

# Computerized osteoporosis detection

EurekaAlert!

A computerized approach to examining patient bone X-rays for diagnosis of osteoporosis could side-step the subjectivity associated with visual examination, according to a new research paper in the *International Journal of Biomedical Engineering and Technology* published in October.

Neelesh Kumar of the Central Scientific Instruments Organisation in Chandigarh, India, and colleagues recognized that the bone disorder osteoporosis is on the increase but that diagnosis using X-ray images of the patient's skeleton often lead to false positives and false negatives because visual examination, no matter how expert, is subjective. They have now developed a new approach based on the digitization of the X-ray images and estimation of the bone porosity associated with osteoporosis based on a sophisticated computer algorithm. X-rays are used in four times out of five for the diagnosis of osteoporosis, usually where other more expensive or inconvenient tests such as dual X-ray absorptiometry (DXA) are precluded.

The World Health Organization (WHO) defines osteoporosis as "a skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture". X-ray examination usually confirms the diagnosis at the severe or late-stage of development. However, a computerized system could allow much earlier diagnosis to be made and so give patients the opportunity to be treated more successfully before the disorder becomes a potentially debilitating illness.

The addition of a reference index to the X-ray image is key to the success of the new computerized technique. In conventional methods, the X-ray source quality, the film and its processing quality are possible sources of error but in the new system these sources are all but removed by the digital index on the film, the team says.

The team has tested the system on 40 elderly Asian patients with known diagnoses. 9 out of 10 of the females had osteoporosis, almost two-thirds of the men. The error rate is less than 2 percent, the team says. The team has begun the compilation of a knowledge base contained validated X-ray images to which the computer algorithm compares new X-rays. This database can be added to with new verified images once a definitive diagnosis has been made and so the system will improve with use.

"The new tool is a cost-effective solution, as it uses the existing facilities available in hospitals and thus, imparts no extra financial burden on healthcare providers or patients for quantitative estimation of osteoporosis," the researchers say. They point out that the same computerized diagnosis could be adapted to analyze bone deformity, scoliosis measurement, X-ray cracks and fractures.

"Computer aided diagnostic tool for osteoporosis estimation" in *Int. J. Biomedical*

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