38.1A: Functions of the Musculoskeletal System

The musculoskeletal system provides form, support, stability, and movement to the body.

Learning Objectives

• Summarize the structure and role of the musculoskeletal system

Key Points

• The skeleton, muscles, cartilage, tendons, ligaments, joints, and other connective tissues are all part of the musculoskeletal system, which work together to provide the body with support, protection, and movement.

• The bones of the skeletal system protect the body’s internal organs, support the weight of the body, and serve as the main storage system for calcium and phosphorus.

• The muscles of the muscular system keep bones in place; they assist with movement by contracting and pulling on the bones.

• To allow motion, different bones are connected by joints which are connected to other bones and muscle fibers via connective tissues such as tendons and ligaments.

• Cartilage prevents the bone ends from rubbing directly on each other.

• Malnutrition and arthritis are examples of disorders and diseases in the body that can severely impair the function of the musculoskeletal system.

Key Terms

• prosthesis: an artificial replacement for a body part, either internal or external
• arthritis: inflammation of a joint or joints causing pain and/or disability, swelling, and stiffness due to various causes, such as infection, trauma, degenerative changes, or metabolic disorders
• musculoskeletal system: an organ system made up of the muscular and skeletal systems; the system provides form, support, stability, and movement to the body

The Musculoskeletal System

The musculoskeletal system provides support to the body and gives humans (and many animal species) the ability to move. The body’s bones (the skeletal system), muscles (muscular system), cartilage, tendons, ligaments, joints, and other connective tissue that supports and binds tissues and organs together comprise the musculoskeletal system.

Most importantly, the system provides form, support, stability, and movement to the body. For example, the bones of the skeletal system protect the body’s internal organs and support the weight of the body. The skeletal portion of the system serves as the main storage depot for calcium and phosphorus. It also contains critical components of the hematopoietic system (blood cell production). The muscles of the muscular system keep bones in place; they also play a role in movement of the bones by contracting and pulling on the bones, allowing for movements as diverse as standing, walking, running, and grasping items. To allow motion, different bones are connected by joints. Within these joints, bones are connected to other bones and muscle fibers via connective tissue such as tendons and ligaments. Cartilage prevents the bone ends from rubbing directly on each other. Muscles contract (bunch up) to move the bone attached at the joint.

Figure 1: Joints, tendons, and ligaments: To allow motion, different bones are connected by joints. Within these joints, bones are connected to other bones and muscle fibers via connective tissue such as tendons and ligaments.
Figure 1: Human muscular system: The muscles of the muscular system keep bones in place while assisting with movement by contracting and pulling on the bones.

Unfortunately, diseases and disorders that may adversely affect the function and overall effectiveness of the system
exist and can be detrimental to the body. These potentially debilitating diseases can be difficult to diagnose due to the close relation of the musculoskeletal system to other internal systems. In humans, the most common musculoskeletal diseases worldwide are caused by malnutrition. Ailments that affect the joints, such as arthritis, are also widespread. These can make movement difficult; in advanced cases, they completely impair mobility. In severe cases in which the joint has suffered extensive damage, joint replacement surgery may be needed.

Figure \(\PageIndex{1}\): Human skeletal system: The bones of the skeletal system protect the body's internal organs, support the weight of the body, and serve as the main storage system for calcium and phosphorus.

Progress in the science of prosthesis design has resulted in the development of artificial joints, with joint replacement surgery in the hips and knees being the most common. Replacement joints for shoulders, elbows, and fingers are also
available. Even with this progress, there is still room for improvement in the design of prostheses. The state-of-the-art prostheses have limited durability, wearing out quickly, particularly in young or active individuals. Current research is focused on the use of new materials, such as carbon fiber, that may make prostheses more durable.

Figure 1: Prostheses: Improvements in the design of prostheses, artificial replacements for body parts such as joints, elbows, legs, and fingers, have allowed for a wider range of activities in impaired recipients.