Human umbilical cord blood cell co-culture supports embryonic stem cell expansion

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Researchers in Taiwan have developed a "safe, feasible and robust co-culture system" supplied by human umbilical cord mensenchymal stem cells (HUCMSCs) to feed the sustained culture used for human embryonic stem cell (hESC) expansion prior to cell transplantation. The co-culture, said the researchers, "appears to eliminate the most feared characteristic of transplanted hESCs," which is their propensity to form tumors.

The study, published in the current issue of CELL TRANSPLANTATION, is now freely available on-line at http://www.ingentaconnect.com/content/cog/ct/.

"Embryonic stem cells have pluripotent potential," said study co-author Dr. Tang-Yuan Chu of the Buddhist Tzu Chi General Hospital at Tzu Chi University in Hualien, Taiwan. "The sustained maintenance of hESCs depends on a co-culture with an animal based "feeder" that can create the risk for transmitting nonhuman materials and unknown pathogens. To solve this problem, human tissues have been used as feeders."

The expansion of pluripotent hESCs traditionally requires a feeder culture, meaning that a variety of animal and human tissues have been used in feeder cultures.

The researchers note that while hESCs have been successfully co-cultured using human fetal muscle and skin cells, adult fallopian tube

epithelial cells, foreskin cells, and bone marrow stem cells, their study used hUCMScs to create a co-culture. They said that using hUCMSCs as a source feeder has several advantages, including their wide availability, ease of handling and low immunogenicity.

However, according to the researchers, when using various mouse or primate tissues, and even when using human tissues for co-cultures, tumor-like formations called "teratomas" - growths containing tissues belonging to all three germ layers - often form. Although undesirable, teratomas have been used as a marker for the ability of stem cells to be able to develop pluripotency.

This study demonstrated that pluripotency development need not necessarily be teratoma forming.

"We suggest that the feeder we developed from hUCMSCs may support the transition of hESCs that does not grow teratomas because, unlike tissue sources for other feeders, by using hUCMSCs we did not use material comprised of all three germ layers," said the researchers.

"In addition to eliminating teratomas, the proposed system also significantly reduces the workload involved in the preparation of new feeder lines," they concluded.

More information: Ding, D-C.; Shyu, W-C.; Lin, S-Z.; Liu, H-W; Chiou, S-H.; Chu, T-Y. Human Umbilical Cord Mesenchymal Stem Cells Support Nontumorigenic Expansion of Human Embryonic Stem Cells *Cell Transplant.* 21(7):1515-1527; 2012.

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