WHAT IS PHYSIOLOGY...?

• Physiology is the combination of mechanical, physical, and biochemical functions of living organisms. Physiology has traditionally been divided between plant physiology and animal and all living things physiology.

• Physiology the study of how the body functions.

HISTORY...

• Human physiology dates back to at least 420 B.C.

• The critical thinking of Aristotle and his emphasis on the relationship between structure and function marked the beginning of physiology in Ancient Greece.

• In the 20th century, biologists also became interested in how organisms other than human beings function, eventually spawning the fields of comparative physiology and ecophysiology.

ERGONOMICS AND PHYSIOLOGY

There are three main divisions in Ergonomics:

• Physical Ergonomics
• Cognitive ergonomics
• Organizational Ergonomics

Physical ergonomics,
It is concerned with human anatomical, anthropometric, PHYSIOLOGICAL and biomechanical characteristics as they relate to physical activity.

BASIC HUMAN PHYSIOLOGY

• In human physiology, it is mainly focused on the specific characteristics and mechanisms of the human body that make it a living being.

• The very fact that they remain alive is almost beyond their control, for hunger makes them seek food and fear makes them seek refuge. Sensations of cold make them look for warmth. Other forces cause them to seek fellowship and to reproduce.

• Thus, the human being is actually an automaton, and the fact that they are sensing, feeling, and knowledgeable beings is part of this automatic sequence of life; these special attributes allow them to exist under widely varying conditions.

HOMEOSTASIS

• Homeostasis is a key word in modern physiology.

• Greek words - “homeo,” meaning the same, and “stasis,” meaning standing.

• What is homeostasis ....?

• More than a century ago, French physicist, Claude Bernard (1813-1878), made a remarkable observation. He noted that body cells survived in a healthy condition only when the temperature, pressure, and chemical composition of their environment remained relatively constant.
Cells as the Living Units of the Body

- The basic living unit of the body is the cell. Each organ is an aggregate of many different cells held together by intercellular supporting structures.
- Each type of cell is specially adapted to perform one or a few particular functions. For instance, the red blood cells, numbering 2.5 trillion in each human being, transport oxygen from the lungs to the tissues.
- Although the red cells are the most abundant of any single type of cell in the body, there are about 7.5 trillion additional cells of other types that perform functions different from those of the red cell. The entire body, then, contains about 100 trillion cells.

CELLULAR

- Cells are the basic structural and functional units of the human body & there are many different types of cells (e.g., muscle, nerve, blood, and so on)

BODY SYSTEMS

- SKELETAL
- MUSCULAR
- NEUROLOGICAL
- ENDOCRINE
- CARDIOVASCULAR
- RESPIRATORY
- DIGESTIVE

1. SKELETAL SYSTEM

The skeletal system provides four basic functions:

- **Support** for tissues and muscle
- **Protection** for vital organs
- **Movement** through bones and attached muscles
- **Storage** for minerals and immature blood cells

SUPPORT

- Bones and cartilage that make up the skeleton are the only rigid materials in the body.
- The 206 bones of the skeleton provide a framework and points of attachment for many of the soft tissues of the body.
- The five main classifications of bones are: Long (e.g. femur), Short (e.g. tarsal bones of the foot), Flat (e.g. frontal bone of the skull), Irregular (e.g. vertebrae) and Sesamoid (e.g. knee cap)

PROTECTION

- Protect some of the vital tissues and functional organs of the body.
- Typical examples are:
  - Skull - protects the brain
  -Vertebrae - protects the spinal cord
  -Thoracic cage - protects the heart and lungs
• MOVEMENT

• Bones act as levers during movement and provide solid structures to which muscles are attached.
• The joints allow movement between bones.
• Movements are directly related to the type of joint and range of motion.
• Types of joints:
  1. Fixed fibrous or Synarthroses (e.g. bones of the skull)
  2. Slightly moveable or Amphiarthroses (e.g. symphysis pubis)
  3. Freely movable or Diarthroses.

2. MUSCULAR SYSTEM

• Four main properties:
  1. Excitability (ability to respond to stimuli)
  2. Contractibility (ability to contract)
  3. Extensibility (ability of a muscle to be stretched without tearing)
  4. Elasticity (ability to return to its normal shape)

• Three important functions:
  1. Motion - walking, running etc.
  2. Heat production - maintain normal body temperature
  3. Maintenance of posture - standing, sitting etc.

3. DIGESTIVE SYSTEM

The functions of the digestive system are:

• Ingestion - eating food
• Digestion - breakdown of the food
• Absorption - extraction of nutrients from the food
• Defecation - removal of waste products

FUNCTIONS OF OTHER SYSTEMS

• NEUROLOGICAL SYSTEM

All of our body systems work in conjunction with each other and none are capable of working in isolation.

The nervous system controls and coordinates the functioning of all other systems in response to our surroundings.
ENDOCRINE SYSTEM
The endocrine system affects bodily activities by releasing chemical messages, called hormones, into the bloodstream from exocrine and endocrine glands. The function of hormones is to:
- Control the internal environment
- Respond to environmental changes
- Help regulate organic metabolism and energy balance
- Contribute to the management of growth and development

CARDIOVASCULAR SYSTEM
- The cardiovascular system comprises of the heart, blood, blood vessels and lymphatic system.

RESPIRATORY SYSTEM
- The function of the respiratory system is to facilitate gaseous exchange to take place in the lungs and tissue cells of the body.

Exercise Physiology

• EXERCISE........ WE ALL NEED
• PHYSIOLOGY AND EXERCISE

What is exercise physiology?
- Exercise physiology is how exercise alters the structure and function of the human body. It requires diverse knowledge and considerable physiologic responses to exercise.
- Exercise physiology include human energy transfer, human energy expenditure, evaluation of energy-generating capacities, the nervous system, pulmonary system, the cardiovascular system, endocrine system and the interaction of these, plus training methods, environmental effects on physiology, and ergogenic acids.

Measurement of Exercise Physiology
- Examine patients’ medical histories
- Test and measure the patients strength, range of motion, balance and coordination, muscle performance and motor function
- Determine patients’ ability to be independent and reintegrate into the community or workplace after injury or illness
- Develop treatment plans describing a treatment strategy, its purpose and its anticipated outcome