SOUTHWESTERN NEWS

Contact: Jennifer Donovan
(214) 648-3404

SLOW-RELEASE FLUORIDE STRENGTHENS SPINAL BONE

DALLAS — November 1, 1994 — The human spine is an engineering masterpiece. Like a bridge or a skyscraper, a healthy spine can support considerable weight and withstand amazing torque without snapping or collapsing.

Composed mainly of trabecular bone, the spinal vertebrae consist of vertical columns connected by horizontal cross struts that make them strong and resilient. But in an osteoporosis patient, the horizontal struts of trabecular bone begin to thin, crack and separate. The vertical columns of trabecular bone also lose mass, although somewhat more slowly. Eventually, with most of their reinforcements gone, the thinning columns bend and break under the same load they once supported easily. The result: the spinal fractures of osteoporosis -- crippling and painful.

Research by Dr. Joseph Zerwekh at The University of Texas Southwestern Medical Center at Dallas, published in the November/December issue of the international journal, *Bone*, shows that intermittent treatment with slow-release sodium fluoride, supplemented by calcium citrate and vitamin D, can rebuild the strengthening cross struts of trabecular bone.

"This study confirms what we have suspected," said Zerwekh, professor of internal medicine. "Our particular fluoride treatment not only builds bone, it restores connectivity, which could explain the improved strength and lower fracture rate we've seen in our fluoride-treated patients."

Holder of the Frederic C. Bartter Professorship in Vitamin D Research, Zerwekh is a member of the UT Southwestern research team headed by Dr. Charles Y.C. Pak that has been conducting clinical trials on slow-release fluoride with calcium citrate as a treatment for osteoporosis. Their interim results were reported in the *Annals of Internal Medicine* in April.

Zerwekh studied the bone biopsies of 23 osteoporosis patients participating

(MORE)

in the slow-release fluoride trials, 17 women and six men. Thirteen had severe bone loss, defined as bone density that is less than 65 percent of that of a normal 30-year-old. The other 10 showed mild to moderate bone loss — less than normal but more than 65 percent of normal. Each study participant had suffered at least one spontaneous vertebral fracture.

All 23 were treated for two years with intermittent doses of slow-release fluoride, twice-weekly doses of vitamin D and daily doses of calcium citrate.

The connectivity of the bones of patients with mild to moderate bone loss improved significantly, based on several kinds of measurements, Zerwekh said. In those with severe bone loss, connectivity also improved slightly, but the improvement was not statistically significant.

"Our results tell us that you must have some bone to begin with," he said. "This drug has to build bone on existing surfaces. This study shows that if you have a certain critical amount of bone to begin with, and you take this drug, you're going to make more bone in a given period of time than if you were to start taking the fluoride in the face of severe bone loss."

Pak, director of UT Southwestern's Robert T. Hayes Center for Mineral Metabolism Research and holder of the Charles Pak Distinguished Chair in Mineral Metabolism and the Donald W. Seldin Professorship in Clinical Investigation, called Zerwekh's work an important piece of the osteoporosis puzzle. "Any therapy designed to replace lost bone mass must also restore lost connectivity," he said. "Now we know that slow-release fluoride plus calcium citrate can do that."

Data on connectivity comes from two-dimensional images, a potentially limiting factor in evaluating the three-dimensional structure of bones. Zerwekh now is working with Dr. Peter Antich, a UT Southwestern professor of radiology and holder of the Wechun Pak Professorship of Bone Biophysics, to develop a technique for imaging bone structure in three dimensions.

###