

Series - Muscle: The Organ that Powers Vitality

In this series, discover how skeletal muscle, the body's largest organ, impacts health and longevity. From regulating hormones and blood sugar to boosting brain health, muscles are far more than just a source of strength.

By [Sheramy Tsai](#) (Epoch Health / The Epoch Times) July 17, 2024 Updated: July 27, 2024

Part 1

Muscle: The Unexpected Feats of Your Body's Largest Organ

Beyond major contributors to movement, our muscles play a systemic role in the function of metabolism, immune support, and mental health.

In this series, discover how skeletal muscle, the body's largest organ, impacts health and longevity. From regulating hormones and blood sugar to boosting brain health, muscles are far more than just a source of strength.

We often see muscles as the source of our strength and physical appearance but regard organs as more essential, responsible for functions such as circulating blood and digesting food.

However, muscles do far more than move the body. They regulate metabolism, support the immune system, and influence mental health. In fact, muscles should be considered organs in their own right, Dr. Sandeep Palakodeti, chief medical officer of Rebel Health Alliance, told The Epoch Times in an interview.

“By classifying muscles as organs, we start to appreciate all the roles they play, not just in movement but in regulating our body's health at a systemic level,” he said.

This broader view of muscles as organs can reshape our understanding of their vital contributions to health and well-being.

Muscle as an Organ

For years, the skin has been widely accepted as the body's largest organ. Recent research challenges this idea, suggesting a new contender for the title.

Dr. Bente Pedersen, professor of integrative medicine at Copenhagen University Hospital, asserts that “skeletal muscle is the largest organ in the body.”

Biology professor Walter Jahn told The Epoch Times in an email that an organ is defined as “the collaboration of multiple tissues performing a common function.” This definition leads us to reconsider the role of muscles beyond their conventional understanding.

“Muscle is one of the most dynamic and plastic tissues of the human body,” Dr. Walter Frontera, a muscle physiology expert, told The Epoch Times in an email. According to Dr. Frontera, muscles regulate body temperature, manage energy consumption, and perform other vital functions.

Muscle Mass — The Key to Longevity

“Of particular interest is the role of skeletal muscle as a reservoir of amino acids needed by other tissues such as skin, brain, and heart for the synthesis of organ-specific proteins,” he said.

Mounting evidence suggests that muscles have more roles than previously assumed.

“It is, perhaps, the most important organ system for combating our current health crisis, regaining exceptional health, and maximizing physical performance,” Dr. Gabrielle Lyon, a board-certified doctor specializing in muscle-centric medicine, said in a post on social media platform X.

Muscles Act as Endocrine Organs

“Traditional teaching doesn’t classify muscles as organs,” Dr. Palakodeti said. “However, this perspective is changing.”

His assertion is supported by research reported in the Journal of Pharmacological Studies, stating, “We conclusively show that skeletal muscle is one of the endocrine organs.”

Endocrine organs, such as the thyroid and pituitary gland, release hormones directly into the bloodstream. These hormones regulate everything from growth and reproduction to mood and immune responses—functions essential for overall health.

Dr. Palakodeti suggests that muscles might function similarly to traditional endocrine organs such as the pituitary gland. In response to bodily signals, muscles produce chemicals that enter the bloodstream and target specific organs, influencing physiological responses.

“Muscles secrete myokines, which act like hormones to communicate with other organs,” he said. “Research shows that this endocrine function of muscles may help regulate inflammation, fat metabolism, and brain health.”

One of the most [abundant myokines](#), interleukin-6 (IL-6), reduces chronic inflammation—a contributor to joint pain and stiffness—and decreases risks associated with heart disease and certain cancers. It enhances fat breakdown and improves insulin sensitivity, helping prevent conditions such as diabetes.

Another myokine, irisin, converts less active white fat into calorie-burning brown fat, leading to better weight control and reduced risk of obesity-related illnesses. Irisin also fosters the production of brain-derived neurotrophic factor (BDNF), supporting brain health and potentially protecting against diseases such as Alzheimer’s.

These myokines illustrate how skeletal muscles—much like more traditionally recognized endocrine organs—play a multifaceted role in maintaining and enhancing health.

Muscles Regulate Blood Sugar Levels

Maintaining steady blood sugar levels is crucial for preserving energy and preventing the fatigue and irritability linked to blood sugar spikes. Research [published in Cells](#) in 2022 shows that consistent glucose control can significantly reduce the risk of Type 2 diabetes and cardiovascular disease.

While the pancreas is usually credited with regulating blood sugar, muscles also play a key role. During physical activity, they use glucose as their primary energy source, lowering blood sugar levels and boosting insulin efficiency.

“Muscle contraction during both aerobic and resistance training stimulates the uptake of glucose without any need for insulin’s assistance,” Dr. Lyon writes in her book “Forever Strong: A New, Science-Based Strategy for Aging Well.”

A [2020 study](#) in *Comprehensive Physiology* indicates that skeletal muscle absorbs more than 80 percent of glucose after meals, using GLUT4 transporters that move to the muscle cell surface during exercise.

“Exercise in humans increases muscle glucose uptake up to 100-fold compared with rest,” Erik Richter, professor at the University of Copenhagen, wrote in an email to *The Epoch Times*.

