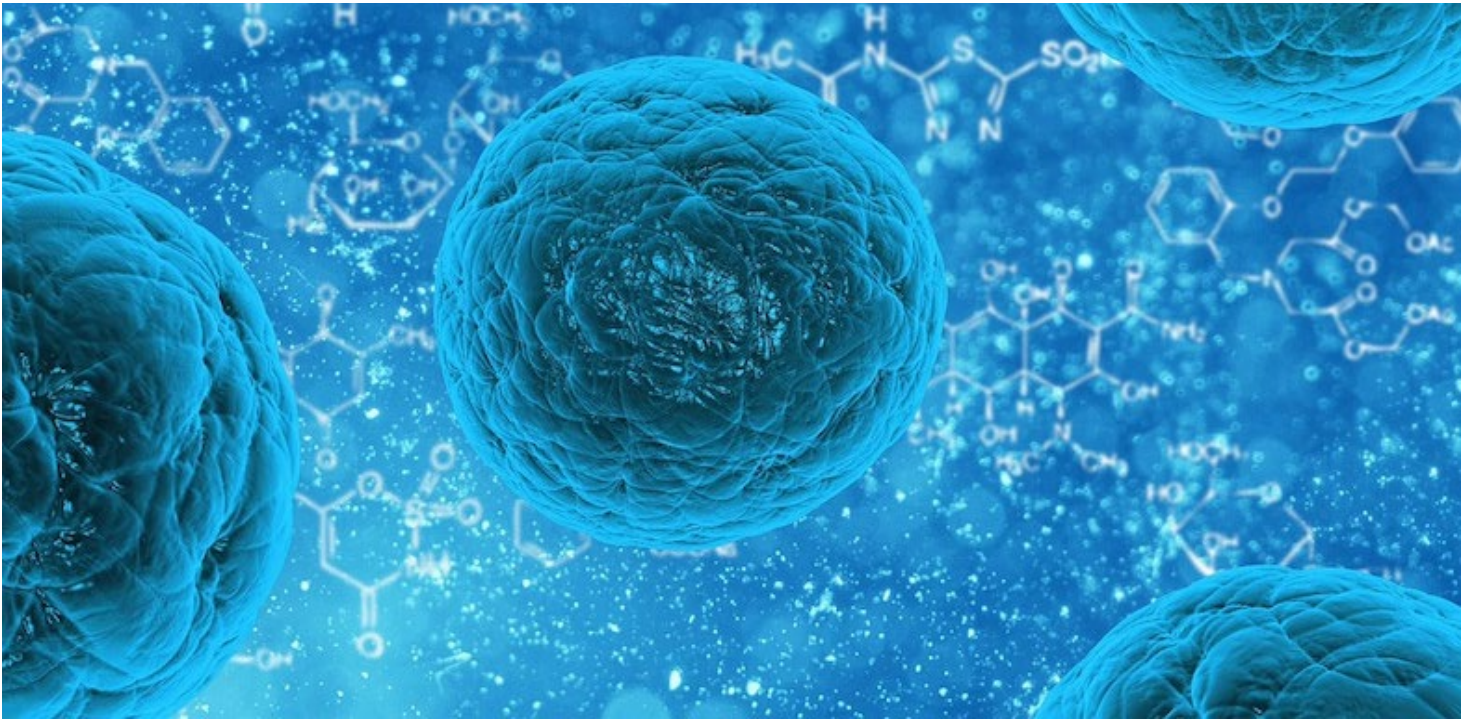


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## What's The Future Of Stem Cell Therapy For Arthritis?



### What's The Future Of Stem Cell Therapy For Arthritis?

Stem cell therapy may be a controversial topic in the news, but one thing is very clear. These injections have the potential to be highly effective pain fighters. Here's how stem cell therapy for arthritis, along with three other chronic pain conditions, could be used in the future.

### **How does stem cell therapy for arthritis work?**

Stem cell therapy belongs to a branch of medical technology called regenerative medicine. Along with platelet-rich plasma therapy, stem cell injections are a type of treatment that helps patients' bodies heal by regenerating damaged tissues.

Stem cells may not have a specialized task in the body. This means that they are capable of growing into any type of cell needed. There are three types of stem cells.

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- **Adult stem cells:** Adult stem cells are cells that have developed into specific cells (e.g., skin, tissue, bone, brain, etc.). These cells are specialized and are not adaptable (as embryonic stem cells are).
- **Induced pluripotent stem cells:** Created in a laboratory by genetic reprogramming, this type of stem cell is as adaptable as embryonic stem cells but are not as controversial, as they can be artificially grown.

