

Chapter 1

Physiology of Exercise in the United States—It's Past, It's Future

Objectives

1. Name the three Nobel Prize winners whose research work involved muscle or muscular exercise.
2. Describe the role of the Harvard Fatigue Laboratory in the history of exercise physiology in United States.
3. Describe factors influencing physical fitness in the United States over the past century.

European Heritage

- Three physiologists received the Nobel Prize for work related to muscle or muscular exercise

Harvard Fatigue Laboratory

- Focal point in the development of exercise physiology in the United States

Physical Fitness

- A popular topic today
-

Public Health Service

- In 1980, listed “physical fitness & exercise” as one of the 15 areas of concern related to improving the country’s overall health.

Civil War until the First World War

- Physical education primarily concerned w/ fitness
- Many physical education leaders were trained in medicine
- Dr. Dudley Sargent
 - Hired by Harvard in 1879
 - Set up physical training programs w/ individual exercise rxn's

World War I and World War II

- Large numbers of draftees failed the induction exams due to mental and physical defects
- Physical programs began to resemble pre-military training programs

1950's

- Autopsies of young soldiers of Korean War showed significant coronary artery disease has already developed
- Hans Kraus showed the American children performed poorly on a muscular fitness test compared to European
- President's Council on Youth Fitness (1955)
- AAHPERD Youth Fitness Test (1957)

John F. Kennedy

- "The Soft American" in *Sports Illustrated* (1960)

"For the physical vigor of our citizens is one of American's most precious resources. If we waste and neglect this resource, if we allow it to dwindle and grow soft, then we will destroy much of our ability to meet the great and vital challenges which confront our people. We will be unable to realize our full potential as a nation."

During Kennedy's Term

- Council's name changed to the "President's Council on Physical Fitness"
- Nixon administration changed it to the current name "President's Council on Physical Fitness and Sports"

1980

- AAHPERD published the *Health-Related Physical Fitness Test Manual*
 - Performance testing
 - Fitness testing

Epidemiological Studies

- On health status of the population underscored the fact that degenerative diseases relate to poor health habits.
 - High-fat diet, smoking, inactivity
- 1970s, an increased use of exercise tests to diagnose heart disease
- Large corporations developed “executive” fitness programs, which evolved into today’s “Corporate Fitness” programs

Undergraduate and Graduate Study

- Growth in the number of exercise physiology laboratories in the 1950s and 1960s

Translation of Exercise Science to the Consumer

- Demand for correct information and programs about physical activity and health

- The American College of Sports Medicine (ACSM)
 - Developed certification programs to establish a standard of knowledge and skill for practitioners

Chapter 2
Control of the Internal Environment

- Objectives**
1. Define the terms *homeostasis* and *steady state*.
 2. Diagram and discuss a biological control system.
 3. Give an example of a biological control system.
 4. Explain the term *negative feedback*.
 5. Define what is meant by the gain of a control system.

- Homeostasis: Dynamic Constancy**
- Homeostasis

 - Steady state

Δs in Body Core Temperature During Exercise

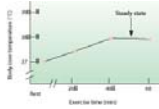


Figure 2.2

Δs in Mean Arterial Blood Pressure at Rest

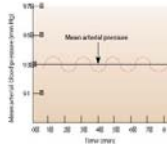


Figure 2.3

Non-Biological Control System

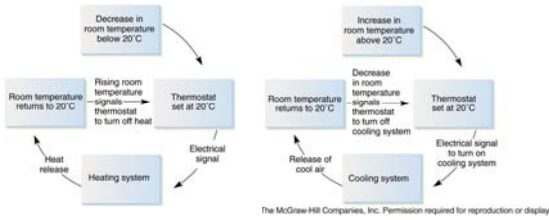


Figure 2.4

Biological Control System

- Series of interconnected components that maintain a physical or chemical parameter at a near constant value

Nature of Biological Control Systems

- Most control systems work via *negative feedback*
- Gain of a control system

Components of a Biological Control System

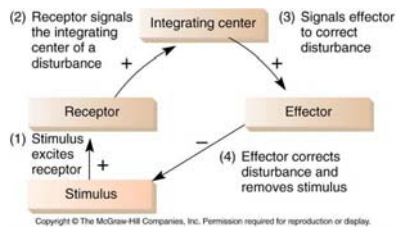


Figure 2.5

Examples of Homeostatic Control

- Regulation of arterial bld pressure
- Regulation of bld glucose
- Regulation of cellular homeostasis

Example of Homeostatic Control: Regulation of Blood Pressure

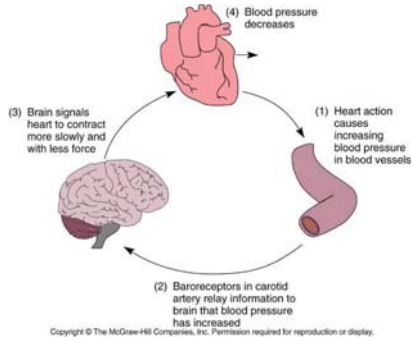


Figure 2.6

Example of Homeostatic Control: Regulation of Blood Glucose

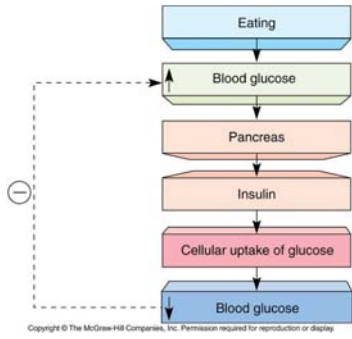


Figure 2.7

Example of Homeostatic Control: Cellular Stress Response

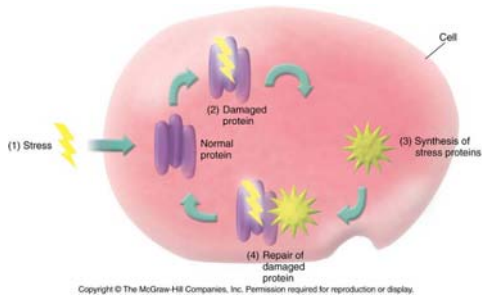


Figure 2.8

Exercise: A Test of Homeostatic Control
