

## BSCS Biology An Ecological Approach

### Chapter 16 The Human Animal: Maintenance of the Internal Environment

*"It is more important to know what sort of person has a disease than to know what sort of disease a person has."* -Hippocrates (460-377 B.C.)

#### Introduction

In order for the human body to survive, thrive, and reproduce, the internal environment must remain relatively constant. In other words, temperature, blood pressure, and related systems must be relatively stable. This is known as homeostasis.

#### The Circulatory System

This system consists of **arteries**, **veins**, **capillaries**, the **heart** and the **lymph** system. The circulatory system keeps liquids in the form of plasma and chemicals flowing through the body. **Red blood cells** transport oxygen while **white blood cells** attack bacterial invaders. **Platelets** and related chemicals assist in preventing blood loss through cuts and injuries. The lymph system helps in removing waste from the body's cells. **Clotting** is a complex series of events involving platelets and certain chemical combinations in the human blood system. **Lymph vessels** help move dissolved nutrients, white blood cells, and other fluids back into the circulatory system. They come together at **lymph nodes**.

#### The Immune System

This system protects the human body from foreign invaders and **pathogens**. **Nonspecific protection** is a general type of defense in which this system protects the body with such structures and systems as the **skin**, **mucous membrane**, and **inflammatory response**. **Specific protection** includes the production of **antibodies**. **Antigens** are substances the body recognizes as foreign and the body's **immune response** is a complex series of chemical and physical reactions to counteract the threats. White blood cells or **lymphocytes** engulf and break down pathogens. Other chemical reactions serve to neutralize these threats to the body. **Autoimmune** diseases cause the body's defenses to attack the body systems.

#### The Respiratory System

**Breathing** is the process of taking air into and out of the body through a series of tubes. **Respiration** is the exchange of oxygen and carbon dioxide from the air we breathe. Dissolved gases are distributed throughout the body in the bloodstream. **Cellular respiration**, which takes in the individual living cells, is the process of taking in and converting food molecules into energy. Smoking and air pollution can reduce the surface area of the lungs and produce such conditions as **emphysema** which causes shortness of breath and other respiratory ailments.

#### Excretion

The **kidneys** serve as the body's primary organs for excreting liquid waste. These wastes are produced by the metabolism of cells, enter the bloodstream, and are processed through the kidneys. Liquid urine leaves the kidneys through the **ureters**, is stored in the **bladder**, and eliminated.

#### Temperature Regulation

**Metabolism** is the total of all chemical reactions that take place in the body. Keeping a constant temperature is an important part of **homeostasis**. **Shivering** is one way in which the body can warm itself. Heat is a product of cellular respiration and the body must cool itself through processes such as sweating. The **brain** through the activity of the **hypothalamus** controls these internal regulatory functions.