

VISWASS SCHOOL & COLLEGE OF NURSING

GNM 1ST YEAR

ANATOMY AND PHYSIOLOGY

UNIT-14

THE MUSCULAR SYSTEM

LONG QUESTION AND ANSWER

PREPARE BY: MS. AMRITA SINGH,
DEPARTMENT OF NURSING, VISWASS

1) Write down the factors affecting skeletal muscle performance.(5)

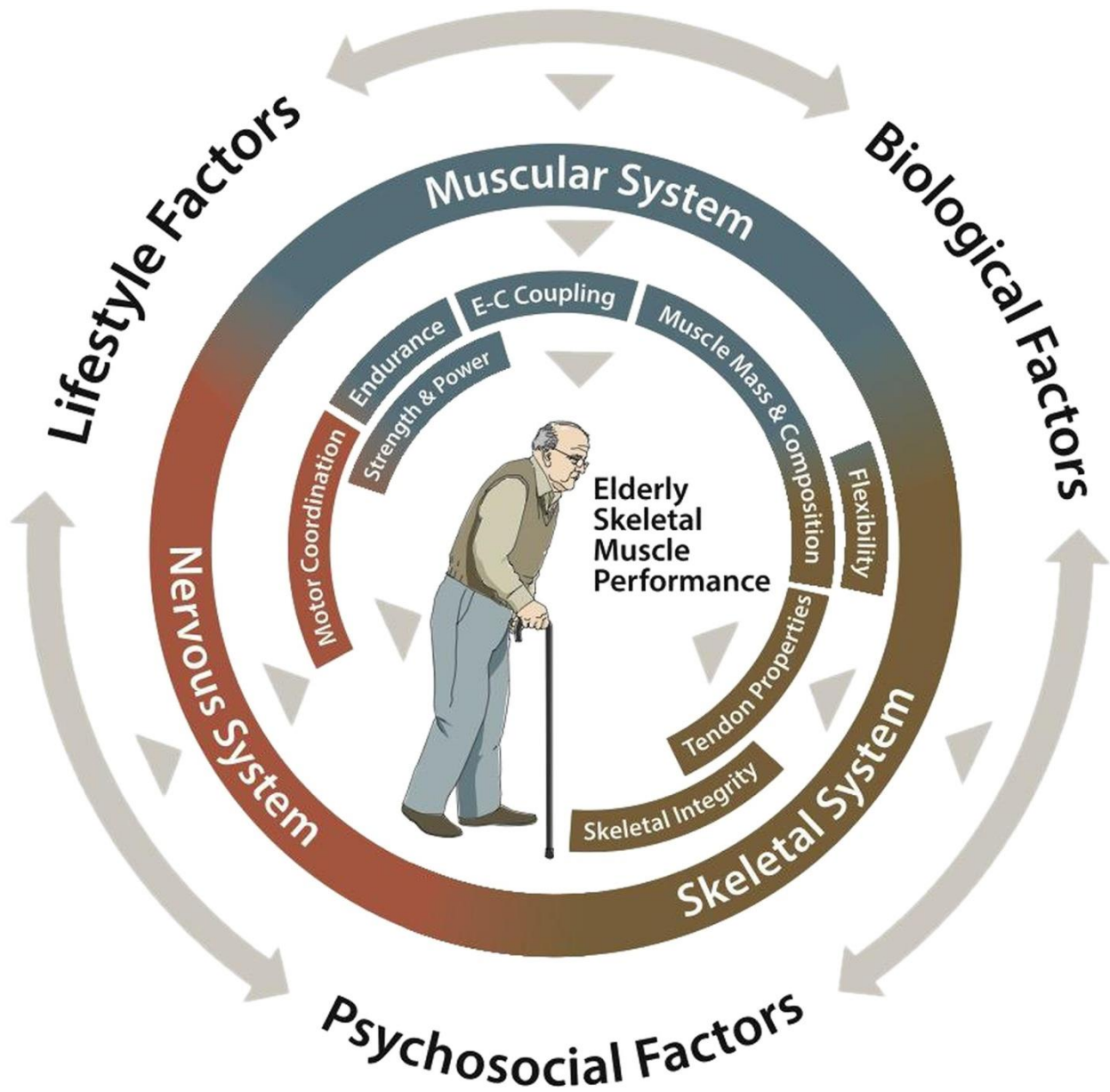
Factors affecting skeletal muscle performance:

- elderly skeletal muscle performance is regulated by factors associated with the nervous, muscular, and skeletal systems.
- The relative contribution of each of these factors on determining 'muscle performance' depends on the type of performance task being considered.
- Broadly speaking, degeneration of the anatomical and/or physiological processes governing these systems will result in impairments in muscle performance. These systems are all influenced by lifestyle, biological, and psychosocial factors.
- For example, the levels of physical activity and nutritional intake are important lifestyle factors, and genetics, hormones, and low-grade inflammation are examples of biological factors.
- Psychosocial factors, such as fear of falling, psychological resiliency, self-efficacy, and loneliness, are also direct and indirect determinants of elderly skeletal muscle performance.

