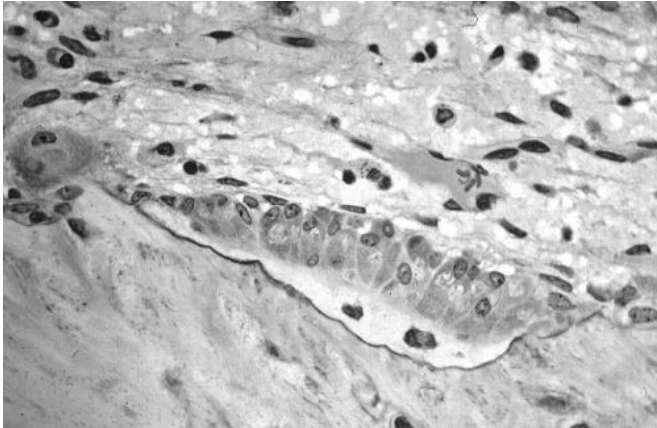


Beyond bone mineral density: Additional bone traits predict risk for fracture

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Osteoblasts actively synthesizing osteoid. Credit: Robert M. Hunt; Wikipedia.

Every year more than 2 million older Americans experience a fragility fracture to the hip, spine or wrist. Usually the result of a fall from standing height or less, fragility fractures stem underlying bone deterioration, not high-impact forces but to. Loss of bone mineral density (BMD) - the condition known as osteoporosis—is one way bones can become fragile, and screening patients for osteoporosis is the current standard for determining fracture risk in older adults. However, low bone mineral density is not the only cause of bone fragility, and the majority of older adults who sustain a fragility fracture do not meet the diagnostic criteria for osteoporosis. Physicians currently lack validated means of assessing fracture risk in these patients.

In the largest prospective study of its kind, researchers from Beth Israel Deaconess Medical Center (BIDMC) and the Institute for Aging Research at Hebrew SeniorLife used high-resolution tomography imaging to assess whether other bone characteristics besides bone [mineral density](#) can be used to determine [fracture risk](#). The

team found that assessing the microstructure of the two different types of bone tissues—compact bone and spongy bone—may be useful to predict the incidence of [fragility fractures](#) in those who would not otherwise be identified as at risk. The study is published today in *The Lancet Diabetes and Endocrinology*.

"Older women are at particularly high risk of fracture. In fact, the number of women who will experience a fragility fracture in any given year exceeds the number who will experience a first-time stroke, breast cancer or myocardial infarction combined," said co-lead author Mary L. Bouxsein, Ph.D., Director of the Center for Advanced Orthopedic Studies at BIDMC. "Improved methods to identify those in whom fractures are common but whom standard clinical testing does not identify as high risk would allow us to target treatment to this important group and ultimately reduce fracture burden."

The multi-national study included more than 7,000 [older women](#) and men from five North American and European countries. Participants—eight research cohorts at the Mayo Clinic, the Framingham Study in Massachusetts and sites in France, Canada, Switzerland and Sweden that comprise the Bone Microarchitecture International Consortium—underwent scanning measurements of the bones of the arms and legs.

While just eight percent of participants met the [diagnostic criteria](#) for osteoporosis, 11 percent of participants experienced a fracture. Those who experienced fracture were more likely to be older, female, have a lower BMI, use osteoporosis medications and have a previous fracture. Participants who sustained [fractures](#) had worse bone measurements for nearly all parameters compared to those who did not fracture.

The scientists' analysis demonstrated that several measures of bone density and structure at different

sites on the bone—including the density of the compact bone tissue and the thickness of the spongy bone tissue at the wrist—were predictive of fracture. Failure load, the stress under which bone begins to fracture, was the bone characteristic most strongly associated with risk of fracture.

"Results from this large international cohort of women and men suggest deficits in density and structure throughout the bone contribute to fracture risk independently of bone mineral density and current risk assessment tools", said Lisa Samelson, Ph.D., who is an epidemiologist at the Institute for Aging Research at Hebrew SeniorLife and Harvard Medical School, and lead author of the study. "Further, assessment of these [bone](#) characteristics may be useful in those who would not otherwise be identified as being at high risk for fracture."

More information: *The Lancet Diabetes and Endocrinology*, www.thelancet.com/journals/lan...rticle/PIIS2213-8587

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