

Human embryonic and adult stem cells each have advantages and disadvantages regarding potential use for cell-based regenerative therapies.

Scientists believe that tissues derived from embryonic and adult stem cells differ in the likelihood of being rejected after transplantation.

Adult stem cells (◈ASC◈s) are present in all living humans (and animals) and as such do not pose the same medical problems as embryonic stem cells. For instance, ASCs from bone marrow have been successfully transplanted in sufferers of leukemia and related cancers for many years now. In addition, adult mesenchymal stem cells (eg from adipose tissue) are immuno-privileged cells that even have the ability to be transplanted ◈ without immune rejection.

[!\[\]\(c8d96c8885d3000a912c2582004aed63\_img.jpg\)A small thumbnail image of a stem cell, likely a human embryonic stem cell, showing a cluster of cells.](http://www.istockphoto.com/stock-photo-14696215-stem-cell.php)

The use of adult stem cells and tissues derived from the patient's own adult stem cells means that the cells are less likely to be rejected by the immune system. This is because a patient's own cells can be expanded in culture, coaxed into assuming a specific cell type (differentiation), and then reintroduced into the patient. This represents a significant advantage, as immune rejection of embryonic stem cells can be circumvented only by continuous administration of immunosuppressive drugs, and the drugs themselves may cause deleterious side effects.

In addition, adult mesenchymal stem cells (eg from adipose tissue) are immune-privileged and as such ◈foreign◈ cells (cells from a donor) ◈can be transplanted without rejection by a ◈recipient◈.

One other possible ◈difference between adult and embryonic stem cells is in their possible ◈different abilities in the number and type of differentiated cell types they can become. Embryonic stem cells can become all cell types of the body because they are pluripotent. Adult stem cells may be ◈limited in their ability to differentiate ◈into different cell types from ◈their tissue of origin.

There are however still unsolved medical problems concerning the therapeutic use of embryonic stem cells. The ability of embryonic stem cells to form teratomas is just one of the obstacles confronting the use of embryonic stem cells.

A further problem with embryonic stem cells is that they can only be obtained by destroying a human embryo. This poses ethical and religious issues. However, there are no ethical issues with the use of Adult Stem Cells (◈ASC◈s) because these cells can be obtained from adult human tissue; for example from adipose (fat) tissue.