Health Psychology (Canadian) 4th edition Taylor Solutions Manual

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CHAPTER 2
THE SYSTEMS OF THE BODY

Learning Objectives

1 Describe the Function of the Nervous System
2 Explain How the Endocrine System Operates
3 Identify How the Cardiovascular System Works
4 Describe the Function of the Immune System
5 Understand the Physiological Systems Involved in the Stress Response

Exercises, Projects, and Activities

Mapping the Brain

Identifying the areas of the brain and learning their functions often is difficult for students. An exercise that provides practice for this knowledge is locating and labeling specific areas on a drawing of the brain. Students can use diagrams provided in the text for aid in locating the areas.

The Role of Neurotransmitters—A Play

Hamilton and Knox (1996) developed a rather innovative class demonstration to portray the neuron activity and physiology. A "play" is staged with class members acting the parts of the various parts of the neuron (e.g., dendrites, axons, sodium molecules). At one point, the neurotransmitters are bumped across the synapse into the arms of the receptors. An interesting variation on this sequence is for the neurotransmitters to be bumped into the receptors, but the receptors' arms are closed. Complete directions, including props, can be found in Hamilton and Knox (1996).

Hamilton, S. B., & Knox, T. A. (1996). The colossal neuron: Acting our physiological psychology. In M. E. Ware & D. E. Johnson (Eds.), *Handbook of demonstrations and activities in the teaching of psychology* (pp. 14–18). Mahwah, NJ: Lawrence Erlbaum.

If You Had to Get Infected…..A Hypothetical Discussion Exercise

One exercise that I (F. Sirois) have used to promote interesting and engaging in-class discussion about infection and immunity involves asking students to imagine that they are in a situation whereby they have to become infected by one of the four routes of transmission outlined in the text. Given this implausible, yet interesting situation, ask students about which of the four ways they would most prefer contracting an infection and why, as well as which route of disease transmission would they least prefer. Instruct them to be specific in their answers by naming the possible diseases that may be transmitted by their preferred and least preferred transmission choices. Have students discuss and defend their answers in small groups first and then open it up for them to share with the whole class. You can also extend this exercise by asking them about the steps they would take to reduce their risk of contracting disease through their chosen modes of transmission. Not only does this promote an understanding of the ways in which infection can occur (air borne, person to person contact, via insects or animals, etc.), but also it highlights the types of diseases/illnesses that are transmitted through each route. In addition, students may become aware of how perceptions of health threat influence the practice of health behaviours (covered in Chapter 3), and make them more aware of how to protect themselves from becoming infected.

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Recommended Reading

The following chapters in Johnson, Perry, & Rozensky (2002) describe diseases and disorders of the physiological systems discussed in this chapter. Each chapter reviews the contributions of health psychology to the treatment of the disease.

Johnson, S. B., Perry, N. W., Jr., & Rozensky, R. H. (eds.), *Handbook of clinical health psychology: Vol. I. Medical disorders and behavioral applications*. Washington, DC: APA
Breier, J. I., & Fletcher, J. M. Diseases of the nervous system and sense organs (pp. 173-201). .
Brown, R. T., Mulhern, R. K., & Simonian, S. Diseases of the blood and blood-forming organs (pp. 101-141).
Ironson, G., Balbin, E., & Schneiderman, N. Health psychology and Infectious Diseases (pp. 5-35).
Suchday, S., Tucker, D. L., & Krantz, D. S. Diseases of the circulatory system (pp. 203-237).
Wysocki, T., & Buckloh, L. M. Endocrine, metabolic, nutritional, and immune disorders (pp. 65-99).

Web Videos

What is Alzheimer's disease? This short animated web video provides a quick but clear overview of the processes involved in the development of Alzheimer's disease and its effects.

http://www.youtube.com/watch?v=9Wv9jrk-gXc

Jan's Story: A Love Lost to Alzheimer's. This CBS news video provides a more human glimpse of the devastating effects of Alzheimer's disease by featuring the story of newswoman who developed Alzheimer's and the effects it had on her husband.

http://www.cbsnews.com/video/watch/?id=6601253n

These brief animations provide an illustrative view of key physiological systems.

