

Portable, low-cost early-warning test for osteoporosis

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A tiny probe can test the strength of a patient's bones and could reveal early signs of osteoporosis. Credit: Louise Coutts, University of Southampton

A handheld device for diagnosing the early signs of osteoporosis could be available for clinical use within five years.

The technology is currently being refined and tested at the University of Southampton with support from the Engineering and Physical Sciences

Research Council (EPSRC). The original concept was invented at the University of California, Santa Barbara.

Unlike existing methods of assessing [bone](#) fragility, which measure bone density using X-rays, the device is designed to measure the ability of bone tissue to prevent small cracks growing into full-blown fractures.

It does this by pressing a microscopic needle a tiny distance into the top layer of bone. Measured electronically, the amount of penetration indicates how fragile the [bone tissue](#) is and therefore the risk of experiencing an osteoporotic fracture later in life.

Osteoporosis is often referred to as fragile [bone disease](#). However, for many sufferers, the first indication that they have the condition is when they actually sustain a fracture.

Drugs can slow or arrest the development of the disease, but the condition may already be quite advanced by the time the first break has happened. Doctors can estimate an individual's risk of fracturing by using bone-density measurements and other factors such as age, gender, smoking and any history of fracturing. But the new microindentation technology affordably delivers a fundamentally different measurement that has huge potential to refine such an evaluation.

A normal reading might see the needle sink into the bone by around 20 micrometres (0.02 mm); a reading of 40 micrometres might indicate a significant risk of fracture.

"As the population ages and [life expectancy](#) rises in the decades ahead, the cost of treating [osteoporotic fractures](#) will increase," says Professor Philipp Thurner of the University of Southampton, who is leading the project. "One in three women aged over 50 is forecast to experience an osteoporotic fracture in her lifetime and, globally, treatment costs are

forecast to reach over US\$130 billion by 2050. The potential improvement in assessing [osteoporosis](#) and future fracture risk offered by this new technology could reduce the burden of broken bones for individuals, healthcare systems and the economy.

"We're currently inviting patients at Southampton General Hospital who have had a hip replacement due to a broken hip to take part in the Observational Study Examining Osteoporosis (OStEO), which is investigating handheld microindentation with EPSRC funding. We would also specifically like to thank the 23 patients who have agreed to take part in the study so far."

"The National Osteoporosis Society welcomes new research in understanding bone health and osteoporosis, and this new study is certainly interesting," says Claire Bowring, Medical Policy Manager at the National Osteoporosis Society.

"Bone density scanning are the 'gold-standard' diagnostic tools. However they are not a perfect measure of bone strength and do not show the quality of bone. New techniques, which look at further measures of bone fragility, are very important in developing our understanding of osteoporosis and bone health and in helping to reduce the number of fragility fractures."

The three-year research project, "[Handheld Microindentation – A Direct Assessment of Bone Fracture Risk?](#)" (EP/J008192/1) (GoW) is due to run until 2015.

Provided by Engineering and Physical Sciences Research Council

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