Sample Chapter 10: Stress and Disease

Test Bank

TRUE/FALSE

1. “Flight or fight” occurs in the exhaustion stage in the general adaptation syndrome (GAS).

ANS:  F

There are successive stages in development of the GAS; the alarm stage is when the central nervous system (CNS) is aroused and the body’s defenses are mobilized (i.e., flight or fight).

REF:  p. 338

2. Cortisol circulates in the plasma free (unbound) and bound to protein.

ANS:  T
Cortisol circulates in the plasma, both protein bound and free.

REF:  p. 343

3. A person does not have a stress reaction unless the stress exceeds his or her coping abilities.

ANS:  T

In general, a person experiences stress when a demand exceeds a person’s coping abilities, resulting in reactions such as disturbances of cognition, emotion, and behavior that can adversely affect well-being.

REF:  p. 337

4. The decrease in insulin during a stress response prevents glucose from being taken up by peripheral tissue so that more glucose will be available for the CNS.

ANS:  T

The decrease in insulin release prevents glucose from being taken up by peripheral tissue and thus preserves it for the CNS.

REF:  p. 342

5. For catecholamines to be immunosuppressive, their levels must be chronically elevated.
ANS:  T

A study of stress duration and susceptibility to infection found that chronic elevation of catecholamines is immunosuppressive.

REF:  p. 343

6. Stress and negative emotions have not been associated with the production of increased levels of proinflammatory cytokines.

ANS:  F

Stress and negative emotions are associated directly with the production of increased levels of proinflammatory cytokines, providing a possible link between stress, immune function, and disease.

REF:  p. 347

7. Although stress generally inhibits the female reproductive system, it increases the production of testosterone.

ANS:  F

Stress generally inhibits the female reproductive system (Figure 10-6). Testosterone levels decrease after stressful stimuli.

REF:  pp. 349, 352
8. Lymphocytes secrete growth hormone (GH), prolactin, adrenocorticotropic hormone (ACTH), and endorphins.

ANS: T

GH is synthesized from the anterior pituitary gland and is produced by lymphocytes and mononuclear phagocytic cells. Several classes of lymphocytes have receptors for prolactin, suggesting a direct effect of prolactin on immune function. Lymphocytes also are known to produce ACTH and endorphins in small amounts, which probably influence immune response in an autocrine or a paracrine manner in the local microenvironment of an ongoing immune response.

REF: pp. 349-351

9. Studies have shown a relationship between depression and reduction in lymphocyte proliferation and natural killer (NK) cell activity.

ANS: T

A meta-analysis of studies shows a relationship between depression and reduction in lymphocyte proliferation and NK cell activity.

REF: p. 352

10. Stress has no effect on the development of cancer.

ANS: F
Illustrating the influence of an individualized stress appraisal on physiologic processes, a meta-analysis of the relationships between stressors and immunity found that a higher perception of stress was associated with reduced T cytotoxic (Tc)–cell cytotoxicity although not with levels of circulating Th or Tc lymphocytes.

REF: p. 352

MULTIPLE CHOICE

1. Exhaustion occurs if stress continues and _____ is not successful. a. flight or fight  
   b. alarm  
   c. adaptation  
   d. arousal

ANS: C

Exhaustion occurs if stress continues and adaptation is not successful, ultimately causing impairment of the immune response, heart failure, and kidney failure, leading to death.

REF: p. 338

2. The _____ is stimulated during the alarm phase of the GAS?
   a. adrenal cortex
b. hypothalamus
c. anterior pituitary
d. limbic system

ANS:  B

The alarm phase of the GAS begins when a stressor triggers the actions of the hypothalamus and the sympathetic nervous system (SNS) (Figure 10-1).

REF:   p. 338

3. During an anticipatory response to stress, the response from the limbic system is stimulated by the:

a. retronucleus of the anterior pituitary.
b. anterior nucleus of the hippocampus.
c. paraventricular nucleus of the hypothalamus.
d. prefrontal nucleus of the amygdala.

ANS:  C

In order for these regions to elicit a stress response, the paraventricular nucleus (PVN) of the hypothalamus must be stimulated (see Chapter 20).