Stem cell injections are administered into a damaged area of the body and can actually help that area to regenerate. For example, a person with liver disease may be able to be treated with stem cell therapy. The stem cells would regenerate new liver tissue, thereby healing the damage. This same procedure could be used for damage to joints, muscles, or any part of the body.

## What does the research say?

Self-healing organs may sound like science fiction, but researchers have been studying the potential of stem cell therapy for chronic pain (and other conditions) for decades. A recent study from Duke University found that stem cells injections offered long-term pain relief for laboratory mice. Researchers at Duke focused on neuropathic pain and its treatment via the spinal cord. They injected bone marrow stromal cells (BMSCs) into the spinal column of mice with nerve damage and pain similar to the nerve damage of type 2 diabetes, surgical amputation, and chemotherapy. They found the treated mice to be less sensitive to painful touch as compared to the control mice.

Ru-Rong Ji, professor of anesthesiology and neurobiology in the Duke School of Medicine, noted that the effects of the stem cell injections were more powerful and longer-lasting than a regular analgesic, saying:

*“This analgesic effect was amazing. Normally, if you give an analgesic, you see pain relief for a few hours, at most a few days. But with bone marrow stem cells, after a single injection we saw pain relief over four to five weeks.”*



## Stem cell therapy for rheumatoid arthritis

Stem cell research gives hope to patients with rheumatoid arthritis. Rheumatoid arthritis is an autoimmune condition, which means the body essentially attacks itself, and stem cell therapy for arthritis may soon be a “go-to treatment option,” reports *Healthline*.

The recent scientific advances that have allowed adult stem cells to be used for medicine have also opened the door for treatment advances with rheumatoid arthritis. The cells for treatment can even be created from the patient’s own body.

This treatment isn’t available on the market yet, but scientists are working to see which type of stem cells will be most useful to treat rheumatoid arthritis patients. Even though medical treatments haven’t yet been federally tested and approved, some patients have already taken stem cell therapy for arthritis.

Blogger Julie Cerrone tried a treatment for her knees, *Healthline* reports, and had dramatic results, regaining the ability to walk without the crutches she had long relied on. For the first time in many years, she could walk nearly pain free with the help of stem cells. Tina McVicker is another rheumatoid arthritis patient who is eagerly awaiting stem cell treatments. She tells *Healthline*:

*“I would try anything to help ease my RA pain and symptoms. I just want to walk again without struggle.”*

## Stem cell therapy for osteoarthritis

Stem cell therapy could actually help patients with osteoarthritis replace bone. Johns Hopkins researchers are working to transform stem cells from goats into a special tissue resembling human cartilage, which could repair damage to osteoarthritic knees or hips. The research is still in the early stages but will soon be tested on mice. If that works, the next step would be to test the technique on humans.

Scientists are also working on a hydrogel they can place inside the body that degrades without toxicity after spurring new bone tissues, called osteoblasts, to develop. The researchers say the injectable gel is a practical way of delivering the cells exactly where they’re needed, providing another option to use stem cell therapy for arthritis.

Johns Hopkins researchers aren’t the only ones working to generate new bone tissue from stem cells.

