PERSPECTIVES OF USING STEM CELLS IN MEDICINE

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Stem cells are of great interest for scientists and researches nowadays. And there are several reasons for that.

Researchers hope stem cell studies can help to **increase understanding of how diseases occur.They hopeto generate healthy cells to replace diseased cells (regenerative medicine).**Researchers hope they can train stem cells into becoming specific cells. Stem cells could also be grown to become new tissue for use in transplant medicine, and they can be used to **test new drugs for safety and effectiveness.** Tests could show whether the new drug had any effect on the cells and whether the cells were harmed.

Stem cells are the body's raw materials — cells from which all other cells with specialized functions are generated. Under the right conditions in the body or a laboratory, stem cells divide to form more cells, called daughter cells. These daughter cells either become new stem cells (self-renewal) or become specialized cells (differentiation) with a more specific function, such as blood cells, brain cells, heart muscle or bone. Stem cells are unique — no other cell in the body has the natural ability to generate new cell types.

Researchers have discovered several sources of stem cells, for example, **embryonic stem cellswhich** come from embryos that are four to five days old and can specialize and become any type of body cell. Because of this versatility, embryonic stem cells have the highest potential for use to regenerate or repair diseased tissue and organs in people.**Adult stem cells**are found in small numbers in most adult tissues, such as bone marrow, in placentas and umbilical cords.**There are also adult cells altered to have properties of embryonic stem cells (inducedpluripotent stem cells).** Scientists have successfully transformed regular adult cells into stem cells using a technique called nuclear reprogramming which can prevent immune system rejection of the new stem cells. Finally, **amniotic fluid stem cells which** can be tested for abnormalities, such as Down syndrome, and fetal maturity.

Researchers grow stem cells in the lab. These stem cells are manipulated to make them specialize into specific types of cells, such as heart muscle cells, blood cells or nerve cells. This manipulation may involve changing the material in which the stem cells are grown or even injecting genes into the cells. The specialized cells could then be implanted into a person. Stem cells are used in treatment, too. They are stem cell transplants, also known as bone marrow transplants which use adult stem cells. Adult stem cells are being tested in other applications, including a number of degenerative diseases, such as heart failure. Stem cells from umbilical cord blood have been successfully used in clinical trials to treat cancer and blood-related diseases.

To be useful in people, researchers must be certain that stem cells will differentiate into the specific cell types desired. Researchers don't want to transplant a stem cell into a person hoping it'll become a heart cell. They have found ways to direct stem cells to become specific types of cells, and research into this area has advanced significantly. Embryonic stem cells could also grow irregularly or travel to a part of the body where they're not intended to go. They also, might trigger an immune response in which the recipient's body attacks the stem cells as foreign invaders, or simply fail to function normally, with unknown consequences. So, researchers are working on ways to avoid these possible complications.