transmission cells descend over the spinothalamic tract to the brain.

- _____ 6. Which of the following stimuli could result in the liberation of endogenous opiates?
 - A. Short duration, low intensity exercise
 - B. Sleeping

- C. Intense pain
- D. Eating an apple

- _____ 7. Vascularized tissue responds to injury with a series of events that are referred to as inflammation and repair. Which of the following statements is *least accurate* in describing the purpose of inflammation?
- A. Inflammation results in immobilization of the area.
 - B. Inflammation results in preparation of the area for repair.
 - C. Inflammation results in dysfunction and must be avoided.
 - D. Inflammation results in vasodilation to improve circulation.
- _____ 8. The proliferative phase of healing involves the revascularization and rebuilding of tissues. Which of the following is *most accurate* in describing tissues during this stage of healing?
- A. Fragile
 - B. Hot
 - C. Bulky
 - D. Smooth
- _____ 9. Which of the following statements is *most accurate*?
- A. Scar tissue is as strong as the tissue it replaces.
 - B. Scar tissue is stronger than the tissue it replaces.
 - C. Scar tissue is not as strong as the tissue it replaces.
 - D. Scar tissue is 70% as strong as the tissue it replaces.
- _____ 10. When surgical intervention is involved in the closure of a wound, it is termed “healing by first intention.” Which of the following reasons would *NOT* be associated with promoting healing by first intention?
- A. Dirt in the wound
 - B. Infection
 - C. Excessive drainage
 - D. Physical condition of the patient
- _____ 11. Which of the following endogenous substances is *NOT* released into an injured area as a normal response to injury?
- A. Potassium
 - B. Serotonin
 - C. Histamine
 - D. Glucose
- _____ 12. Which of the following types of non-narcotic medications is often prescribed for analgesia but tends to cause gastrointestinal irritation?
- A. NSAIDs
 - B. Codeine
 - C. Morphine
 - D. Serotonin
- _____ 13. A referral area of pain that follows the dermatome of a nerve is following what pattern?
- A. The muscle that is supplied by that nerve
 - B. The bone that is supplied by that nerve

- C. The skin that is supplied by that nerve
- D. The organ that is supplied by that nerve

- _____ 14. Pain receptors are responsible for signaling potential tissue damage. What is the name for this type of receptor?
- A. Motor fibers
 - B. Mechanoreceptors
 - C. Nociceptors
 - D. Thermoreceptors
- _____ 15. Which of the following types of nociceptors has the fastest conduction velocity?
- A. A-delta fibers
 - B. C-fibers
 - C. Small, unmyelinated C-fibers
 - D. Mechanoreceptors
- _____ 16. Which of the following explanations is *most accurate* in helping to explain why chronic pain is often difficult to localize?
- A. Chronic pain persists long after the time of insult to the injured tissues.
 - B. Chronic pain is not difficult to localize; the statement is false.
 - C. A-beta fibers carry painful stimuli and they may travel several spinal segments prior to entering the spinal gray matter.
 - D. Nociceptors commonly transmit stimuli from the nerve root through several different segments.
- _____ 17. Wide-dynamic-range cells are *NOT* responsible for the localization of which of the following symptoms?
- A. Burning or prickling
 - B. Touch
 - C. Motion
 - D. Noxious stimuli
- _____ 18. The most basic premise behind Melzack and Wall's gate control theory of pain is that:
- A. Pain is a unique experience for all individuals, which can be qualified only by the individual experiencing it.
 - B. Psychological factors influence pain perception, making it impossible to accurately quantify.
 - C. Sensory stimuli can inhibit painful stimuli from reaching the brain.
 - D. There is an interaction of peripheral and central mechanisms that may or may not elicit a painful response to noxious stimuli.
- _____ 19. Which of the following statements is *most accurate* regarding clinical versus experimental pain?
- A. Although the sensation is the same, results accomplished experimentally should not be extrapolated to be identical in clinical pain syndromes.
 - B. The sensations are the same regardless of the method of production, which makes extrapolation of data from experimental studies directly applicable to clinical pain syndromes.
 - C. Experimental pain is easier to produce than clinical pain and is therefore of no use

for research purposes.

- D. Clinical pain is unique to each individual, which makes experimental pain of no use for research purposes.

