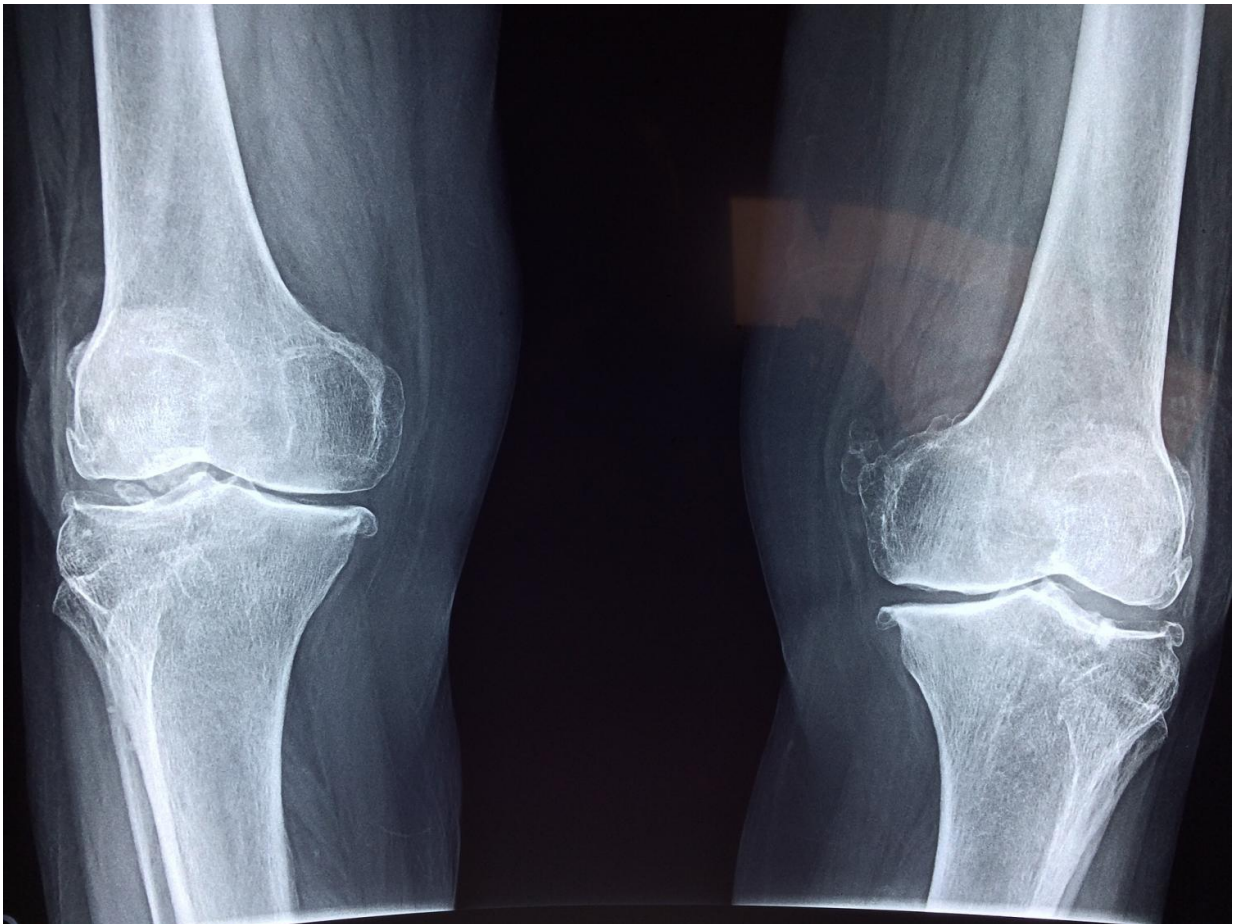# Researchers use AI to identify a new bone shape measure in knee osteoarthritis

May 11 2021

Credit: CC0 Public Domain

Knee osteoarthritis (OA) is a global health problem. Almost half the

adults over the age of 75 have some form of knee OA—one of the leading causes of disability worldwide. Because there is no cure for knee OA, current treatment relies on accurately identifying and staging the disease.

Using an Artificial Intelligence-based approach known as deep learning, researchers from Boston University School of Medicine (BUSM) have now identified a new measure to determine the severity of knee osteoarthritis—named "subchondral bone length" (SBL).

There are only a handful of proven imaging markers of knee OA. Currently, medical imaging tools such as Magnetic Resonance Imaging (MRI) or x-rays are used to examine the knee joint. "Our study identified a new imaging measure that has the potential to become a biomarker of knee OA," explained corresponding author explained corresponding author Vijaya B. Kolachalama, Ph.D., assistant professor of medicine at BUSM.

The researchers used thousands of knee MRI scans and defined SBL, a novel shape measure characterizing the extent of overlying cartilage and bone flattening and examined its relationship with radiographic joint space narrowing (JSN), concurrent pain and disability as well as subsequent partial or total knee replacement. They then estimated the odds ratios for each of these outcomes using relative changes in SBL. They found that SBL values for knees with joint space narrowing were consistently different from knees without JSN. They also found that greater changes of SBL from baseline were associated with greater pain and disability.

According to the researchers, this study has important clinical implications. "Our study identified SBL as a potentially useful measure of the bone morphology within the knee joint and showed that it varies with disease grade. SBL also has the potential to stage knee OA in the

future," adds Kolachalama.

The researchers hope to study if SBL can be used for early detection of disease which can significantly impact patient care management.

More information: Gary H. Chang et al, Subchondral bone length in knee osteoarthritis: A deep learning derived imaging measure and its association with radiographic and clinical outcomes, *Arthritis & Rheumatology* (2021). DOI: 10.1002/art.41808

Provided by Boston University School of Medicine