

# What is regenerative medicine?

Stem Cell & Regenerative Medicine Center

University of Wisconsin-Madison



**R**egenerative medicine is a new scientific and medical discipline focused on harnessing the power of stem cells and the body's own regenerative capabilities to restore function to damaged cells, tissues and organs.

Researchers in this field seek to understand how and why various kinds of stem cells are able to develop into specialized cells and tissues. Basic scientists and doctors working together are growing stem cells into the specific cell types they hope to transplant into patients to repair or replace damaged or destroyed cells. Researchers also aim to develop tissue replacement therapies that could restore lost function in damaged organs, or perhaps even grow new, fully functioning organs for transplant.

In addition to the study and development of stem cells, regenerative medicine also includes the new field of tissue engineering. Bioengineers working with developmental biologists, physicians, nanotechnologists and other specialists can construct connecting tissues and potentially organs on matrices, or scaffolds made of biological materials to resemble cartilage, bone and other supporting structures that support cellular, tissue and organ growth. This 3D approach mimics human anatomical development much better than anything researchers can come up with in a culture dish. It is the next step to testing therapies for safety and effectiveness before trying them in animals and in people.

Regenerative medicine also seeks to understand and promote the ability of an organ or tissue to repair itself. Many adult tissues contain stem cells, but the stem cells are dysfunctional or

impaired by disease. Using factors to activate and promote intrinsic repair processes in a diseased organ opens up whole new horizons for therapies targeted toward many degenerative diseases.

Thus, specially grown tissues and cells, structures resembling artificial organs, other laboratory-made compounds, and combinations of these approaches make up the regenerative medicine approach to treating injuries and disease. Regenerative medicine can involve the production of new tissue or simply improving the function of existing tissue.

Many UW-Madison scientists are using regenerative medicine approaches to grow cells and tissues with the overriding goal of helping the body repair itself. In some cases, clinical trials pioneering these new therapies are beginning.

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