

April 10, 2008

Stem cells 'cleaned up' with antibody terminators

BY WAI LANG CHU

Scientists believe they may have found the key to eliminating stem cells that pose a cancerous threat when it comes to differentiation during the cell's life cycle.

The discovery brings a degree of optimism to current stem cell research, which has stuttered of late because of primary concerns of embryonic cells to efficiently develop into the desired specific cell type, such as muscle, skin, blood vessels, bone or neurons.

Of particular concern is the alarming frequency of which residual stem cells turn cancerous later on.

The scientists from Singapore reported their findings in the journal *Stem Cells*. In the study actual antibodies were created that specifically eliminated these residual stem cells in mice.

By injecting human embryonic stem cells into these mice, the researchers were able to generate these antibodies, which in turn were harvested into a more viable number.

These antibodies were then added to cultured embryonic stem cells that had been newly differentiated on Petri dishes.

To the researchers' surprise, the antibodies targeted the undifferentiated cells within half an hour while leaving the differentiated cells untouched.

"We made antibodies that can kill them (undifferentiated stem cells) ... it acts as a clean up step for you to remove any of these rogue cells or potentially problematic cells," said Andre Choo, senior scientist at the Bioprocessing Technology Institute in Singapore.

Although human embryonic stems cells are a very powerful source to make differentiated cells, such as heart cells, the problem residual cells are almost always present and there is a safety concern because they can form a mass of tumour cells.

So in theory any product that contains a tiny proportion of embryonic stem cells will become a safety concern later on as the product develops and grows.

The researchers continued with their experiment injecting the mice with the antibody/differentiated cell

mixture. Another batch of mice was also injected, this time with untreated stem cells.

Results were as expected after 6-8 weeks with researchers noticing tumours in mice injected with untreated stem cells. Mice that received the mixture of stem cells and antibodies were tumour-free even after 20 weeks.

While results were at the preliminary stage the hope is that this research may form a basis to help understand the risks involved with stem cell development and to develop safe and effective therapies.

Experts have long known that stem cells harvested from embryos can turn cancerous. They have been linked to leukaemias and breast cancer. In order for stem cells to realise the enormous potential for clinical treatment those lingering safety issues need to be investigated and resolved.

Perhaps the most important potential application of human stem cells is the generation of cells and tissues that could be used for cell-based therapies.

Today, donated organs and tissues are often used to replace ailing or destroyed tissue, but the need for transplantable tissues and organs far outweighs the available supply.

Stem cells, directed to differentiate into specific cell types, offer the possibility of a renewable source of replacement cells and tissues to treat diseases including Parkinson's and Alzheimer's diseases, spinal cord injury, stroke, burns, heart disease, diabetes, osteoarthritis, and rheumatoid arthritis.