

Cartilage degeneration algorithm predicts progression of osteoarthritis

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A novel cartilage degeneration algorithm can predict the progression of osteoarthritis in individual patients, according to new research from the University of Eastern Finland. The new algorithm could greatly facilitate clinical decision-making in the treatment of osteoarthritis.

Osteoarthritis (OA) is a joint disease that deteriorates the [articular cartilage](#). The most important risk factors are ageing and overweight, and osteoarthritis is common especially in joints that are subject to heavy loading. For societies, osteoarthritis constitutes a significant financial burden: it cannot be cured by current treatments, and the disease often leads to [joint replacement surgery](#), which is highly expensive. Current imaging methods, such as MRI or X-ray, only provide information on the thickness or composition of the [cartilage](#), but they fail to provide data on the risk of osteoarthritis or tools to predict its progression.

A research group from the University of Eastern Finland tested the ability of a cartilage degeneration [algorithm](#), created earlier by the same group, to predict the progression of osteoarthritis in individual patients and to grade the severity of their disease by using the Kellgren-Lawrence classification. The findings were published in *Scientific Reports*.

The algorithm was applied to 21 patients who were divided into three groups: patients without OA, patients with mild OA, and patients with severe OA. The patients were divided into the groups based on their Kellgren-Lawrence grades defined experimentally after a four-year follow-up. At the start of the follow-up, all of the patients were OA-free.

The algorithm was applied at the onset of the follow-up, and the findings were compared against the four-year follow-up data. Based on the prognosis from the simulation and the experimentally defined Kellgren-Lawrence grades four years later, the researchers found that the algorithm was able to categorise patients into their correct groups.

The degeneration algorithm is based on stresses experienced by the knee joint during walking, and these were simulated on a computer. The algorithm assumes that stresses exceeding a certain threshold during walking will cause local degeneration in the articular cartilage of the knee.

This degeneration algorithm shows great potential in predicting patient-specific progression of osteoarthritis in the knee. The algorithm could be used to clinically simulate the effects of various interventions, including osteotomy, meniscectomy and weight loss, on the progression of osteoarthritis..

The [new algorithm](#) could facilitate clinical decision-making in the treatment of [osteoarthritis](#). The objective is to slow down and possibly even stop the progression of the disease. Alleviated symptoms or their complete absence can greatly affect the functional capacity of patients.

More information: Mimmi K. Liukkonen et al. Simulation of Subject-Specific Progression of Knee Osteoarthritis and Comparison to Experimental Follow-up Data: Data from the Osteoarthritis Initiative, *Scientific Reports* (2017). [DOI: 10.1038/s41598-017-09013-7](https://doi.org/10.1038/s41598-017-09013-7)

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