Role of the muscular system

- ❖ skeletal muscle form and function
 - The body consists of more than 500 skeletal muscles which are controlled by the nervous system and which connects and supports the skeletal system.

- Skeletal muscles consist of muscle fibres, each containing sarcomeres, which are the smallest repeating functional units in the muscle.
- Via a series of complex events, sarcomeres are responsible for muscle contraction and relaxation.
- This allows the body to perform a wide variety of different movements, ranging from fast and powerful movements to small and fine motions.
- Since skeletal muscles are responsible for all the voluntary movements, logically, skeletal muscles are essential for optimal physical performance.
- Physiological changes, such as a loss of motor units, changes in fibre type, muscle fibre atrophy, and reduced neuromuscular activation, could affect the velocity, force, and strength of movements, leading to reduced physical performance, potentially leading to functional disability and institutionalization.
- Not only are skeletal muscles important for physical performance, they are also an important contributing factor in maintaining optimal health throughout life.
- As such, skeletal muscles are involved in different metabolic pathways.
- Since muscles are the primary site for the insulin-stimulated glucose uptake from the blood, the muscles are crucial in maintaining glucose homeostasis.



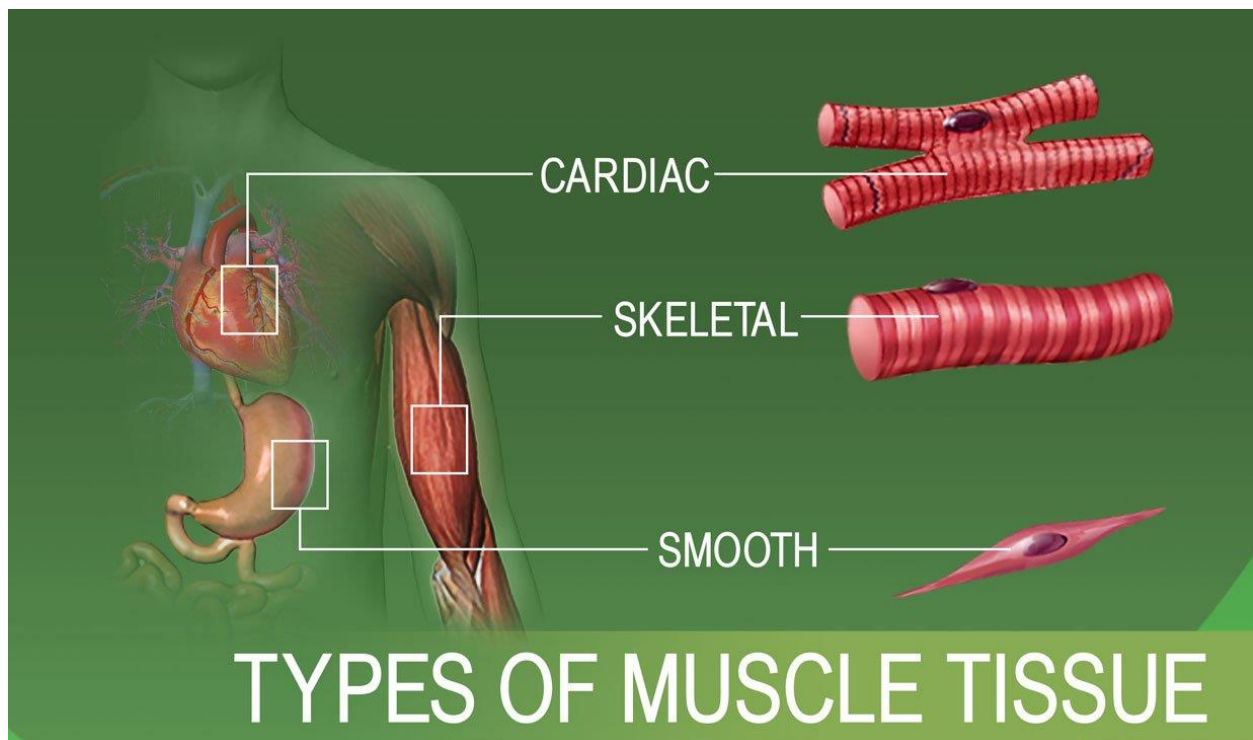
- ❖ Age-related changes in muscle size and fibre types
- Skeletal muscle atrophy undoubtedly occurs with advancing age.
- However, during periods of physical inactivity, skeletal muscle atrophy is substantially accelerated.
- For instance, data from immobilization and bed rest studies show a substantial 1 kg loss of muscle mass in 10 days. This substantial loss of skeletal muscle mass is accompanied by a major decline in strength that ranges between 0.3% and 4.2% per day.

