Pituitary hormone TSH found to directly influence bone growth

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Researchers at Mount Sinai School of Medicine have found that thyroid-stimulating hormone (TSH), a hormone produced in the anterior pituitary gland that regulates endocrine function in the thyroid gland, can promote bone growth independent of its usual thyroid functions. The research suggests that TSH, or drugs that mimic its affect on bone, may be key to possible future treatments for osteoporosis and other conditions involving bone loss, such as cancer. The findings were published online this week in the National Academy of Sciences journal PNAS.

The same Mount Sinai researchers had previously published research showing that TSH inhibits the creation of osteoclasts, a type of cell that removes bone tissue from the body. With this new study, however, the researchers have established for the first time that TSH also activates osteoblasts, which are cells responsible for bone formation.

"There are relatively few treatments right now for osteoporosis, and virtually all of them focus on limiting osteoclasts – that is, fighting the loss of existing bone," said Terry F. Davies, MD, FRCP, FACE, Florence and Theodore Baumritter Professor of Medicine, Mount Sinai School of Medicine. "However, our study shows that future progress in osteoporosis therapies may hinge on medications that can mimic the effects of TSH and promote the growth of new bone. The key will be to develop TSH analogs that would activate osteoblasts and yet not affect the thyroid gland the way TSH itself does."

"Osteoporosis is really an imbalance in the functions that create and destroy bone in the body," said Mone Zaidi, MD, PhD, FRCP, FACE, Hon MD, Professor of Medicine, and Director of the Mount Sinai Bone Program, Mount Sinai School of Medicine. "Our findings indicate that there may be a novel new method for addressing the lack of bone production. Our discovery that TSH causes bone growth also represents a new way of thinking about the role of certain glands and how they operate."

About 60 million people in the United States have symptoms of osteoporosis, and often they are unaware of the condition until they experience a broken bone or shrinkage of their skeleton. The disease affects women more often than men, and risk factors include aging; low body weight; low levels of the sex hormone estrogen; smoking; and some medications.

Dr. Zaidi is a named inventor of a pending patent application related to the use of TSH in the inhibition of TNF activity. This patent has been filed by the Mount Sinai School of Medicine. In the event the patent is licensed, Dr. Zaidi would be entitled to a share of a any proceeds Mount Sinai School of Medicine receives from the license.

Provided by The Mount Sinai Hospital