REF:   p. 339

4. During a stress response, increased anxiety, vigilance, and arousal is prompted by:
ANS: A

Norepinephrine release promotes arousal, increased vigilance, increased anxiety, and other protective emotional responses.

REF: p. 339

5. Perceived stress elicits an emotional, anticipatory response that begins in the:

a. prefrontal cortex.
b. anterior pituitary.
c. limbic system.
d. hypothalamus.

ANS: C

Perceived stressors elicit an anticipatory response that usually begins in the limbic system of the brain, the area responsible for emotions and cognition.

REF: p. 339

6. During a stress response, which hormone decreases lymphocytes, eosinophils, and macrophages and prostaglandin?
a. ACTH  
b. Cortisol  
c. Prolactin  
d. Growth hormone

ANS: B

Increased cortisol produced by the anterior pituitary results in decreased lymphocytes, eosinophils, and macrophages (Figure 10-2).

REF: p. 341

7. The effect that low serum albumin has on the central stress response is to:
   a. impair circulation of epinephrine and norepinephrine.  
   b. impair wound healing.  
   c. lessen circulation of cortisol.  
   d. diminish oncotic pressure.

ANS: A

Once released, catecholamines circulate bound to the plasma protein albumin. Low serum albumin would impair circulation of both epinephrine and norepinephrine.

REF: p. 339

8. The effect epinephrine has on the immune system during stress response is to increase:
a. NK cells.
b. immunoglobulins.
c. cytokines.
d. helper T cells.

ANS: A

Injection of epinephrine into healthy human subjects is associated with a transient increase of the number of lymphocytes (e.g., T cells and NK cells) in the peripheral blood. Specifically, T cytotoxic and NK cells increase, whereas little change occurs in B lymphocytes.

REF: p. 342

9. Stress-induced sympathetic stimulation of the adrenal medulla causes the secretion of catecholamines, which include:

a. epinephrine and aldosterone.
b. norepinephrine and cortisol.
c. epinephrine and norepinephrine.
d. acetylcholine and cortisol.

ANS: C

The sympathetic nervous system is aroused during the stress response and causes the medulla of the adrenal gland to release catecholamines (80% epinephrine and 20% norepinephrine) into the bloodstream.

REF: p. 339
10. Stress-induced norepinephrine results in:

a. decreased blood flow to the brain and skin.
b. peripheral vasoconstriction.
c. increased glycogen synthesis in the liver.
d. decreased muscle contraction as a result of an energy depletion.

ANS: B

Norepinephrine regulates blood pressure by constricting smooth muscle in all blood vessels. During stress, norepinephrine raises blood pressure by constricting peripheral vessels.

REF: p. 340

11. Stress-induced cortisol released from the adrenal cortex results in:

a. stimulation of gluconeogenesis.
b. increased lipolysis.
c. stimulation of glycogenolysis.
d. increased peripheral uptake and use of glucose.

ANS: A

One of the primary effects of cortisol is the stimulation of gluconeogenesis, or the formation of glucose from noncarbohydrate sources, such as amino or free fatty acids in the liver.
12. What is the effect of increased secretions of epinephrine, glucagon, and growth hormone?

a. Hyperglycemia  
b. Hypertension  
c. Bronchodilation  
d. Pupil dilation

ANS: A  

Cortisol also enhances the elevation of blood glucose promoted by other hormones, such as epinephrine, glucagon, and growth hormone.

13. Which hormone increases the formation of glucose from amino acids and free fatty acids?

a. Epinephrine  
b. Norepinephrine  
c. Cortisol  
d. Growth hormone

ANS: C  

One of the primary effects of cortisol is the stimulation of gluconeogenesis, or the formation of glucose from noncarbohydrate sources, such as amino or free fatty acids in the liver.
14. Which immune cells are suppressed by corticotropin-releasing hormone (CRH)?

a. B cells and eosinophils  
b. Cytokines and neutrophils  
c. Cytotoxic T cells and NK cells  
d. Helper T cells and monocyte-macrophage cells  

ANS: D

Direct suppressive effects of CRH have been reported also on two immune cell types possessing CRH receptors—the monocyte/macrophage and CD4 (T helper) lymphocytes.