The Anatomy of the Heart

http://www.youtube.com/watch?v=H04d3rJCLCE

The Stress Response

http://www.youtube.com/watch?v=BIfK0L8xDP0

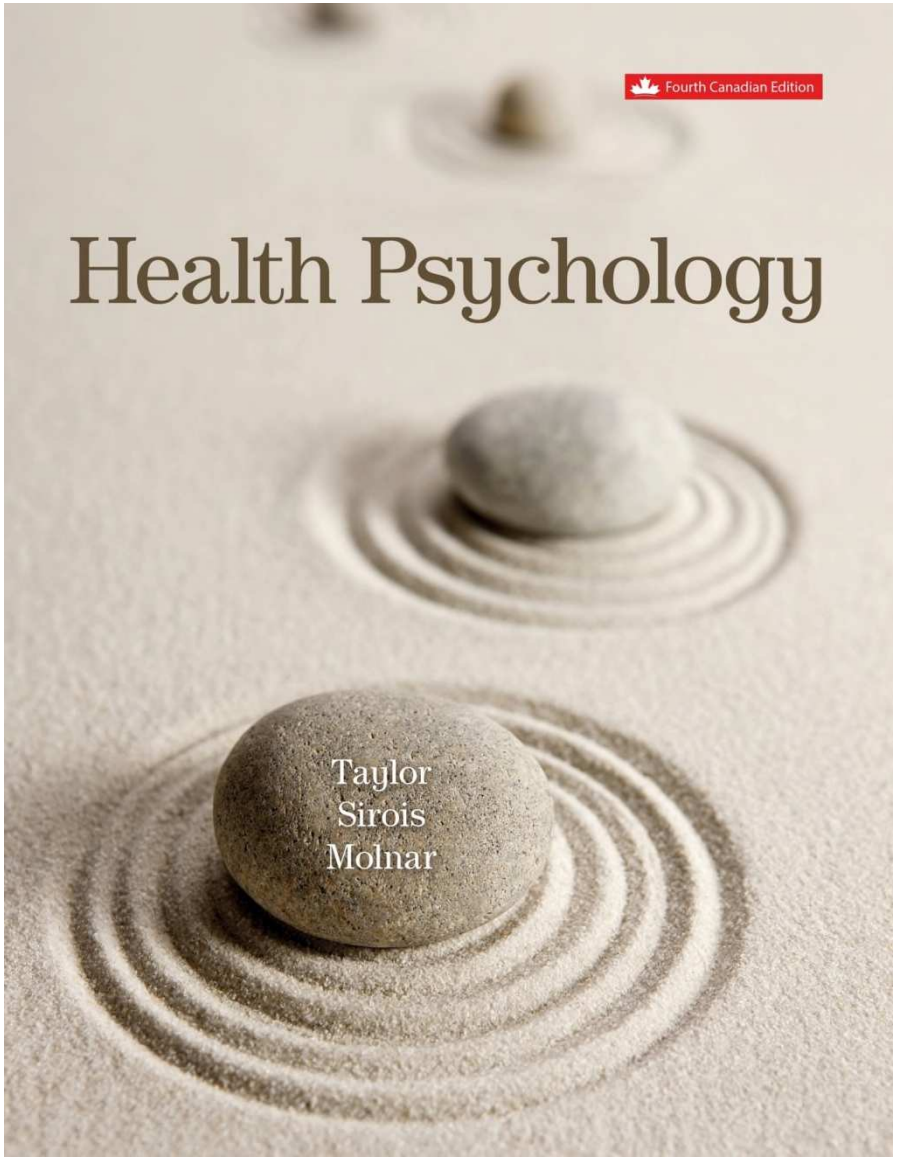
Lymphocytes

http://www.youtube.com/watch?v=cD_uAGPBfQQ

Phagocytes

http://www.youtube.com/watch?v=CEOV-SFTlpY

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Chapter 2:

The Systems of the Body

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Learning Objectives

LO1 Describe the function of the nervous system

LO2 Explain how the endocrine system operates

LO3 Identify how the cardiovascular system works

LO4 Describe the function of the immune system

LO5 Understand the physiological systems involved in the stress response

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The Nervous System
Overview

- The nervous system (NS) is made up of the central nervous system and the peripheral nervous system
- Central NS is made up of brain and spinal cord
- Peripheral NS is made up of somatic and autonomic nervous systems

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The Nervous System (cont.)