### Bone cells from fat?

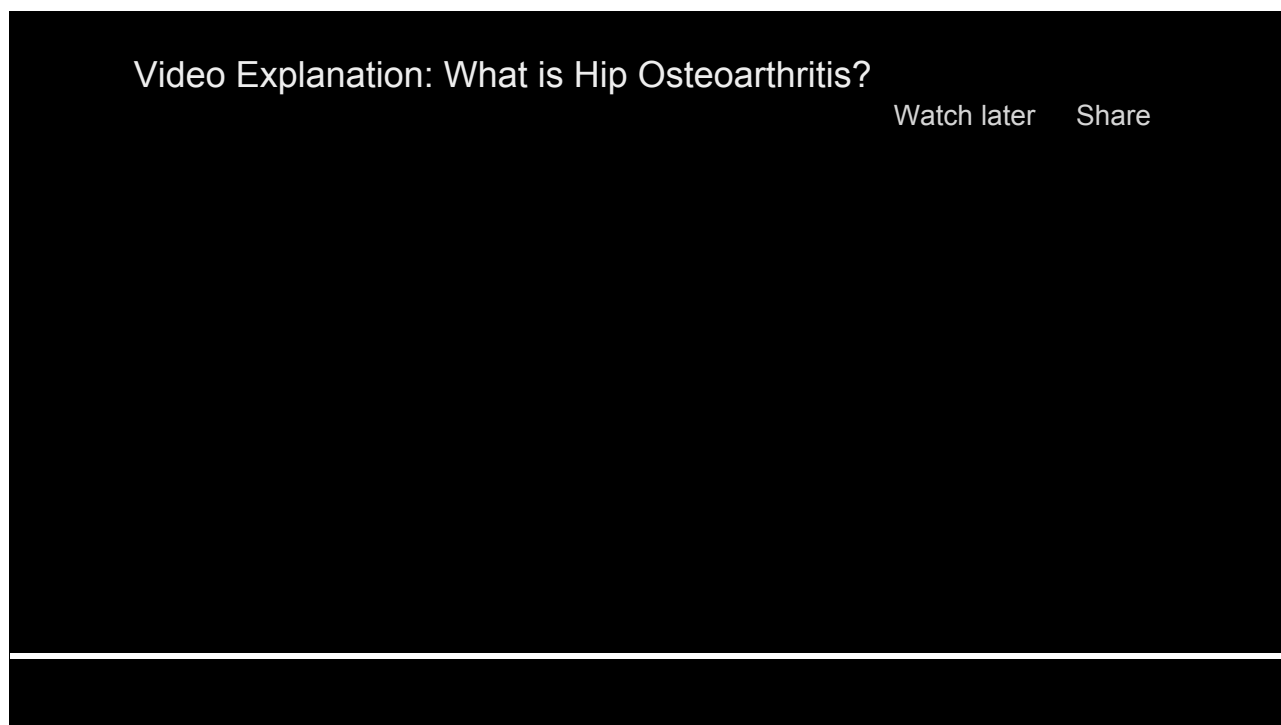
Scientists at the University of North Carolina Health Care System are using a special substance called cytochalasin D, an organic chemical found in mold, to encourage stem cells to become bone cells instead of fat cells. When injected into the marrow of mice, the substance caused bone to form. Study co-author Janet Rubin says:

*“And the bone forms quickly...The data and images are so clear, you don’t have to be a bone biologist to see what cytochalasin D does in one week in a mouse.”*

The effects surprised even researchers, who didn't set out to create bone in this way. In fact, they thought the cytochalasin would have destroyed the chance for bone cells to form, based on previous studies. Rubin adds:

*“Amazingly, we found that the actin (a protein) forms an architecture inside the nucleus and turns on the bone-making genetic program.”*

When the actin remains outside the nucleus, no bone forms. Scientists believe the discovery will translate well from mice to humans since the two organisms have similar bone-modeling processes. This avenue of research could be the beginnings of using stem cell therapy for arthritis patients. To learn more about hip osteoarthritis—its causes and treatments—check out the video below.



While stem cell therapy for arthritis offers a huge opportunity for treating this chronic condition, it also has potential for other conditions, including knee pain after surgery and degenerative disc disease.

## **Stem cells for knee surgery**

Another study from the American Academy of Orthopedic Surgeons looked at the effects of a single stem cell injection after knee surgery. Researchers found that not only did the stem cell injection help relieve pain but it also resulted in regrowth of the damaged meniscus. Because the knee is weight-bearing and used frequently, the possibility of repeat knee surgery exists. Stem cell injections may minimize this risk by helping the knee to create a new, healthy knee.

Lead study author C. Thomas Vangsness, Jr., MD, noted that this promising study is the first of its kind and pointed to other potential treatment options, saying:

*“The results of this study suggest that...stem cells have the potential to improve the overall condition of the knee joint. I am very excited and encouraged by the results. With the success of a single injection, it begs the question: What if we give a series of injections?”*

## Stem cell therapy for degenerative disc disease

For back pain caused by degenerative disc disease, scientists at the University of Gothenburg in Sweden believe that stem cell injections may be able to help intervertebral discs to regenerate, thereby eliminating back pain. Helena Barreto-Henriksson of the Institute of Clinical Sciences and the Institute of Biomedicine at the Sahlgrenska Academy identified cells on the edges of damaged intervertebral discs that act similarly to stem cells.

