Researchers first worldwide to generate pluripotent stem cells from horses

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In a world first, pluripotent stem cells have been generated from horses by a team of researchers led by Dr. Andras Nagy at the Samuel Lunenfeld Research Institute of Mount Sinai Hospital and Dr. Lawrence Smith at the University of Montreal's Faculty of Veterinary Science. The findings will help enable new stem-cell based regenerative therapies in veterinary medicine, and because horses' muscle and tendon systems are similar to our own, aid the development of preclinical models leading to human applications. The study was published in the February 28 issue of the leading journal *Stem Cell Reviews and Reports*.

These induced pluripotent stem (iPS) cells can develop into most other cell types and are a source of great hope for use in regenerative medicine and the development of new drugs to prevent and treat various illnesses. One aspect of regenerative medicine is the process of creating living, functional tissues to repair or replace tissue or organ function lost due to damage or disease. "To date, iPS cells have been established from several species, but our study is the first to report the derivation of these changeable cells from horses," Dr. Smith explained.

The research represents a breakthrough for both human and animal health alike. "Equine iPS cells bring new therapeutic potential to the veterinary field, and open up the opportunity to validate stem-cell based therapies before clinical studies in humans," Dr. Nagy said. "As well, stem-cell based studies using the horse as a model more closely replicate human illnesses, when compared with studies in mice."

After two months of reprogramming equine somatic cells, the resulting iPS cell lines expressed hallmark markers of pluripotency, contained a correct set of horse chromosomes, and were able to form a full spectrum of cell types and tissues fulfilling the criteria of pluripotency. The term pluripotency refers to the ability of a stem cell to become any of the vast number of different cell types found in the body. "This means that the cell lines passed all the tests available to us for determining if they truly are what we think they are: pluripotent and a good source for future regenerative applications," said Kristina Nagy, research associate in the Nagy laboratory and lead author of the study.

"The horse is an excellent model for a range of human degenerative diseases, especially those involving joints, bones, tendons and ligaments, such as arthritis," said Dr. Sheila Laverty, a professor in the Faculty of Veterinary Medicine at the University of Montreal. "Bone fracture, as well as damaged cartilage, tendons and ligaments heal poorly in horses. Therefore, the use of iPS cells in these animals may help enhance long-term tissue repair." Further research will be required to develop clinical treatments.

Provided by University of Montreal