

Accelerating Research Towards Cures

En Español

In addition to replacing lost or damaged tissue, stem cells are helping to accelerate drug discovery, drug screening and disease research. Find out how stem cells are used to help fast-track medical research.

How can pluripotent stem cells speed drug development?

How can stem cells model human disease?

How can stem cells address infertility?

How can pluripotent stem cells speed drug development?

Stem cells are expected to dramatically improve the ability of drug companies to screen new drugs for side effects much earlier in the development process— significantly lowering costs and shortening the time it takes to develop a new drug. Right now, all drugs go through extensive animal trials before they are ever given to people. This can take years and cost millions of dollars. And even if the drugs appear perfectly safe in animals—there is no guarantee that the same will be true for humans

The ideal solution to the problem of drug side effects would be to test the drugs on human cells *before* the drugs enter human clinical trials. The most common drug side effects are on the liver, kidney and heart. For that reason, those are the tissues people are trying to create from pluripotent stem cells to use for screening drug toxicity.

With toxicity screening, drug companies would have banks of stem cells from a wide variety of genetic backgrounds. They could then test how heart, liver, or kidney cells created from those stem cells react to a drug—thus weeding out those drug candidates that lead to toxicity in human cells.

This work also could reveal groups of people with similar genetic backgrounds that collectively do or don't respond well to a given drug. This type of personalized medicine would allow drug companies to develop drugs that are safe and effective in targeted groups of people.

Find out More:



[Bruce Conklin talks about screening drugs for toxic side effects with human stem cells\(3:40\)](#)

How can stem cells model human disease?

Stem cells provide a powerful tool for studying how a disease develops in human cells. Pluripotent stem cells created via iPS cell or SCNT technology are *genetically identical* to the person who donated the cell to create the lines. If that person has Parkinson's disease, for example, researchers can take some skin cells from them, grow those cells in a dish and transform them into the type of neurons that go bad in Parkinson's disease. Even though these cells were originally skin cells, they now look and act precisely the same as a neuron with Parkinson's disease. Stem cell researchers can then study the cells to understand what goes wrong when they begin forming the disease in the dish. These studies would then lead to better ways of detecting the disease at an early stage—or finding ways to slow, halt or reverse the condition.

Find out More:



[Fred H. Gage talks about using embryonic stem cells to model disease\(4:30\)](#)

How can stem cells address infertility?

Embryonic stem cells provide the only glimpse of what happens in the earliest days of human development. One of the earliest decisions these cells make is whether to become cells of the germ line (the cells that make up the eggs and sperm). Some researchers think that some forms of infertility may start at this early stage. Information that comes from studying embryonic stem cells as they develop into sperm or eggs could help treat some of the 30% of couples who have infertility issues.

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