This increase in glucose uptake enhances insulin sensitivity and helps control blood sugar levels. More muscle mass means more GLUT4 transporters, leading to better glucose management during and after exercise.

“We call muscle a glucose sink,” Dr. Palakodeti said. Muscle cells store extra glucose as glycogen, providing a backup energy supply for high-demand situations such as intense exercise or stress. Accessing these reserves helps meet energy demands without disrupting blood sugar levels.

Muscles Improve Cardiovascular Health

We often rely on cardiovascular exercise to improve heart health, but muscle training may be just as important. Weight training increases oxygen demand, prompting the heart to pump more vigorously. This boost in cardiac output improves blood flow, ensuring the efficient distribution of oxygen and nutrients throughout the body.

The benefits of skeletal muscle activity on the cardiovascular system extend beyond improved blood circulation. A [2020 study](#) published in *Sports Science and Medicine* found that regular resistance training significantly reduces arterial stiffness, a common risk factor for heart disease. Maintaining or increasing muscle mass can also lower blood pressure and improve lipid profiles.

Recent research has strengthened the link between muscle mass and cardiovascular health. A [study](#) published in the *Journal of Epidemiology and Community Health* found that adults ages 45 and older with higher muscle mass had an 81 percent lower risk of cardiovascular events than those with the lowest.

You don't have to actively use muscles to reap these benefits. A [2020 study](#) published in the *Journal of Gerontology* indicates that muscles remain metabolically active even at rest, continuously burning calories. This means that higher muscle mass correlates with an elevated resting metabolic rate, which aids in weight management and reduces strain on the heart.

Muscles Help Move Blood and Lymph

“Muscles are the external pumps to our body’s fluid systems, both cardiovascular and lymphatic. The heart gets all the glory, but the muscles do a lot of the work,” Beret Loncar, chief executive officer of Body Mechanics Orthopedic Massage, told the Epoch Times in an email.

Muscles act as auxiliary pumps that support the heart by moving fluids throughout the body. Working against gravity, the heart alone can’t return blood from the legs. Skeletal muscle contractions during movement help push blood upward by squeezing the veins and forcing blood toward the heart, enhancing overall circulation with each contraction.

Unlike the circulatory system, which benefits from the heart’s pumping action, the lymphatic system relies entirely on muscle movements to transport lymph fluid. This fluid is essential for immune function, carrying white blood cells throughout the body and removing toxins and waste. A 2023 [Frontiers in Cardiovascular Medicine study](#) states that “large muscle exercises enhance lymph fluid flow and drain across the whole body.”

Ms. Loncar calls muscles “unsung heroes” for their dual role in supporting blood and lymph circulation. These processes are vital for delivering nutrients to cells and removing waste products, fundamental to maintaining healthy immune and bodily functions.

Muscles Boost Immune Function

While many rely on vitamin C, echinacea, and other supplements to bolster the immune system, the key to enhancing immunity might be within our muscles. A [2019 study](#) published in eBioMedicine asserts that “muscle is increasingly recognized as an organ with immune regulatory properties,” releasing myokines like IL-6, crucial for boosting the body’s defenses against infections.

[According to research](#) published in Brain, Behavior, and Immunity, it’s a two-way street between muscles and the immune system. Regular physical activity keeps immune cells young and muscles strong, even as we age.

“Through exercise, skeletal muscle and T cells interact and keep each other young,” the authors wrote.

[A 2020 study](#) published in *Frontiers in Physiology* further supports the role of muscle in immune regulation, noting that during exercise, muscles produce glutamine. This amino acid is a vital energy source for immune cells, enhancing their ability to fight infections.

Regular physical activity has been linked to a reduction in chronic disease. [A 2022 study](#) published in the *British Journal of Sports Medicine* reveals that muscle-strengthening activities reduce the risk of all-cause mortality, cardiovascular diseases, cancer, diabetes, and lung cancer by 10 percent to 17 percent.

Muscles Strengthen the Brain

When we hit the gym, it's not just our muscles that get a workout—our brains do, too. During exercise, muscles secrete specific myokines that play critical roles in brain health and cognitive function.

[A 2023 study](#) published in the *Journal of Orthopedic Translation* shows skeletal muscles' impact on the brain. This research reveals that myokines, such as BDNF and irisin, are crucial for muscle repair, neural health, and cognitive functions. For instance, BDNF is essential for the growth and survival of brain cells, bolstering memory and learning.

[Additional research](#) highlights the role of muscle strength and exercise in staving off cognitive decline, particularly emphasizing the secretion of Cathepsin B during muscle contractions. Cathepsin B has been linked to improved memory and faster information processing in the brain.

“Society has trained us to believe that age-related memory problems are a given. I argue, however, that memory deficits are more directly associated with low skeletal muscle than with age,” Dr. Lyon writes in her book “Forever Strong.”

Muscles: The Hidden Powerhouse

Imagine unlocking a secret powerhouse within your body—one that not only fuels your every move but also holds the key to better health and longevity.

The next time you think about fitness, remember that every step, lift, or stretch taps into this remarkable system. What other secrets could your muscles be hiding? The journey to discovering their full potential has only just begun.

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