

Muscles Matter: Uncovering the Role of Muscles in Health and Disease

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Muscles are not only crucial in maintaining posture, breathing, movement, and activities of daily living, but also play an integral role in energy and protein metabolism in the body. Muscles are fundamentally important for health and altered muscle metabolism can lead to the development of conditions such as sarcopenia, a “syndrome characterised by progressive and generalised loss of skeletal muscle mass and strength”¹ that is associated with a significantly higher risk of mortality and morbidity.^{2,3}

Muscle protein serves as a major reservoir for amino acids, especially during fasting or periods of nutritional scarcity where muscle protein breakdown ensures the supply of amino acids for vital processes such as gluconeogenesis in the liver and protein synthesis in essential tissues like the brain and heart.⁴⁻⁶ Without adequate muscle mass, the body cannot maintain necessary blood amino acid levels, leading to severe consequences, including shortened survival during conditions like starvation.^{7,8} During stressed states and critical illnesses such as sepsis, cancer, or traumatic injury, the body’s demand for amino acids increases dramatically to support immune function, wound healing, and the synthesis of acute phase proteins.⁹⁻¹¹ Muscle protein breakdown accelerates to meet these demands, and individuals with low muscle mass struggle to recover.¹² This is evident in conditions like severe burn injuries or cancer cachexia, where muscle depletion worsens survival outcomes.¹³ Recovery from such critical illnesses is often hindered by significant losses in muscle mass and strength, leading to prolonged physical impairment and poor long-term health outcomes.^{14,15}

While muscle loss is a concern in conditions like sarcopenia, muscle mass also plays a significant role in preventing obesity and managing insulin resistance.¹⁶⁻¹⁸ Obesity results from a long-term energy imbalance, and muscle metabolism is crucial for regulating energy expenditure.¹⁹ Increased muscle mass prevents fat accumulation by boosting resting energy expenditure. Furthermore, muscle influences the development of insulin resistance, a key factor in type 2 diabetes.²⁰ Maintaining muscle mass and function is key to preventing obesity and managing metabolic disorders like diabetes.

In summary, muscles play diverse roles not only in physical functioning but as a regulator of energy and protein metabolism as well.

In Unit 1, A/Prof Lim Wee Shiong and Dr Daphne Yang give an update on Singapore’s clinical practice guidelines on the screening, diagnosis, management, and prevention of sarcopenia.

In Unit 2, Drs Tham Kwang Wei, Sarah Tan, and Lee Phong Ching provide an overview of sarcopenic obesity and its management.

In Unit 3, A/Prof Samuel Chew writes about the key roles of exercise and nutrition in preventing and managing sarcopenia.

In this issue, A/Prof Goh Lee Gan has also selected ten current readings on topics related to the role of muscle in health and disease. These readings include articles exercise, diet, and sarcopenia.

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