

## Exercise in a Pill?

The importance of exercise in maintaining a healthy lifestyle is universally accepted and is well supported by scientific research. Eighty-five percent of the world's population leads a sedentary life that is associated with an increased risk of chronic disease. In fact, the British Heart Foundation attributes more than five million deaths worldwide to inactivity.



We are encouraged to engage in at least 2-3 hours of aerobic exercise each week, from which we derive both physical (increased muscle mass and stronger bones) and mental benefits. While many people enjoy being physically active, for others it is a daunting undertaking, for which they manifest significant inertia. The road to poor health is often paved by good intentions (think of that exercise equipment gathering dust in your basement). On the other hand, chronic conditions, injury and aging often make it difficult, if not impossible, to undertake physical activity.

Regardless of the reason(s) for a person's inactivity, it often leads to muscle weakening (sarcopenia) and/or bone loss (osteoporosis). This is especially true in the elderly. In an exciting new study, a research team at Tokyo Medical and Dental University has identified a drug, locamidazole (LAMZ), as a potential therapeutic that can cause positive changes in muscle and bone similar to those in response to exercise.

When researchers administered LAMZ either orally or by injection, or a control solution for 14 days to male mice, they noted wider muscle fibers and increased muscle strength when compared to the non-LAMZ-treated mice. And when endurance was tested on a treadmill, LAMZ-treated mice were less fatigued and traveled a longer distance than controls.

Using gene analysis, the researchers showed that LAMZ increased the number of mitochondria (the power-supplying organelle in the cell) in muscle and bone cells. The drug also increased the expression of the gene for PGC-1 alpha protein, known to maintain muscle and bone cells. When they gave LAMZ but blocked PGC-1 alpha, there was no increase in muscle strength, showing that the drug worked via this protein.

Additional exciting data showed LAMZ-induced increases in bone thickness, density and mineral content, confirming the increased formation of bone with lower bone resorption activity.

In summary, the study provided convincing evidence in animals for an agent that can improve bone and muscle health. Nevertheless, it will be a great challenge to develop a pharmacological treatment to replace the many benefits of regular physical activity and exercise. Hopefully the actions in mice can translate to humans. If it can be accomplished, it would provide a means to maintain bone and muscle in those individuals unable (or unwilling) to be physically active.