- _____ 20. Edema is a normal response during the inflammatory phase of the process of tissue healing. The constituents of the edema change dependent upon the length of time that the edema is present and the magnitude of the injury. Which statement is correct and why?
- A. Transudates appear last and easily dissipate due to the vast number of leukocytes present within.
 - B. Plasma proteins are first to help the lymphatic system to flush the area and decontaminate it from necrotic tissues.
 - C. Exudates indicate that there is a break in the surface of the skin and represent the presence of infection.
 - D. Pus contains large numbers of white blood cells and is often difficult to reduce.

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Answer Section

MULTIPLE CHOICE

1. ANS: C

	Feedback
A	Incorrect. Trauma alone may not cause enough significant tissue damage to cause pain. For example, a bruise is the result of soft tissue trauma but rarely causes someone to seek attention for it.
B	Incorrect. Although obesity is a major health concern in recent times, there has been a rapid growth in the marketing of diets and diet products, which an individual often seeks prior to medical advice.
C	Correct. Pain is the most common symptom that causes individuals to seek medical attention.
D	Incorrect. Depression often is unreported and untreated by medical professionals.

PTS: 1 KEY: pain | symptoms

2. ANS: D

	Feedback
A	Incorrect. There are too many variables that contribute to a patient's painful experience to be able to establish a set percentage.
B	Incorrect. There are too many variables that contribute to a patient's painful experience to be able to establish a set percentage.
C	Incorrect. There are too many variables that contribute to a patient's painful experience to be able to establish a set percentage.
D	Correct. There are too many variables that contribute to a patient's painful experience to be able to establish a set percentage.

PTS: 1 KEY: psychology of pain | pain perception | painful sensation

3. ANS: A

	Feedback
A	Correct. Chronic pain often is not well defined or easily localized.
B	Incorrect. Often, patients who have been diagnosed with conditions that have a chronic pain component have been treated unsuccessfully by several means.
C	Incorrect. Painful symptoms that persist for more than 3 months are characteristic of chronic pain. Acute pain often subsides in a much shorter period of time.

D	Incorrect. Chronic pain syndromes can result from a variety of diagnoses that may be so remote from the present symptoms that they are now unrelated or difficult to trace back to the original insult. Some of these diagnoses are not correctable and must be managed through therapeutic treatment interventions.
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PTS: 1 KEY: chronic pain | pain definitions

4. ANS: C

	Feedback
A	Incorrect. Acute pain is often experienced local to the site of insult to the soft tissues.
B	Incorrect. Chronic pain may be referred or localized. However, the term chronic does not refer to this quality of pain. Chronic refers to the time component since the time of insult.
C	Correct. Referred pain is pain that arises from deep body structures but is felt at another distant site.
D	Incorrect. Phantom pain is the term used to describe the sensation of pain being perceived in an area that is no longer present. For example, an amputee may experience the sensation of pain in the extremity that was amputated and is no longer there. Hence, the term phantom is used to describe this phenomenon.

PTS: 1 KEY: chronic pain | acute pain | referred pain

5. ANS: A

	Feedback
A	Correct. The crossing over of the cells prior to ascending is one of the reasons that sensory stimulation at the spinal cord nerve root on either side can result in pain reduction.
B	Incorrect. Ipsilaterally means “same,” and, in this scenario, pain experienced on the right would ascend only on the right, which is inaccurate.
C	Incorrect. The tracts must ascend from the periphery to the brain, not descend.
D	Incorrect. The tracts must ascend from the periphery to the brain, not descend.

PTS: 1 KEY: pain pathways | spinal cord tracts | ascending tracts

6. ANS: C

	Feedback
A	Incorrect. Intense exercise that persists for 10 to 20 minutes has been reported to elicit the release of endorphins. Short duration, low intensity exercise has not.
B	Incorrect. Sleeping has not been shown to result in liberation of endogenous opiates.
C	Correct. Intense pain has the ability to cause the liberation of endogenous opiates. This may also be linked to the “fight or flight” response that occurs in

	emergency situations.
D	Incorrect. Eating an apple has not been shown to result in liberation of endogenous opiates.

