

Bears may hold key to osteoporosis treatment

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Seth Donahue's work on bear parathyroid hormone could lead to a new treatment for osteoporosis.

All it takes is a few days of bed rest for human bones to start to weaken. Stretch that out many weeks, and we risk full-blown osteoporosis and its attendant woes of broken hips, wrists and vertebrae. Bears hibernate for months on end. Yet, when they wake up in spring, their bones are just as strong as before they settled down for their long winter's nap.

Seth Donahue, an associate professor of biomedical engineering at Michigan Technological University, has been studying bear physiology for years, teasing out the mechanism that protects them from osteoporosis. Just as in humans, bear bones release minerals during periods of inactivity, like hibernation. But instead of excreting calcium, [bears](#) reabsorb it and put it back where it belongs—in their skeleton.

One big reason bears have such healthy bones is because of the actions of parathyroid hormone, Donahue surmises. Human parathyroid hormone, while it plays a key role in bone health, may not be as efficient as the bear variety when it comes to shuttling minerals back into bones.

A critical step in testing that hypothesis was to get a supply of bear parathyroid hormone, so Donahue and his research team made their own. Using samples of American black bear blood provided by another research study, they isolated the DNA responsible for making bear parathyroid hormone. Then they cloned the gene and used *E. coli* bacteria to turn out gobs of the stuff. No bears were involved in the making of this hormone, he is quick to point out. “We don’t use bears for this research,” Donahue says.

With a \$1 million grant from the National Institutes of Health, Donahue and his team are undertaking two experiments using their bear hormone that they hope will lead to a new, more effective treatment for human osteoporosis.

They are growing human bone-making cells in the lab, which they will treat with either human or bear parathyroid hormone and then measure differences in the two groups. “Preliminary studies have shown that the bear parathyroid hormone is better at preventing cell death,” Donahue says. It also appears to have a robust effect on the signaling pathways that control bone formation in humans.

A second study begins this summer to see if bear parathyroid hormone has potential for treating osteoporosis in post-menopausal women, the time when they are most vulnerable to the bone-thinning condition. Expanding on an earlier study, Donahue and his team will give human and bear hormones to mice that have had their ovaries surgically removed and developed osteoporosis. Then they will gauge the hormones’ effect on the bone density of the mice.

What's next? Donahue chairs the scientific advisory board for the pharmaceutical company Aursos, which recently filed an application with the Food and Drug Administration to use the recombinant bear [parathyroid hormone](#) as a treatment for [osteoporosis](#). "It would be years away, but if the studies go well, it could be used in humans," Donahue says.

Provided by Michigan Technological University

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