

Can regenerative therapy restore vision and the promise of stem cell technology?

Argentinian soccer player Angel di Maria was not on the field for the 2014 World Cup final against Germany, due to a hamstring injury, but he still managed to make headlines. Di Maria is now one of several professional athletes who have decided to [undergo controversial and still unproven stem cell therapy](#) in an attempt to prolong or rescue their careers.

Despite a great deal of hype, [especially in the world of sports](#), the promised magic of stem cell therapy is not quite a proven reality. A Harvard Stem Cell Institute-affiliated research team has brought the promise one step closer; they have devised a way to improve regenerative surgery for patients suffering from partial or complete blindness.

The results of the study, published in *Nature*, are the latest of many recent findings that show how far adult stem cell research has evolved over the years. The authors used adult stem cells to regenerate corneal tissue and repair severe cornea damage in patients' eyes. This is one of the first instances in which a whole tissue was successfully regrown in a laboratory from adult stem cells. Robert Lanza, a leader in stem cell research at Advanced Cell Technology, has long [advocated for the organ-growing application of stem cell therapy](#):

...when you combine stem cell technology with the technology known as tissue engineering you can actually grow up entire organs, so [if] sometime in the future you get in an auto accident and lose your kidney, we'd simply take a few skin cells and grow you up a new kidney.

He added that this is already a reality. Lanza, along with Tony Atala at Wake Forest University School of Medicine, [has grown entire bladders](#) viable for transplant from patients' own cells.

While adult stem cells are commonly used in bone marrow transplants, organ regrowth is often relegated to embryonic stem cells – which comprise the more ethically questionable sector of stem cell research. In 2001, President Bush issued a ban on federal funding for most embryonic stem cell research, due to the controversial destruction of human embryos it entails. President Obama overturned this policy in 2009, citing its vast possibilities in advancing medical treatments, though it remains [a controversial subject](#) among ethicists as well as religious and political groups.

Amy Sievers, an oncologist and proponent of embryonic stem cell research at Portsmouth Regional Hospital, acknowledges the concern that funding for embryonic stem cell research might be used for human cloning to derive ES cells from embryos; however, she doubts that this will prove to be a serious issue in practice:

There will always be people who do immoral things. Most funded projects will be legally sound. There would be a strict vetting process. Projects would be informed choices made with moral choices for the good of everyone. At least I would hope so. I think the possibilities outweigh the objections.

Many scientists, including Sievers, remain optimistic about the potential of embryonic stem cells, especially in [researching neurological conditions](#); however, others believe that they will eventually be rendered unnecessary in research and medicine as knowledge of adult stem cells advances.

If adult stem cells can be used to grow whole organs, it is possible that they *will* remove the need for embryonic stem cells. For corneal repair, Bruce Ksander of Harvard Medical School is hopeful that the new research will soon be successfully applied to real cases:

Stem cells [in the cornea] are very rare, and successful transplants are dependent on these rare cells. It's a very good example of basic research moving quickly to a translational application.

Additional Resources:

- [Patient with nasal tissue tumor illustrates unknowable side effects of stem cells](#), Genetic Literacy Project
- [Stem cell therapy in cardiovascular disease: Past obstacles and promising new directions](#), Genetic Engineering & Biotechnology News
- [Stem cell creation technique changes their usability](#), The Scientist