PTS: 1 KEY: acupuncture | endogenous opiates

7. ANS: C

	Feedback
A	Incorrect. Inflammation may result in immobilization of the area. However, this is necessary to prevent further injury to the involved tissues. The amount of immobilization must be minimized to maintain motion in those areas that would suffer a loss of motion if the immobilization were prolonged.
B	Incorrect. Inflammation does help to prepare the area for repair. Without inflammation, the platelets would not have aggregated to prevent excessive blood loss. The area also would not be decontaminated if inflammation did NOT occur.
C	Correct. Although inflammation does result in dysfunction, without the inflammation the area would not be able to repair itself. Inflammation involves a “self-defense” response, which is a prerequisite to healing.
D	Incorrect. Inflammation does result in vasodilation of the injured vessels to increase the blood flow, which helps to initiate the release of macromolecules from the vascular system into the interstitial spaces to restore osmotic pressure to the area.

PTS: 1 KEY: inflammation | wounds | tissue repair

8. ANS: A

	Feedback
A	Correct. Resurfacing of the infrastructure of the wound occurs with epithelial tissue that is one cell layer thick.
B	Incorrect. The tissue has small vascular buds that grow into the wound area, eventually joining to form a capillary loop. This is incapable of producing heat at this stage of healing unless infection is present.
C	Incorrect. The tissue is in the process of forming epithelial tissue to rebuild and restructure and to cover the surfaces of the wound. Resurfacing of the infrastructure of the wound occurs with epithelial tissue that is one cell layer thick.
D	Incorrect. There is a significant amount of irregularity between the edges of the wound and the interior of a wound during this early stage in the healing process, with the interior just beginning to resurface.

PTS: 1 KEY: tissue repair | proliferation

9. ANS: D

	Feedback
A	Incorrect. Scar tissue is NOT as strong as the tissue it replaces.
B	Incorrect. Scar tissue is NOT stronger than the tissue it replaces. This is a common myth that must be overcome with clinicians and patients.
C	Incorrect. Although this is an accurate statement, it is not the most accurate of the options. Scar tissue is 70% as strong as the tissue it replaces, which was the option in D .
D	Correct. Scar tissue is only 70% as strong as the tissue it replaces, which is one of the underlying reasons that the surrounding area must be strengthened.

PTS: 1 KEY: scar tissue | tissue repair

10. ANS: D

	Feedback
A	Incorrect. Dirt in a wound is one of the indications to leave the wound open to allow it to granulate and re-epithelialize on its own.
B	Incorrect. Infection in a wound is one of the indications to leave the wound open to allow it to granulate and re-epithelialize on its own so that the infection can be treated and observed.
C	Incorrect. Excessive drainage from a wound is one of the indications to leave the wound open to allow it to granulate and re-epithelialize on its own so that the drainage can be monitored, treated, and observed.
D	Correct. When the physical condition of the patient is poor or compromised due to the wound's location or size, the wound will probably need to be closed by surgical intervention to help stabilize the patient.

PTS: 1 KEY: tissue repair | first intention | second intention

11. ANS: D

	Feedback
A	Incorrect. Potassium, serotonin, and histamine are released in response to injury as a normal part of the inflammatory process.
B	Incorrect. Potassium, serotonin, and histamine are released in response to injury as a normal part of the inflammatory process.
C	Incorrect. Potassium, serotonin, and histamine are released in response to injury as a normal part of the inflammatory process.
D	Correct. Glucose is not released in response to injury as a normal part of the inflammatory process.

PTS: 1 KEY: endogenous substances | inflammation

12. ANS: A

	Feedback
A	Correct. Non-steroidal anti-inflammatory medications often cause GI irritation, mental confusion, drowsiness, and hypersensitivity.
B	Incorrect. Codeine is a narcotic drug that can produce physical addiction.
C	Incorrect. Morphine is a narcotic drug that can produce physical addiction.
D	Incorrect. Serotonin is not a prescribed medication; it is an endogenous substance.

PTS: 1

KEY: endogenous substances | non-steroidal anti-inflammatory drugs

13. ANS: C

	Feedback
A	Incorrect. A myotome is the muscle that is supplied by a specific nerve root.
B	Incorrect. A sclerotome is the bone that is supplied by a specific nerve root.
C	Correct. A dermatome is the sensory area of skin supplied by a specific nerve root.
D	Incorrect. Organs are also innervated by specific spinal cord levels.

PTS: 1

KEY: dermatomes | referral patterns of pain | myotomes | innervation

14. ANS: C

	Feedback
A	Incorrect. Motor fibers are those portions of the nerve that are responsible for eliciting a contractile response in the motor units of the muscle.
B	Incorrect. Mechanoreceptors receive mechanical stimuli such as pressure from sound or touch.
C	Correct. A nociceptor is a pain receptor; there are three distinct types.
D	Incorrect. Thermoreceptors are stimulated in response to a rise in body temperature.

