

Amniotic Fluid Stem Cells

Amniotic fluid stem cells (AFSCs) appear to be a valuable alternative to both embryonic and adult stem cells, offering a new approach to tissue repair and regenerative medicine. Stem cells were discovered in amniotic fluid donated by pregnant women in 2007, representing a novel and ground-breaking finding in the field. Since then, it has become well known that AFSCs are readily available via routine antenatal testing (i.e., amniocenteses). AFSCs also appear to be much more pluripotent (i.e., able to generate a broad range of cell types) than adult stem cells, yet do not involve harming or destroying life at any stage, thus avoiding the ethical dilemma associated with the use of embryonic stem cells.

Amniotic fluid stem cells, which are shed mostly from skin of the developing fetus, can be safely obtained and are routinely harvested from pregnant women undergoing antenatal testing (i.e., amniocentesis) at about 15 weeks of pregnancy. While amniocentesis, which is performed by inserting a needle through the abdomen into the amniotic sac to extract amniotic fluid, is not risk-free, it is often performed during the fourth to sixth months of pregnancy to detect birth defects. Typically, more cells than are actually needed for the test are collected, and AFSCs can be then be banked; in 2009, [Biocell Center](#) Corporation opened the first amniotic stem cells bank in the United States (Medford, MA).

Amniotic fluid stem cells are neither embryonic nor adult. When considered in terms of ability to replicate, AFSCs have been called “intermediate” on the stem cell type continuum, with embryonic stem cells on one end and adult stem cells on the other end. Some researchers believe AFSCs are actually closer to embryonic stem cells in that they can grow large quantities of cells

of many different types for potential therapy. While adult stem cells can change into just a limited number of tissue types, embryonic stem cells can transform into virtually any type of tissue but their growth is difficult to control and they may form tumors when implanted. Overall, compared with embryonic stem cells, AFSCs seem to have high pluripotency and low tumorigenicity and do not carry as high a potential for heated debate and ethical controversy.

The fact that AFSC research does not cause human harm at any stage of life has been positively received by several religious groups who oppose destructive embryonic research. In an article in the 2010 issue of a Vatican newspaper, amniotic stem cells were called, "the future of medicine." The discovery of viable stem cells in amniotic fluid was welcomed as "wonderful news" by Richard Doerflinger of the U.S. Conference of Catholic Bishops back in 2007. In short, using AFSCs instead of embryonic or adult stem cells seems to resolve many of the problems associated with stem cell research from a practical, scientific, and ethical point of view.

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