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Stem Cells: 10 Diseases They May—or May Not—Cure

Embryonic stem cell research is poised to expand. Could an array of treatments or cures come next?

BY: LINDSEY LYON

With President Obama's recent lifting of the ban on federal funding for embryonic stem cell research, scientists now have new prospects for developing medical treatments. Excitement over the embryonic cells comes from their remarkable ability, as biological blank slates, to become virtually any of the body's cell types. Many observers believe the president's move will accelerate the hunt for cures for some of our most vexing diseases. However, the benefits are largely hypothetical, given the infancy of the field, and are offset by some real obstacles: The risks of embryonic stem cells, as well as cells programmed to become like them, include the possibility they will actually cause cancers in people who receive them. Nonetheless, here's a look at 10 health problems that stem cells might someday cure—or at least help treat:

1. Spinal cord injury. In January, the Food and Drug Administration OK'd its first-ever human study of a medical treatment derived from human embryonic stem cells. The objective: help people with acute spinal cord injuries. While expected to assess only the safety of the treatment, the study also might show if the paralyzed volunteers can regain some feeling in and control over their lower extremities.

2. Diabetes. For the many Americans with type 1 diabetes, whose insulin-making pancreatic cells have been killed off by their immune system, stem cells may be the answer. Last year, scientists reported that they had coaxed human embryonic stem cells into becoming insulin-producing, blood sugar-regulating cells in diabetic mice. The aim: to someday do the same for people.

3. Heart disease. It's the leading cause of death in the United States, and stem cells may provide some relief. Research is underway to see if injecting the cells into the heart could help regenerate heart muscle damaged by, for example, a heart attack. Again, researchers have reported success in rodents.

4. Parkinson's disease. Stem cells may also help those who suffer from Parkinson's, a neurodegenerative disorder that can cause tremors, stiffness, and other movement and speech problems. Studies show that embryonic stem cells can give rise to the dopamine-making neurons that Parkinson's patients lack. When transplanted into rodents with a Parkinson's-like disorder, those replacement brain cells improved the animals' motor function.

5. Alzheimer's disease. Likewise, embryonic stem cells may come in handy against Alzheimer's disease, a progressive and deadly disorder that degrades and kills brain cells, leading to memory loss, cognitive decline, and behavioral problems. Stem cells may give rise to new treatments or even, some say, a cure; other experts have expressed skepticism.

6. Lou Gehrig's disease. There's hope that stem cells could help those with Lou Gehrig's disease, also known as amyotrophic lateral sclerosis, or ALS. The crippling disease comes with a grim prognosis: Many die within three to five years of diagnosis, as their bodies progressively damage muscle-controlling motor neurons in the brain and spinal cord. Scientists are exploring ways to coax stem cells into becoming motor neurons that could be transplanted into ALS patients, restoring their ability to move.

7. Lung diseases. From human embryonic stem cells, researchers in Texas have created transplantable sources of lung cells in the lab. Those lung cells could potentially be used to repair damage brought on by a variety of pulmonary conditions or by lung trauma resulting from a car accident, bullet wound, or sports injury. Unpublished studies using such cells have shown promise for tissue repair in mice with acute lung injury, the group reports.

8. Arthritis. Also called degenerative joint disease, osteoarthritis—the most common form of arthritis—results when protective cartilage in joints wastes away. Once it's gone, it's gone for good. Stem cells could change that. Scientists are examining how best to use them to rebuild lost cartilage and repair shot joints.

9. Sickle cell anemia. Stem cell researchers are exploring ways to correct numerous blood disorders, including sickle cell anemia. Mice have been cured of the sometimes-deadly condition after receiving transfusions of stem cells made from their own skin cells.

10. Organ failure. What better way to ease the shortage of organs for transplantation than to grow new ones? That's what some scientists think, and with stem cells, that vision may become more than a pipe dream. Last year, researchers grew a beating rat heart in the lab with the help of heart cells from newborn rats, preliminary proof of the concept.