The Brain:

- hindbrain:
  - -medulla, pons, cerebellum
- midbrain:
  - -major pathway for sensory and motor impulses moving between forebrain and hindbrain

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The Nervous System (cont.)

The Brain (cont.):

- forebrain has two main sections:
  - diencephalons
    - thalamus
    - hypothalamus
  - telecephalon:
    - two hemispheres of cerebral cortex

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The Nervous System (cont.)

The Brain (cont.):

- Limbic system:
  - Amygdala:
    - detection of threat
  - Hippocampus:
    - emotional memories
  - Cingulate gyrus, Septum, areas of the Hypothalamus:
    - emotional functioning

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The Nervous System (cont.)

Neurotransmitters:

- chemicals that regulate nervous system functioning
  - Catecholamines:
    - epinephrine and norepinephrine
      - promote sympathetic NS activity
      - released during stressful times

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The Nervous System (cont.)

Disorders of the Nervous System:

- Epilepsy
- Parkinson's disease
- Cerebral palsy
- Alzheimer's disease
- Multiple sclerosis
- Huntington's disease
- Paraplegia, quadriplegia

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The Endocrine System

Overview:

- complements the nervous system in controlling bodily activities
- regulated by the hypothalamus and pituitary gland

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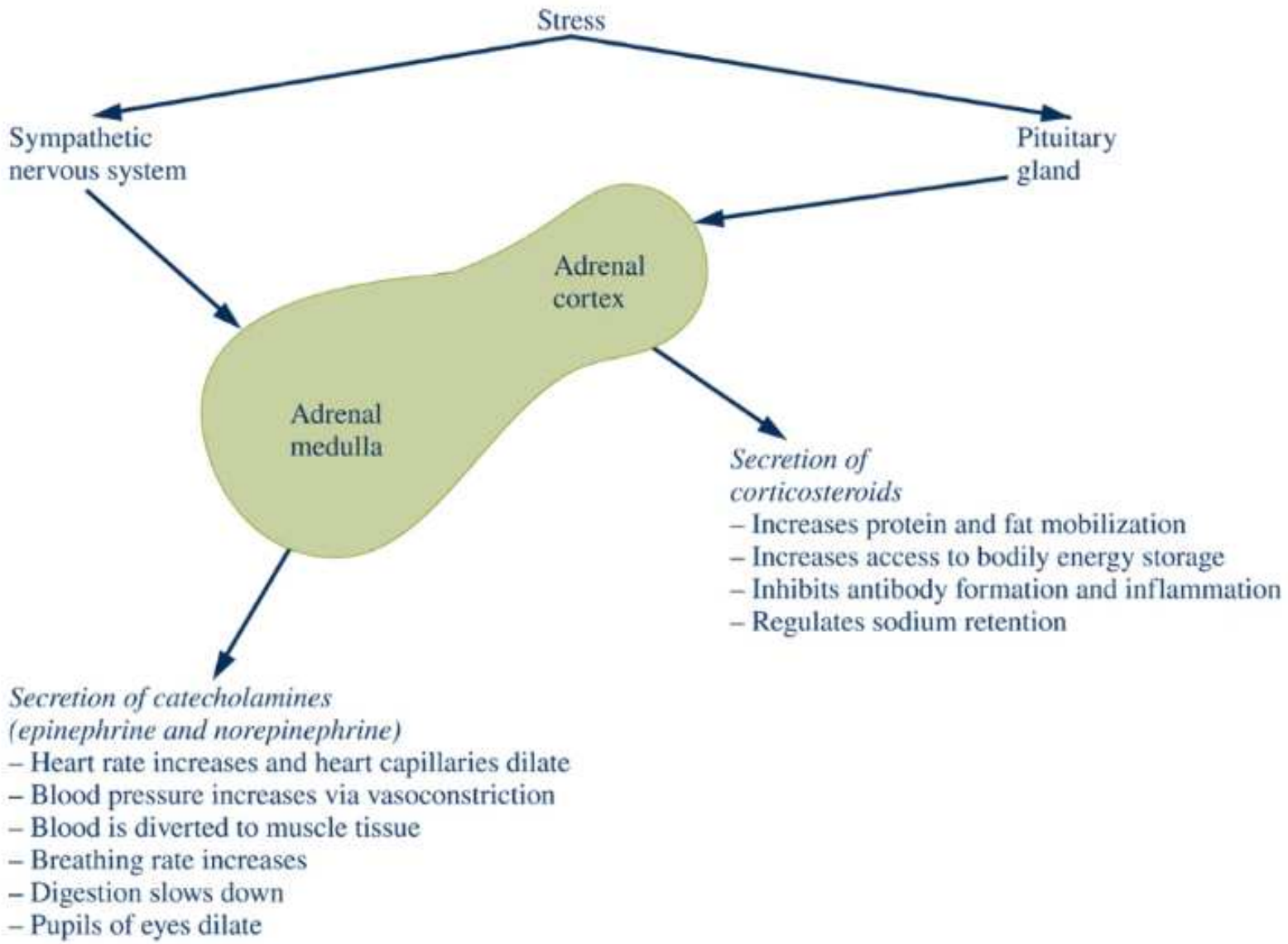
The Endocrine System (cont.)

