How Does Muscle Help Prevent or Manage Disease?

By

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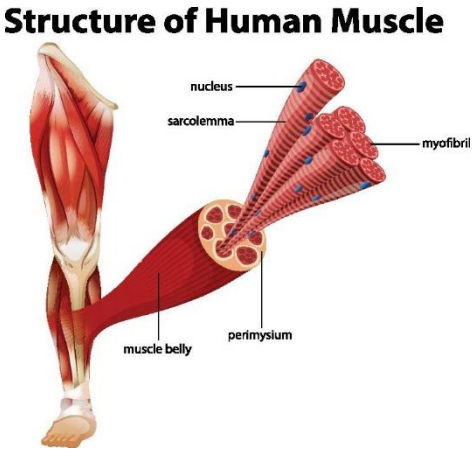
The majority of people understand the importance of muscle to perform physical tasks such as walking, driving, working and even more importantly chewing, swallowing and breathing. While these are important everyday tasks, muscle plays a critical role in injury and disease prevention/management. The purpose of this message is to detail how muscle plays such a critical role.

Background

Skeletal muscle makes up about 40% of a person's body weight for non-obese individuals. Muscle is the largest organ in the body. Muscle is primarily composed of two constituents – 75% water and 20% protein along with a few minor other constituents. Muscle is considered an endocrine organ and contributes to hormonal regulation of many other organs such as the heart, kidneys, brain, liver, immune system and others. The protein in muscle breaks down and rebuilds every day. Muscle contains the largest reservoir of amino acids in the body. These are critical to the function of many essential organs in the body as long as the muscle mass is adequate.



As we age, the body loses muscle. This muscle loss is known as sarcopenia. The loss of muscle greatly reduces the reservoir of amino acids limiting the body's ability to combat illnesses, infections and wasting (muscle loss). Further, it takes away from the healthy function of other organs; thus, increasing their risk of disease – cardiovascular, dementia, certain cancers, hypertension, Type II diabetes, liver, kidney to name some.

How Does A Healthy Muscle Mass Help to Prevent Type II Diabetes?

Muscle is an important blood sugar (glucose) regulator. Insulin in the blood aids in the uptake of sugar from the blood into the muscle. As muscle is lost due to physical inactivity, aging or disease, less sugar is taken up into the muscle. This happens because the muscle becomes resistant to insulin resulting in more sugar accumulating in the blood increasing the risk for Type II diabetes. Maintaining a healthy muscle mass, especially as one ages, prevents insulin resistance and allows for sugar to enter into the muscle helping to regulate and normalize blood sugar levels. Even those with Type II diabetes can better manage their blood sugar with a healthier and stronger muscle mass.

Chronic Inflammation

Chronic conditions such as heart disease, pulmonary disease, immunodeficiency diseases, kidney disease and some traumas such as injury and burns results in an increased inflammation in the body.

Inflammation contributes to muscle atrophy (shrinkage) and a decrease in protein build-up with an increase in protein break down. This means the muscle's role in disease prevention and disease management is greatly impaired. Maintaining a healthy muscle mass helps to off-set the impact of inflammation.

What is frailty?

This condition can lead to death. Aging and illness leads to muscle atrophy/sarcopenia, breakdown and muscle loss. A reduced muscle mass leads to the depletion of the amino acid reservoir in muscle which means the body is less likely to combat infection, illness and muscle wasting. This places the elderly individual into a clinical condition called frailty. As aging continues, the frail individual is at great risk for death, disability, falls, fractures and delayed recovery from illness, surgery and wounds.

Summary

I only touched on a few important functions and components that muscle plays in maintaining health. No matter what your age, maintaining a healthy muscle mass is essential to your health, well-being and safety. Many resistance training studies have been completed on 80 and 90 year old individuals that demonstrate it is never too late to increase your strength.

Sarcopenia can be delayed dramatically by maintaining a healthy muscle mass throughout your lifespan. If you do nothing to maintain a strong muscle mass, you will lose about 35-40% of your muscle and even more strength by the time you are 65-70 years old. By maintaining a strong muscle mass throughout your lifespan, the loss will be more in line with 10-15% allowing you to reap the benefits of a healthy muscle on disease prevention and management as well as injury prevention.

References:

Argiles, JM, et. al. Skeletal Muscle Regulates Metabolism via Interorgan Crosstalk: Roles in Health and Disease. JAMDA: 17 (2016), 789-796.

Mrowka, R. and Westphal, A. Skeletal Muscle in the Fight Against Chronic Disease. Acta Physiologica: 223 (2018), e13086

Wolfe, RR. The Unappreciated Role of Muscle in Health and Disease. Am. J. Clin Nutr: 84 (2006), 475-482.