

Study demonstrates tomosynthesis effective in diagnosing knee osteoarthritis

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A recent study done by researchers at Boston University School of Medicine (BUSM) shows that tomosynthesis may be more beneficial in diagnosing knee osteoarthritis than X-ray imaging. In the study, which is published online in the journal *Radiology*, tomosynthesis detected more osteophytes (abnormal bony spurs) and subchondral cysts (small collection of fluid within the bone) in the knee joint than conventional X-ray imaging .

Daichi Hayashi, MD, PhD, research instructor at the Quantitative Imaging Center in the department of radiology at BUSM, is the lead author of the study. The research was led by Ali Guermazi, MD, PhD, professor of radiology at BUSM and chief of musculoskeletal radiology at Boston Medical Center.

Osteoarthritis, the most common form of arthritis, is characterized by a degeneration of cartilage and the underlying bone and other soft tissues in the joints, leading to pain and stiffness. According to the [Centers for Disease Control and Prevention](#), osteoarthritis is the leading cause of disability in the United States, affecting approximately 26.9 million Americans.

Osteoarthritis can be diagnosed clinically, from symptoms and physical examinations, or by taking and evaluating images. While X-ray imaging has commonly been used to diagnose the disease, recent research has shown that it is less accurate than [Magnetic Resonance Imaging](#) (MRI). However, while MRI provides higher-quality images, it is much more

expensive than X-rays and cannot be routinely used in daily clinical practice. CT scan is another imaging technique that can provide detailed images of the joint, but it exposes patients to higher doses of radiation than X-rays.

"Despite the known limitation of X-ray imaging, it is widely used to diagnosis knee osteoarthritis, both in terms of daily clinical practice and also for clinical research studies," said Hayashi.

Given the limitations, Hayashi and the team lead by Guermazi explored tomosynthesis to image the knee joint and determine its accuracy in detecting signs of osteoarthritis in the knee. Tomosynthesis uses an X-ray beam to take tomographic images (that is, images in slices similar to those from CT scans), which allows for better visualization than from a single X-ray image. The radiation exposure from tomosynthesis is similar to the traditional X-ray and much lower than CT. Also, it takes seconds to obtain images using tomosynthesis and can be done while a person is standing up.

The team examined 40 participants (80 knees), all over the age of 40, who were recruited irrespective of [knee pain](#) or an X-ray diagnosis of osteoarthritis. The knees were imaged using X-ray, tomosynthesis and MRI. The presence of osteophytes and subchondral cysts were recorded, and knee pain was assessed for each participant based on a questionnaire.

The results demonstrated that tomosynthesis, compared to X-ray, improves the detection of osteophytes in the knee joint in patients with or without osteoarthritis. The sensitivity for detecting osteophytes increased by five to 29 percent with tomosynthesis compared to X-ray. The sensitivity for detection of subchondral cysts in the knee joint increased by 11 to 50 percent with tomosynthesis compared to X-ray. The study also concludes that subjects with tomosynthesis-detected

osteophytes and cysts were more likely to feel pain than those without the lesions.

"This study shows that the images obtained through tomosynthesis are significantly better than those from X-rays and could potentially be a better diagnostic tool for knee osteoarthritis in patients with knee pain," said Hayashi. "While tomosynthesis has not been widely used in imaging of bones and joints to date, the results of our study show that using tomosynthesis to detect [knee osteoarthritis](#) can be effective."

Provided by Boston University Medical Center

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