- As a consequence, multiple episodes of prolonged muscle disuse atrophy accelerate the degradation of muscle performance and physical performance.

2) Explain about types of muscles.(5)

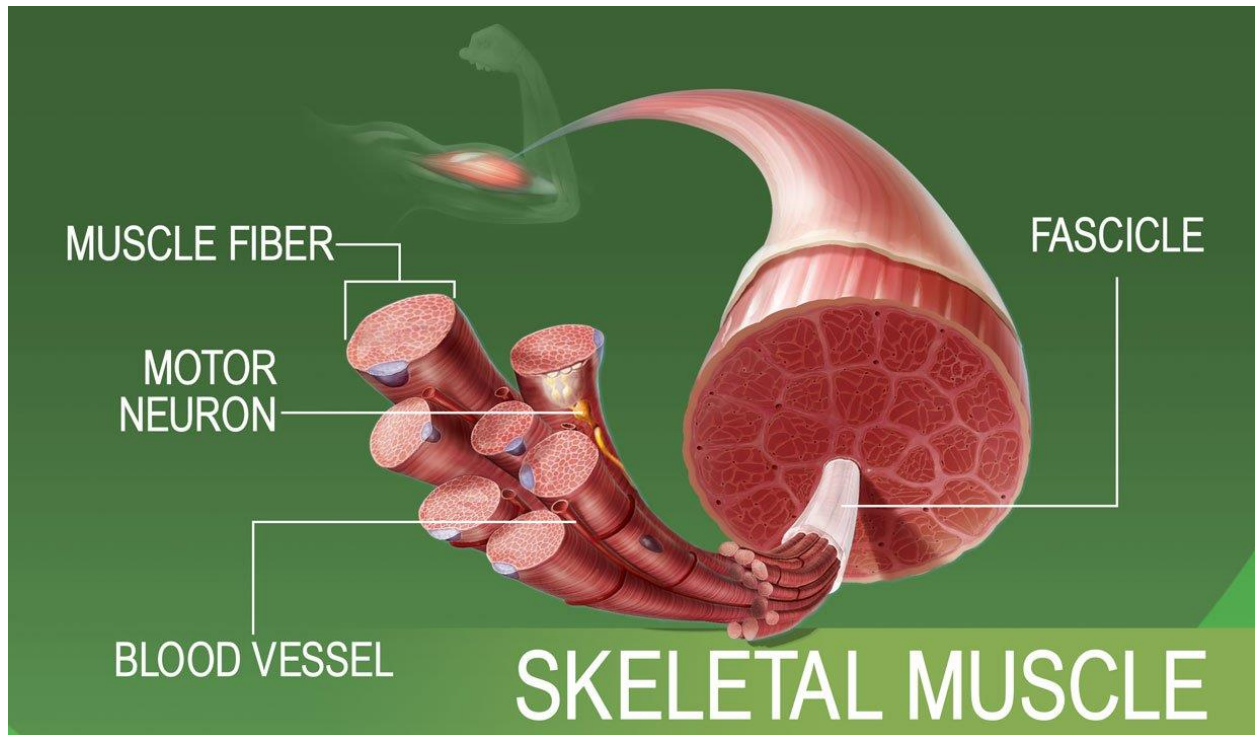
a) Muscles:

- About half of your body's weight is muscle.
- In the muscular system, muscle tissue is categorized into three distinct types: skeletal, cardiac, and smooth.
- Each type of muscle tissue in the human body has a unique structure and a specific role.
- Skeletal muscle moves bones and other structures.
- Cardiac muscle contracts the heart to pump blood.
- The smooth muscle tissue that forms organs like the stomach and bladder changes shape to facilitate bodily functions.



Skeletal muscle:

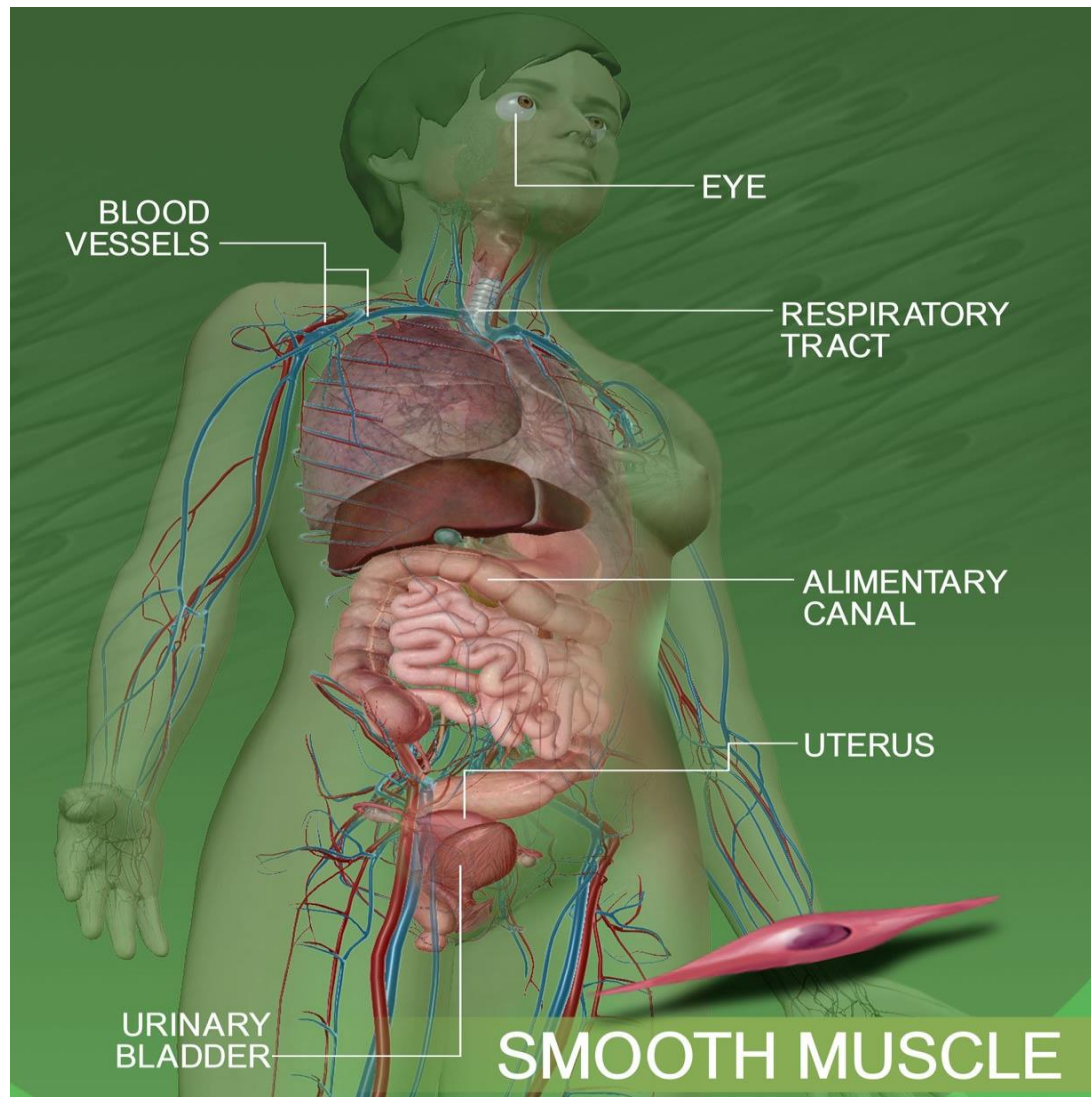
- Skeletal muscles attach to and move bones by contracting and relaxing in response to voluntary messages from the nervous system.
- Skeletal muscle tissue is composed of long cells called muscle fibers that have a striated appearance.
- Muscle fibers are organized into bundles supplied by blood vessels and innervated by motor neurons.



Smooth muscles:

- Smooth muscle is found in the walls of hollow organs throughout the body.
- Smooth muscle contractions are involuntary movements triggered by impulses that travel through the autonomic nervous system to the smooth muscle tissue.
- The arrangement of cells within smooth muscle tissue allows for contraction and relaxation with great elasticity.
- The smooth muscle in the walls of organs like the urinary bladder and the uterus allow those organs to expand and relax as needed.

- The smooth muscle of the alimentary canal (the digestive tract) facilitates the peristaltic waves that move swallowed food and nutrients.
- In the eye smooth muscle changes the shape of the lens to bring objects into focus.
- Artery walls include smooth muscle that relaxes and contracts to move blood through the body.



Cardiac muscles:

- The heart wall is composed of three layers.
- The middle layer, the myocardium, is responsible for the heart's pumping action.

- Cardiac muscle, found only in the myocardium, contracts in response to signals from the cardiac conduction system to make the heart beat.
- Cardiac muscle is made from cells called cardiocytes.
- Like skeletal muscle cells cardiocytes have a striated appearance, but their overall structure is shorter and thicker.
- Cardiocytes are branched, allowing them to connect with several other cardiocytes, forming a network that facilitates coordinated contraction.