REF: pp. 347-348

15. The _____ (gland) regulates the immune response and mediates the apparent effects of circadian rhythms on immunity.

a. anterior pituitary  
b. adrenal  
c. basal ganglia  
d. pineal  

ANS: D
The pineal gland regulates the immune response and mediates the apparent effects of circadian rhythm on immunity.

REF: p. 348

16. Which cytokines initiate the production of corticotropin-releasing hormone (CRH)?

a. IL-1 and IL-6  
b. IL-2 and TNF-a  
c. IFN and IL-12  
d. TNF-β and IL-4

ANS: A

A number of stress factors initiate CRH production, including high levels of IL-1 and IL-6.

REF: p. 349

17. The release of which cytokines is triggered by bacterial or viral infections, cancer, and tissue injury that in turn initiate a stress response?

a. IL-1 and IL-2  
b. IL-12, TNF-a, and colony-stimulating factor  
c. IFN, TNF-β, and IL-6  
d. IL-4 and IL-24
The release of immune inflammatory mediators IL-6, TNF-β, and interferon is triggered by bacterial or viral infections, cancer, and tissue injury that in turn initiates a stress response through the HPA pathway.

18. The action of which hormone helps explain increases in affective anxiety and eating disorders, mood cycles, and vulnerability to autoimmune and inflammatory diseases in women as a result of stimulation of the CRH gene promoter and central norepinephrine system?

a. Progesterone
b. Cortisol
c. Estrogen
d. Prolactin

ANS: C

Estrogen directly stimulates the CRH gene promoter and the central noradrenergic (norepinephrine) system, which may help explain adult women’s slight hypercortisolism, increases in affective anxiety and eating disorders, mood cycles, and vulnerability to autoimmune and inflammatory disease, all of which follow estradiol fluctuations.

19. What effect does estrogen have on lymphocytes?

a. Depression of B cells and enhancement of T cells
b. Depression of T cells and enhancement of B cells

c. Depression of B cells and T cells

d. Enhancement of B cells and T cells

ANS: B

Estrogens generally are associated with a depression of T-cell–dependent immune function and enhancement of B-cell functions.

REF: p. 352

20. Which statement is true about the differences between stress-induced hormonal alterations of men and women?

After injury, women produce more proinflammatory cytokines than

a. men, a profile that is associated with poor outcomes.

b. Androgens appear to reduce a greater degree of immune cell apoptosis following injury, creating greater immunosuppression in injured men than women.

Psychologic stress associated with some types of competition decreases
c. both testosterone and cortisol especially in athletes older than 45 years of age.

After stressful stimuli, estrogen is increased in women, but testosterone d. is decreased in men.

ANS: B

Androgens appear to induce a greater degree of immune cell apoptosis following injury, a mechanism that may elicit a greater immunosuppression in injured men versus women.
21. What effect do androgens have on lymphocytes?

a. Suppression of B cells and enhancement of T cells
b. Suppression of T cells and enhancement of B cells
c. Suppression of B cells and T cells
d. Enhancement of B cells and T cells

ANS: C
Androgens suppress T- and B-cell responses.

22. Stress-age syndrome results in decreased:

a. catecholamines.
b. ACTH.
c. cortisol.
d. immune system.

ANS: D
Immunodepression is one of the characteristic changes seen in stress-age syndrome.
MATCHING

Match the hormone with its effects during a stress response. Hormones may be used more than once.

a. Epinephrine
b. Norepinephrine
c. Cortisol

1. Constricts peripheral vessels to increase blood pressure
2. Increases cardiac output by increasing heart rate and myocardial contractility
3. Increases gastric secretions

1. ANS: B REF: p. 340

NOT: Norepinephrine regulates blood pressure by constricting smooth muscle in all blood vessels.

2. ANS: A REF: p. 340

NOT: Epinephrine enhances myocardial contractility (inotropic effect), increases the heart rate (chronotropic effect), and increases venous return to the heart, all of which increase cardiac output and blood pressure.

3. ANS: C REF: p. 344