

# Research team finds compound that can spur cartilage growth

April 6 2012, by Bob Yirka

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(Medical Xpress) -- A research team from drug maker Novartis has discovered a compound that spurs cartilage growth in mice. As they describe in their paper published in the journal *Science*, the team has found that when a compound with molecules of kartogenin in it comes in contact with certain kinds of stem cells, chondrocytes develop, resulting in new cartilage growth, possibly paving the way perhaps, to a long sought treatment for osteoarthritis.

Osteoarthritis is a [degenerative joint disease](#) that occurs when cartilage between joints wears away after years of use (and sometimes from injury). When it happens, bones begin to rub against one another resulting in stiffness and pain. Researchers have looked in vain for years for a way to cure the condition but thus far the only treatment is [pain medication](#) and sometimes surgery. This new research may finally be the breakthrough researchers and patients have been hoping for.

To find a substance that might spur mesenchymal stem cells (which occur naturally in cartilage) into action, the researchers tried over 22,000 different molecule compounds before hitting on kartogenin. After putting together a compound with it as a main ingredient and then injecting it into the cartilage in damaged [knee joints](#) in mice, the team found that the [mesenchymal stem cells](#) were jump-started into developing into chondrocytes, which are the kinds of cells in the body that grow into cartilage. In the mice, the chondrocytes did indeed develop into new cartilage which led to a decrease in collagen bits and proteins in the joints which are common symptoms of [osteoarthritis](#). The

researchers also believe the mice suffered less pain as well.

Osteoarthritis, which generally occurs as people age, is responsible for 600,000 knee replacements in the U.S. and 285,000 hip replacements each year, not to mention countless hours of living in pain for those that suffer from it. Thus a therapy that could cause the rejuvenation of cartilage would alleviate a lot of pain and suffering as well as reducing medical costs.

Thus far the treatment in the mice has not shown any signs of side effects, but the team is still cautious, saying that a lot of work still needs to be done to discover how kartogenin does its magic in stimulating chondrocytes, and whether other interactions are going on as well.

**More information:** A Stem Cell–Based Approach to Cartilage Repair, *Science* [DOI: 10.1126/science.1215157](https://doi.org/10.1126/science.1215157)

## **ABSTRACT**

Osteoarthritis (OA) is a degenerative joint disease that involves destruction of articular cartilage and eventually leads to disability. Molecules that promote the selective differentiation of multipotent mesenchymal stem cells (MSCs) into chondrocytes may stimulate the repair of damaged cartilage. Using an image-based, high-throughput screen, we identified the small molecule kartogenin, which promotes chondrocyte differentiation ( $EC_{50} = 100$  nM), shows chondroprotective effects in vitro, and is efficacious in two OA animal models. Kartogenin binds filamin A, disrupts its interaction with the transcription factor CBF $\beta$ , and induces chondrogenesis by regulating the CBF $\beta$ -RUNX1 transcriptional program. This work provides new insights into the control of chondrogenesis that may ultimately lead to a stem cell–based therapy for osteoarthritis.

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