

'Best of both worlds' -- Targeting a single gene could inhibit bone decay and stimulate bone growth

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Researchers at the University of Pennsylvania's School of Medicine have found by targeting the function of a single gene that it is possible to inhibit bone decay while simultaneously stimulating bone formation. This concept may lead to drug treatments for osteoporosis and other bone diseases. Senior author Yongwon Choi, PhD, professor of Pathology and Laboratory Medicine at the University of Pennsylvania and colleagues report their findings in the December issue of *Nature Medicine*.

Osteoporosis is a major quality of life issue for the millions of senior citizens in the United States and will only become a bigger problem as the population continues to age.

"The main challenge is how to prevent bone decay while also encouraging bone growth," said Choi.

The basic principles behind bone metabolism are largely understood, hence a handful of drugs treating osteoporosis are available. Most drugs inhibit osteoclasts, which cause bone decay. But there is also at least one that stimulates osteoblasts, enhancing bone formation. A combined treatment will not only prevent the occurrence of osteoporosis, but also make the quality of bone even better.

"Our discovery proves that inhibiting osteoclasts while simultaneously

stimulating new bone formation can be done."

Bone health is maintained by the balanced activities of osteoblasts and osteoclasts. The study shows that the inactivation of gene *Atp6v0d2* in mice results in dramatically increased bone mass due to defective osteoclasts as well as enhanced bone formation. These findings may provide some clarity into the regulation of bone metabolism and show that targeting the function of a single gene could possibly inhibit bone decay while stimulating bone formation.

"We have finally proven the theory that targeting one gene can do both," said Choi. "Now that we have demonstrated a new approach that is theoretically attainable, one that combines the best of both worlds, we can go to work on the genes up and down stream from our target gene. If we can find a way to get to our target gene with a drug we may be able to help the millions of seniors with osteoporosis."

Dr. Choi was recently named the 2006 winner of Korea's prestigious Ho-Am Prize for his work in osteoimmunology. The award recognizes scholars and researchers who make outstanding achievements by international standards while encouraging future activities of even higher levels and who also present exemplary models for the academic community. Choi, who is originally from Seoul, South Korea, has been at the University of Pennsylvania since 2001.

Source: University of Pennsylvania School of Medicine

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