Adrenal Glands:

- small glands at top of each kidney
- each gland composed of
  adrenal medulla and adrenal cortex
- produces epinephrine and norepinephrine

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FIGURE 2.3 *Adrenal Gland Activity in Response to Stress*



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The Endocrine System (cont.)

Disorders involving the Endocrine System:

- Diabetes:
  - body cannot manufacture or properly use insulin
    - Type I: insulin-dependent diabetes
    - Type II: insufficient insulin or sensitivity to it

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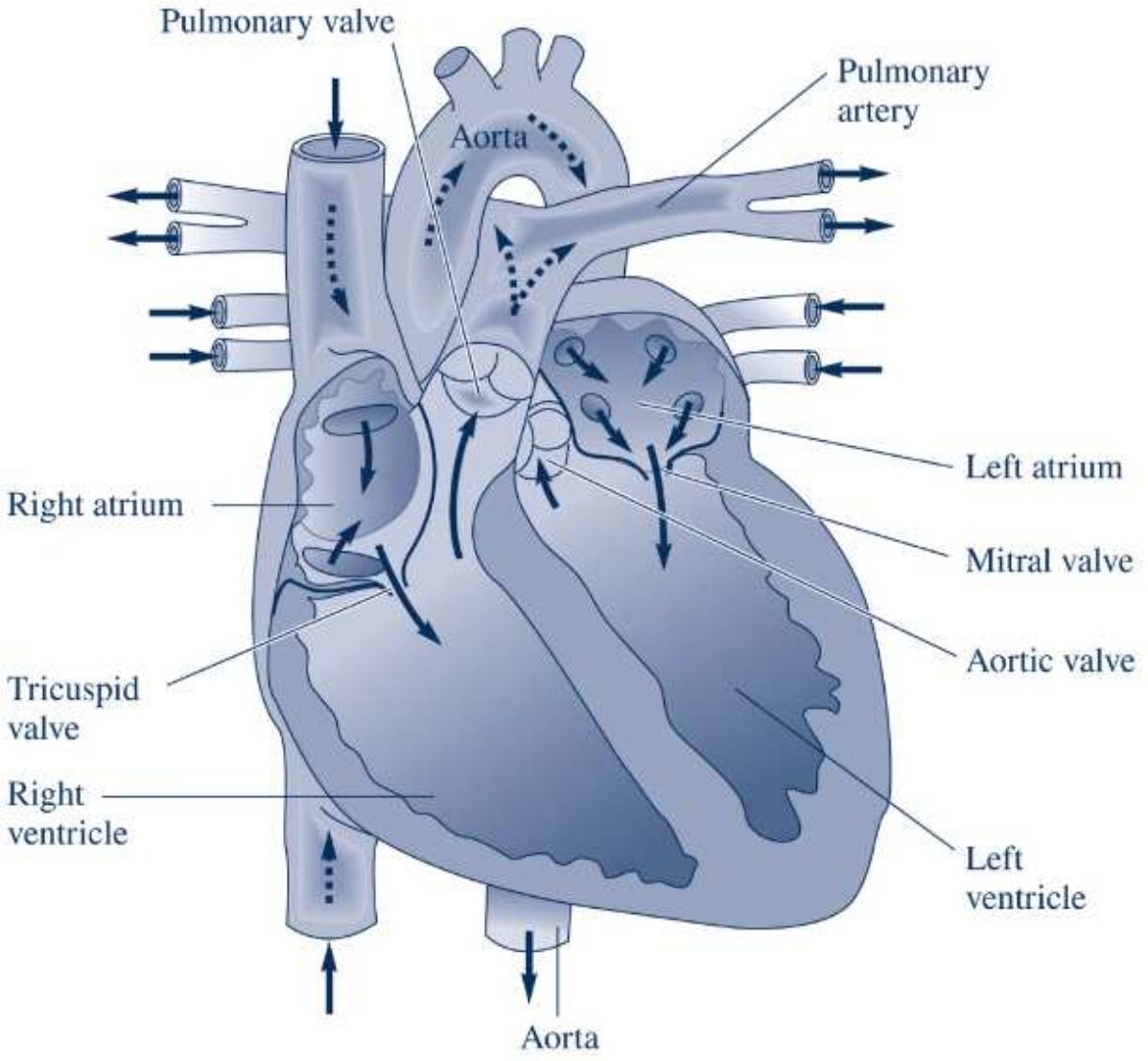
The Cardiovascular System

