

Study reveals bone coupling factor key to skeletal health (w/ Video)

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Researchers at the University of Alabama at Birmingham (UAB) have discovered a molecular coupling factor that helps bones grow and remodel themselves to stay strong, a finding that could lead to better bone-building therapies and new osteoporosis drugs, the researchers said.

The coupling factor is a human protein called transforming growth factor beta-1, or TGF beta-1. Previously, scientists had searched for but missed the biological link between bone growth and bone remodeling - a natural give-and-take system that is crucial to skeletal health. The discovery is reported online in the journal *Nature Medicine*.

"For the first time, we've identified TGF beta-1 is a coupling mechanism for [bone resorption](#) and bone formation," said Xu Cao, Ph.D., a professor in the UAB Department of Pathology and the study's senior author. "[Osteoporosis](#), Paget's [bone disease](#), Camurati-Engelmann disease, and many more, all involve a bone coupling disorder to some degree."

Lead bone researcher Xu Cao, Ph.D., discusses TGF beta-1. Credit: UAB

Previous research has hinted at but failed to explain the coupling role of TGF beta-1 in skeletal health. Bone remodeling occurs through resorption, the body's way of removing old and brittle bone to avoid breaks and skeletal disorders. Bone formation happens as skeletons grow and as the body works to counter bone resorption by laying down new bone.

Cao and his fellow researchers studied mice with Camurati-Engelmann disease, a genetic disorder that causes haphazard bone formation and poor skeletal health. They found the presence of TGF beta-1 in the mice could balance bone resorption and [bone formation](#) and prevent fractures and worsening bone disease.

"The current treatment for many bone diseases does two things: it stimulates osteoblasts, which help form bone, and it inhibits osteoclasts, which trigger bone resorption. That's a coupling problem, and it can lead to minimal benefit for patients," Cao said. "There is no drug designed to balance bone resorption with formation, and hopefully we can help change that."

Discovered many years ago, TGF beta-1 is one of the most abundant cytokines in bone. It has been identified in lung, liver, kidney and other organs that undergo remodeling as a natural part of the growth and aging process. Understanding the TGF beta-1 role in bone may shed light on many other diseases that have roots in biological imbalance, Cao said.

Source: University of Alabama at Birmingham ([news](#) : [web](#))

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