Stem cells born out of indecision

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Scientists at the University of Copenhagen have gained new insight into embryonic stem cells and how blocking their ability to make choices explains why they stay as stem cells in culture. The results have just been published in the scientific journal *Cell Reports*.

This latest research by Joshua Brickman and his research team from Danish Stem Cell Center (Danstem) at the University of Copenhagen specifically found that inhibiting or blocking stem cells ability to make a specific decision, leads to better cell growth and could lead to defined ways to differentiate stem cells.

This research is the first comprehensive analysis of a pathway important for stem and cancer cell decisions known as Erk. As a result this work could contain clues to cancer treatment as well as helping to establish a platform to make stem cell treatments for gut related disorders like the pancreas or the liver.

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Blocking choices

"If you block all the choices they can make, they stay in the stem cell state. If you only allow them one door to exit from the stem cell state, you should be able to make particular cell types more efficiently. So if you only leave one door open then it's the path of least resistance and when you give them a push they really go," says Professor Joshua Brickman.

As embryonic stem cells can become any cell type in the body, they have to make choices. Based on this research, it appears that blocking these choices is the key to making them grow as stem cells. In other words, if these choices are removed the cells simply reproduce more stem cells.

Embryonic stem cells

In an embryo, cells like embryonic stem cells exist very briefly, quickly differentiating into other cell types that will go on to make the entire organism. This new study shows that chemicals traditionally used to grow embryonic stem cells act to block different choices that they would normally make. By blocking these choices, scientists can then transform these cells from the embryo into embryonic stem cells and grow them indefinitely in a dish.

"This creates an intellectual framework to help establish tissue techniques for other stem cells populations and represents a new paradigm for how we think about embryonic stems cells and how we maintain them," says Postdoc William Hamilton from DanStem.

By forcing a cell to go through a particular door by virtue of closing all the other doors, the scientists know need to know what the door is. "On a scientific level we would now like to know what the lock and key looks like and then we can understand how many more doors there are," adds Professor Joshua Brickman.

Provided by University of Copenhagen