Overview:

- heart, blood vessels and blood
- transport system of the body
- arteries carry blood from heart to other organs and tissues
- veins return blood to the heart after the oxygen has been depleted

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FIGURE 2.4 *The Heart*



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The Cardiovascular System (cont.)

The Heart:

- functions as a pump
- left side takes in blood with oxygen from the lungs
- blood is pumped into the aorta and then passes into smaller vessels to reach cells
- oxygen and nutrients are exchanged for waste material

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The Cardiovascular System (cont.)

Disorders of the Cardiovascular System:

- Atherosclerosis:
  - plaque causes narrowing of the arteries
    - clinical manifestations:
      - Angina Pectoris: chest pain
      - Myocardial Infarction: heart attack
      - Ischemia: lack of blood flow
    - other disorders:
      - arteriosclerosis
      - aneurysms
      - phlebitis

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The Cardiovascular System (cont.):

Blood pressure:

- force that blood exerts against the blood vessel walls

Blood:

- adult body contains five liters of blood
- consists of plasma and cells manufactured in bone marrow

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Disorders related to white cell production

- Leukemia: disease of bone marrow

- Leukopenia: deficiency of white blood cells

- Leukocytosis: excessive white blood cells

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Disorders related to red cell production

- Anemia
  - aplastic anemia
  - sickle cell anemia

- Clotting disorders
  - hemophilia

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The Immune System

- Surveillance system of the body
- Impacts infection, allergies, cancer, and autoimmune diseases
- Primary function to distinguish between "self" and foreign

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The Immune System (cont.)

Infection:

- the invasion of microbes and their growth in the body
  - Four means of infection:
    - direct transmission
    - indirect transmission
    - biological transmission
    - mechanical transmission

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The Immune System (cont.)

The course of infection:

- incubation period
- period of nonspecific symptoms
- acute phase (disease is at its height):
  - fatality or a period of decline during which invading
    organisms are expelled

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The Immune System (cont.)

Immunity:

- body's resistance to injury from invading organisms
  - develops naturally or artificially
  - nonspecific immune mechanisms and specific immune mechanisms
  - phagocytosis is when certain white blood cells ingest microbes

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The Immune System (cont.)

Humoral immunity:

- mediated by B lymphocytes

Cell-mediated immunity:

- involving T lymphocytes

Lymphatic System's role in immunity:

- drainage system of the body
- spleen, tonsils, thymus gland are important organs

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The Immune System (cont.)

