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Stem cells restore hearing, vision in animals

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WASHINGTON (Reuters) - Stem cells from tiny embryos can be used to restore lost hearing and vision in animals, researchers said Tuesday in what they believe is a first step toward helping people.

One team repaired hearing in guinea pigs using human bone marrow stem cells, while another grew functioning eyes in tadpoles using frog cells.

While there are no immediate uses for humans, they said their findings help describe some of the most basic biological processes underlying the development of hearing and sight, and may help in the development of the new field of regenerative medicine.

"These discoveries illustrate stem cell research's continuing extraordinary potential to treat a wide range of deadly and disabling diseases that affect millions," said Anand Swaroop, a stem cell researcher at the National Eye Institute, one of the National Institutes of Health.

Dr. Sujeong Jang of Chonnam National University in Gwang-ju, South Korea, and colleagues used mesenchymal stem cells from human bone marrow to restore hearing in guinea pigs whose hearing had been destroyed using chemicals.

They grew the stem cells into neuron-like cells in lab dishes and then transplanted them into the inner ears of the guinea pigs. Three months later, the animals appeared to have some hearing, Jang told a meeting of the Society for Neuroscience.

Jang said the goal was to regrow the tiny hair cells that are essential for mammals to hear, although she is not sure yet how the stem cells made this happen.

They would eventually like to try something similar in humans, Jang told a news conference.

"When sensitive hair cells in the inner ear of humans and other mammals are killed -- by loud noise, autoimmune attack, toxic drugs, or aging -- the damage is permanent," Jang said in a statement.

"Birds and reptiles are luckier. Their damaged hair cells apparently regenerate and can restore normal hearing."

Michael Zuber and colleagues at the SUNY Upstate Medical University in Syracuse, New York, grew functioning eyes in blinded frog embryos using stem cells.

Usually, frog stem cells just form skin when grown in a dish. Zuber's team added seven different genetic "factors" that turned on eye formation genes.

When they transplanted the transformed cells into frog embryos, the resulting tadpoles could see out of those eyes, Zuber told the meeting.

They tested the tadpoles by putting white tissue paper over their tank, Zuber said in an interview. Normal tadpoles will stay in the lighter side of the tank, covered by the white paper.

He showed video of blind tadpoles swimming randomly around the tank while the tadpoles with the transplanted cells stayed on the light side.

Genetic tests showed that the stem cells had transformed, a process called differentiation, into many different cell types.

"All the cells that make an eye are in there," Zuber said.

He does not see any immediate uses for people but noted that regrowing many different cell types is the goal of regenerative medicine.

"The retina, like all body organs, contains multiple, distinct cell types. Therefore, successful recovery from blindness due to injury or disease will require the functional replacement of multiple retinal cell types," he said.