



Tests helps tease out 'good' stem cells from cancer-causing ones: study

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TORONTO — One of the big worries about one day using stem cells to grow new organs and other tissues for curing disease is that these little regenerative powerhouses could give rise to tumours and end up doing more harm than good.

Now Canadian researchers have found a way to tell good stem cells from bad.

"Basically what we've done is we've created a set of tests," said Mick Bhatia, scientific director of the Stem Cell and Cancer Research Institute at McMaster University.

"And these tests tell you the difference between what was previously ... considered a really good, great stem cell versus a cell that went to the dark side and became a transformed, or cancer, stem cell."

Known as the body's master cells, stem cells have the ability to give rise to, or differentiate into, any tissue type - from heart, lung and liver to brain, bone and skin. Unlike mature cells, which remain the same throughout their lifespan, stem cells can both renew themselves and create new cells of whatever tissue type they belong to.

For example, the body's various types of blood cells are created from bone marrow stem cells. Cancer stem cells are the seeds that produce malignant cells that form tumours.

Bhatia said scientists working in labs worldwide, including his own, would assume that their particular stem cell lines were healthy and able to give rise to a vast array of similarly healthy cells of varying types. (A stem cell line is a family of constantly dividing cells arising from a parent group of stem cells.)

But often when researchers tried to use these so-called high-quality stem cells in experiments, they found the cells didn't behave as they'd hoped.

For example, the McMaster lab manipulated human embryonic stem cells to produce brain cells and implanted them into mice. "It turned out that instead of getting normal, healthy neurons, we actually get a tumour," Bhatia said from Hamilton.

"Normal stem cells and cancer stem cells are hard to tell apart, and many have misconstrued really good stem cells for cancer stem cells that have gone bad," he said, adding that the series of quality-assessment tests his lab has put together should allow scientists to avoid that pitfall.

"We now can tell ... normal stem cells from the bad, cancerous ones."

The research, published Sunday in the journal *Nature Biotechnology*, could have important implications for developing drugs that would target only cancer stem cells, while leaving normal stem cells alone.

Several tumour types, including breast and prostate, are known to contain cancer stem cells that are resistant to chemotherapy and allow a malignancy to recur even after treatment appears to have killed all the cancer.

Researchers often liken cancer stem cells to a dandelion root left beneath the soil: eradicating only the stalk above ground allows the weed to regrow.

Bhatia said the new tests should take some of the guesswork out of screening thousands of drugs and drug combinations by allowing researchers to perform side-by-side testing of normal stem cells and cancerous stem cells.

"Essentially, we can now use this to find the 'magic bullet,' a drug or set of drugs that kill cancer stem cells first and spare the normal healthy ones," he said.