Muscle as an Organ

One of the most dynamic and plastic tissues of the human body:

- Regulate body temperature.
- Manage energy consumption.
- A reservoir of amino acids needed by other tissues like skin, brain, and heart for the synthesis of organ-specific proteins.

Muscles Act as Endocrine Organs

The endocrine function of muscles may help regulate inflammation, fat metabolism, and brain health.

- Muscles secrete myokines that act like hormones to communicate with other organs:

  * Myokine interleukin-6 (IL-6) reduces chronic inflammation that contributes to joint pain & stiffness and decreases the risk of heart disease and certain cancers. IL-6 also enhances fat breakdown and improves insulin sensitivity to prevent diabetes.
  * Myokine irisin converts less active white fat into calorie-burning brown fat to facilitate fat loss and reduce the risk of obesity-related illnesses. It also helps produce brain-derived neurotrophic factor (BDNF) to support brain health and protect against neurodegenerative diseases (e.g., Alzheimer's).

Muscles Regulate Blood Sugar Levels

Muscles use glucose as energy during physical activity and thus lower blood sugar levels and boost insulin efficiency.

- During both aerobic and resistance training muscle stimulates glucose uptake without the need for insulin:

  * Muscle absorbs more than 80 percent of glucose after meals using GLUT4 transporters that move into the muscle cell surface during exercise.
  * More muscle mass means more GLUT4 transporters which leads to better glucose management during and post-exercise.

Muscles Improve Cardiovascular Health

Strength training increases O2 demand thus prompting the heart to pump more vigorously and increasing cardiac output to ensure efficient distribution of O2 and nutrients throughout the body.

- ST significantly reduces arterial stiffness which is a common risk factor for heart disease.

- ST can also lower blood pressure and improve lipid profiles.

- Study - Adults ages 45+ with greater muscle mass had an 81% lower risk of C.V. events compared to with less muscle mass.

- More muscle mass also elevates resting metabolic rate to aid in weight management and reduce the strain on the heart.

Muscles Help Move Blood and Lymph

Muscles act as auxiliary pumps that support the heart by moving fluids throughout the body.

- The heart alone can't return blood from the legs due to gravity and skeletal muscle contractions during exercise pushes blood upward by squeezing the veins and forcing blood toward the heart.

- The lymphatic system relies entirely on muscle contraction to transport lymph fluid essential for immune function by carrying W.B.C. throughout the body & removing toxins and waste.

Muscles Boost Immune Function

Muscle has immune regulatory properties via the release of the myokines like IL-6 that boosts the body's defenses against infections.

- With exercise skeletal muscle and T cells interact and keep each other young.

- During exercise muscles produce the AA glutamine that is a vital energy source for immune cells to enhance their ability to fight infections.

- ST also reduces the risk of all-cause mortality, cardiovascular diseases, cancer, diabetes, and lung cancer by 10 percent to 17 percent.

Muscles Strengthen the Brain

During exercise muscles secrete specific myokines that play critical roles in brain health and cognitive function.

- Myokines like BDNF and irisin are needed for muscle repair, neural health, and cognitive functions.

- ST can help decrease cognitive decline due to the secretion of Cathepsin B during muscle contractions. Cathepsin B has been linked to better memory and faster information processing in the brain.

- Memory deficits are more directly associated with less muscle mass as we age.