PTS: 1

KEY: sensory receptors | nociceptors | mechanoreceptors | thermoreceptors

15. ANS: A

	Feedback
A	Correct. A-delta fibers conduct impulses at a faster rate than small, unmyelinated C-fibers.
B	Incorrect. A-delta fibers conduct impulses at a faster rate than C-fibers, which are small and unmyelinated.
C	Incorrect. A-delta fibers conduct impulses at a faster rate than small, unmyelinated C-fibers.
D	Incorrect. Mechanoreceptors are NOT nociceptors (pain fibers).

PTS: 1

KEY: nociceptors | conduction velocity | mechanoreceptors

16. ANS: D

	Feedback
A	Incorrect. Although the statement is true, the length of time that the symptom has been experienced is not what makes it difficult to localize.
B	Incorrect. Chronic pain is difficult to localize.
C	Incorrect. A-beta fibers carry sensory and mechanoreceptive stimuli, NOT painful stimuli, which make this statement inaccurate.
D	Correct. Nociceptors is the category of pain fibers that includes A-delta and C-fibers. These fibers travel several segments prior to transmitting signals into the spinal gray matter.

PTS: 1

KEY: chronic pain | nociceptors | mechanoreceptors

17. ANS: C

	Feedback
A	Incorrect. Wide-dynamic-range cells are responsible for the localization of burning or prickling.
B	Incorrect. Wide-dynamic-range cells are responsible for the localization of touch.
C	Correct. Stimuli produced by motion are carried by mechanoreceptive cells.
D	Incorrect. Wide-dynamic-range cells are responsible for the localization of noxious stimuli.

PTS: 1

KEY: wide-dynamic-range cells | nociceptors

18. ANS: C

	Feedback
A	Incorrect. Although pain is a unique experience for all individuals and can be qualified only by the individual experiencing it, this is not the most basic aspect of the gate control theory.
B	Incorrect. Although psychological factors do influence pain perception, making it difficult to accurately quantify, the gate control theory does not attempt to deal with this issue.
C	Correct. This is the most basic application of the gate control theory. This mechanism is also thought to be the reason why, instinctively, we provide sensory stimuli to an injured area to help relieve pain.
D	Incorrect. Although there is an interaction of peripheral and central mechanisms that may or may not elicit a painful response to noxious stimuli, this is not the most basic application of the gate control theory. Sensory stimuli can inhibit painful stimuli from reaching the brain. This mechanism is also thought to be the reason why, instinctively, we provide sensory stimuli to an injured area to help relieve pain.

PTS: 1

KEY: pain theories | gate control theory

19. ANS: A

	Feedback
A	Correct. Experimental pain does not have the psychological components to deal with results that are commonly associated with clinical pain syndromes. However, data collected may provide insight into potential pain pathways that have not yet been explored.
B	Incorrect. The sensations are the same regardless of the method of production. However, the psychological component is absent, which makes extrapolation of data from experimental studies not directly applicable to clinical pain syndromes.
C	Incorrect. Experimental pain is not easier to produce than clinical pain. However, it is useful for research purposes. Data collected may provide insight into potential pain pathways that have not yet been explored.
D	Incorrect. Clinical pain is unique to each individual. However, experimental pain is useful for research purposes. Data collected may provide insight into potential pain pathways that have not yet been explored.

PTS: 1

KEY: pain perception | clinical pain | experimental pain

20. ANS: D

	Feedback
A	Incorrect. Transudates appear first and easily dissipate due to the lack of cells within them, which makes them clear and watery.
B	Incorrect. Plasma proteins that enter the interstitial space cause the edema to become cloudy and thick. Although they assist in the decontamination of the area, they are not the first event that assists the lymphatic system to flush the area and decontaminate it from necrotic tissues.
C	Incorrect. Exudates do not represent the presence of infection. There can be exudates in both infected and uninfected tissues. An odor is more indicative of an infection than exudates. It is not uncommon for exudates to help maintain the moisture of the wound bed to assist in the healing process.
D	Correct. Pus contains large numbers of white blood cells and is often difficult to reduce.

PTS: 1

KEY: tissue repair | edema | exudates | transudates | pus