

# Cell biology essay sample



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This is a summary of the article titled “ Ethical stem cells stripped of ‘ cancer’ genes” found at New Scientist. The article revolves a new method of successfully generating “ ethical” stem cells by two teams at the University of Edinburgh and the Samuel Lunenfeld Institute at Toronto’s Mount Sinai Hospital.

Stem cells are a very hot research topic in the cell biology world. Stem cells are cells which are able to grow and develop into any other cell type in the body. They serve as a kind of blank molding clay out of which any other cell type in the body can be formed. Apart from developing into any other cell, stem cells unlike other cells can replicate endlessly. This gives stem cells extraordinary healing potential. Stem cells give the potential of biologists and doctors growing any kind of tissue the human body needs. With this ability, the need for tissue or organ donations may be rendered moot as doctors can simply “ grow” the needed tissue or organ which is genetically compatible with the patient. Injecting stem cells into damaged tissue can even help regenerate these troubled areas as the stem cells develop to reinforce the tissue (NIH, n. d.).

One controversial aspect of stem cells is their source. Most stem cell research centers on stem cells harvested from embryos made from in-vitro fertilization clinics. While stem cells can be taken from adult humans, embryonic stem cell cultures are much easier to grow in the laboratory – a crucial advantage since large numbers of cells are needed for useful research to be done in the field. This has raised some controversy as detractors have labeled the process as some form of human harvesting due to the use of fertilized human embryos (NIH, n. d.).

One way to get around the ethical concerns has been through the technique developed by Shinya Yamanaka of Kyoto University. Yamanaka used viruses to insert four genes into normal adult human and mouse cells. These four genes acted together to effectively turn back the clock of these cells, making them effective stem cells again. These new stem cells called “ induced pluripotent stem cells” (iPS) circumvent the ethical issues surrounding the harvesting of human embryos. The catch with the use of iPS cells has been the increased risk of the cell becoming cancerous. The retroviruses used to insert genes to create iPS cells may insert themselves into genes which activate cancer behavior. Additionally, the genes activated in iPS cells may themselves trigger cancer in the cell (Aldhous, 2009).

The new method put forward by the researchers in the UK and Canada got around the problem by dropping the use of retroviruses and instead used piggyBac, a parasitic segment of DNA first discovered in insects. When piggyBac encounters a sequence of TTAA in the chromosome, it inserts itself into the chromosomal DNA at that location. What the researchers did was to remove the gene in piggyBac which enabled it to cut-and-paste itself and replaced it with the four genes needed to create iPS cells. Introduction of the altered piggyBac into mouse and human cells successfully created iPS cells with the same efficiency of using retroviruses (Aldhous, 2009).

Apart from simply using piggyBac to reprogram cells into becoming iPS cells, the researchers also used a flaw in piggyBac’s mechanism to remove the inserted gene once the cell becomes an iPS cell. By removing the inserted gene, the researchers are able to avoid the risks of developing cancer due to the inserted DNA segment. When piggyBac goes out of the DNA, the

segment only has 40% odds of reinserting itself into the chromosome. With this knowledge, what the researchers did was to reactivate the piggyBac gene in the reprogrammed iPS cells. They then screened the cells to filter out the 60% in which the piggyBac segment was unable to reinsert itself into the genome. These 60% are iPS stem cells without any trace of the reprogramming genes. Together, these new cells solve the ethical problem of creating stem cells as well as the risks of cancer associated with reprogramming adult human cells into stem cells (Aldhous. 2009).

### Bibliography

Aldhous, Peter (March 1, 2009) “ Ethical stem cells stripped of ‘ cancer’ genes”. In *New Scientist* . Retrieved March 13, 2009 from <http://www.newscientist.com/article/dn16684-ethical-stem-cells-stripped-of-cancer-genes.html>

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