Human amniotic fluid stem cells show promise in treating severest type of spina bifida

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DURHAM, N.C. (PRWEB) August 15, 2019 -- A study released today in STEM CELLS Translational Medicine provides compelling evidence of how an injection of human amniotic fluid stem cells can be used to protect the spinal cord of a fetus from myelomenigocele (MMC). The finding could lead to a new strategy for treating this debilitating birth defect that affects about 1 out of every 4,000 children born in the United States each year.

The most severe form of spina bifida, myelomenigocele results when the backbone and spinal canal do not close before birth. It can leave a child with many disabilities, including partial or full paralysis, difficulty with bowel and bladder control, hydrocephalus and developmental delay.

“Despite the poor prognosis associated with MMC, the options for prenatal treatments are still limited,” said the study’s lead investigator, Daigo Ochiai, M.D., Ph.D., of the Keio University School of Medicine, Tokyo, Japan. “Recently, however, cellular therapy delivered to the fetus while in the womb has shown promise for treating birth defects.

“This led us to investigate whether human amniotic fluid stem cells (hAFSCs) might be used to treat fetal MMC, especially since fetal MMC can be diagnosed during an early stage of pregnancy and this gives us an opportunity to isolate hAFSCs from those patients and use them for in utero therapy. To the best of our knowledge, this is the first study to do this,” he added.

Pregnant rats were treated to induce fetal MMC, then injected with hAFSCs in each amniotic cavity. “Overall, we examined 116 rat fetuses with MMC,” said Dr. Ochiai. “Results showed that the hAFSCs exerted their effect on fetal MMC via two different mechanisms: by migrating to the lesions and covering the exposed spinal cords, and by secreting hepatocyte growth factor to protect neural elements and promote neural regeneration.”

Yushi Abe, M.D., also of Keio University School of Medicine, was first author of the study. “MMC is a disease that causes many disorders, but there is no effective treatment,” he noted. “This study shows us that in utero therapy with hAFSCs may be an innovative treatment for fetal MMC. As such, we would like to continue research for human clinical application in the future.”

“The ability to use a cell therapy to treat a condition like spina bifida prenatally with minimal risk to the fetus would be a major advance in treatment,” said Anthony Atala, M.D., Editor-in-Chief of STEM CELLS Translational Medicine and director of the Wake Forest Institute for Regenerative Medicine. “We look forward to seeing the development of this important pre-clinical research.”

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The full article, “In Utero Amniotic Fluid Stem Cell Therapy Protects Against Myelomenigocele via Spinal Cord Coverage and Hepatocyte Growth Factor Secretion,” can be accessed at
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