Disorders related to the Immune System:

- AIDS
- cancer
- infectious disorders:
  - splenomegaly, tonsillitis, mononucleosis, lymphoma
- autoimmunity

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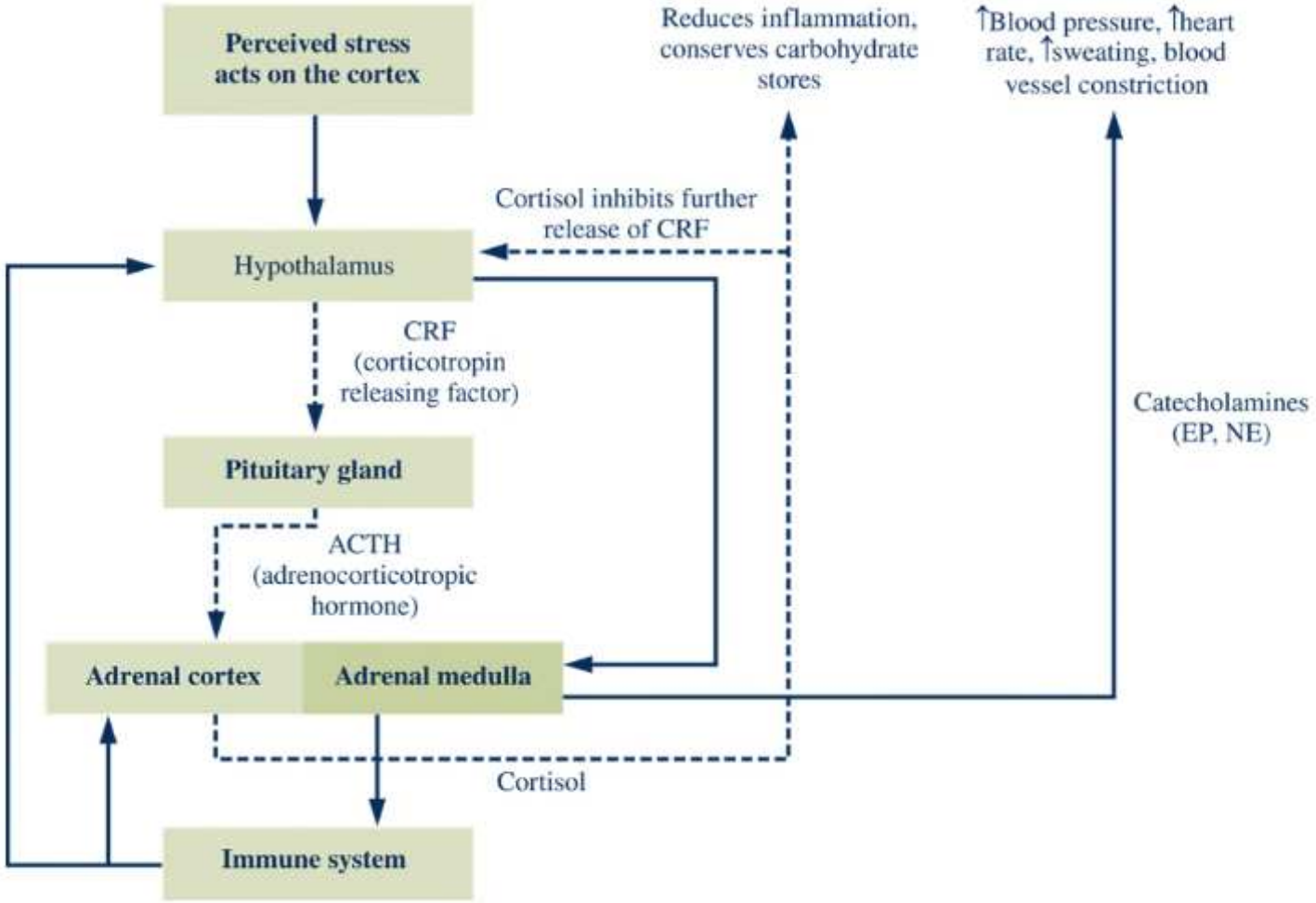
Physiological systems involved in the stress response

- Sympathetic Activation
- HPA Activation

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FIGURE 2.7 *The Body's Stress Systems*

Stressful events result in sympathetic activation (solid lines) and the release of catecholamines, and HPA activation (dashed lines) and the release of CRF.



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Summary

LO1 Describe the function of the nervous system

- NS and endocrine system control system of the body, mobilized in threat

LO2 Explain how the endocrine system operates

- operates chemically and controls growth, helps function of NS

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Summary (cont.)

LO3 Identify how the cardiovascular system works

- transport system of body, speeds up in stress, major cause of death

LO4 Describe the function of the immune system

- wards off infection by producing infection-fighting cells

LO5 Understand the physiological systems involved in the stress response

- stress response activates SAM and HPA

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