Barreto-Henriksson injected human stem cells into an animal model and believes the results are promising, saying:

*“Images taken by MRI showed that the transplanted stem cells survived, that they developed into cells that had a function similar to that of disc cells, and that there was a certain degree of healing in the disc.”*

## Multiple sclerosis and stem cell therapy

Researchers at Northwestern University have achieved miraculous results treating multiple sclerosis patients with stem cells from their own bodies, reports *The Economist*.

Multiple sclerosis is an autoimmune disease in which the body attacks its own nerves. Northwestern researcher Richard Burt treats patients with low-dose chemotherapy to kill white blood cells and then rebuilds the immune system with the patient's own stem cells.

British patient Holly Drewry, treated as part of Burt's research, checked into the hospital in a wheel chair but left walking, reports *Life Site News*. She told reporters:

*“I started seeing changes within days of the stem cells being put in. It was a miracle.”*

## The future of stem cell therapy for arthritis and other conditions

Advances in stem cell therapy for arthritis and other conditions have uncovered potentially game-changing discoveries that could soon change the way many diseases, including rheumatoid arthritis, are treated.

Meanwhile, additional discoveries have paved the way for moving stem cell research forward more quickly. These findings will ultimately expand scientists' access to the cells all while overcoming significant ethical and logistical hurdles that have in the past



been formidable.



## International efforts

The U.S. isn't the only country where medical researchers are focusing on this exciting area of science that's poised to transform the way many conditions are treated.

Canadian researchers have received an influx of \$20 million for studying stem cells. Canada's government injected the sizeable sum into Toronto's Centre for Commercialization of Regenerative Medicine, reports *The Globe and Mail*. The facility's Centre for Advanced Therapeutic Cell Technologies will be the world's first collaborative effort between researchers and the medical industry.

The effort aims to solve challenges related to manufacturing to help deliver the powerful medicine into the hands of more people. Canadian Prime Minister Justin Trudeau says: "Regenerative medicine is the future."

## Embryonic versus adult stem cells

It also turns out that embryonic stem cells may bear important similarities to artificial stem cells. Researchers have wondered for almost 20 years whether human induced pluripotent stem cells—which are adult cells that have been essentially reprogrammed back to their original, stem cell state—exhibit the same qualities as embryonic stem cells.

The ability to reprogram adult cells was discovered in 2007, which debunked scientists' prevailing hypothesis that embryonic cells were the only ones with the ability to transform into other types of cells. The discovery was a landmark one that won scientist Shinya Yamanaka the Nobel Prize, but opened the question of whether these reprogrammed cells had any key differences from the embryonic cells.

This has been an important question, leaving scientists unsure how to weigh the results of their studies. It also cast a shadow on

the future of stem cell medicine because embryonic cells have such heavy ethical concerns.

Researchers from Harvard Stem Cell Institute found that some of these induced cells are the “functional equivalent” of their embryonic counterparts. This is a huge discovery to propel research forward since it will help increase the overall pool of stem cells that researchers have to work with. It also expands the possibilities for real medicine to soon be in the hands of more people. Study co-author Konrad Hochedlinger says:

*“Embryonic stem cells are still an important reference point, against which other pluripotent cells are compared...Along those lines, this study increases the value of iPS cells.”*

## The controversy behind stem cell injections

With such promising studies, it would seem like everyone would be rushing to get stem cell therapy, but there has been controversy surrounding stem cell injections for as long as they have been studied. Initially, stem cells were harvested from the embryonic tissue of fetuses. Because the use of living tissue of any kind comes with ethical concerns, some groups believe that this research should not be continued.

Since the discovery of induced pluripotent cells that are able to be produced in the laboratory and the increased use of specialized adult stem cell injections, those who objected on ethical grounds in the past may feel more comfortable exploring the potential uses of stem cell therapy. Indeed, the name “stem cell injections” is often reframed as regenerative medicine to relieve some of the past stigma. Others hold fast to the idea that this type of medicine is not ethical and should not be practiced, regardless of the potential benefit.

The body’s ability to heal itself is remarkable, and the use of stem cell therapy to help it along has the potential to revolutionize the treatment of chronic pain, especially when using stem cell therapy for arthritis and other chronic conditions. Unlike some current therapies that aim to make refractory pain merely manageable, stem cell injections may be able to help truly heal the source of the pain, making it go away completely.

**How do you feel about the use of stem cell injections for chronic pain? If you’re interested in learning more, click the button below to talk to a pain specialist in your area about how stem cell therapy for arthritis could help you.**

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