

Stem cells used to reattach teeth with new technique

September 29 2010, By Sam Hostettler

A new approach to anchor teeth back in the jaw using stem cells has been developed and successfully tested in the laboratory for the first time by researchers at the University of Illinois at Chicago.

The new strategy represents a potential major advance in the battle against [gum disease](#), a serious infection that eventually leads to [tooth](#) loss. About 80 percent of U.S. adults suffer from gum disease, according to the National Institute of Dental and Craniofacial Research.

Researchers in UIC's Brodie Laboratory for Craniofacial Genetics used stem cells obtained from the periodontal ligament of molars extracted from mice, expanded them in an incubator, and then seeded them on barren rat molars. The stem cell-treated molars were reinserted into the tooth sockets of rats.

After two and four months, the stem cells aligned and formed new fibrous attachments between the tooth and bone, firmly attaching the replanted tooth into the animal's mouth, said Smit Dangaria, a bioengineering doctoral candidate who conducted the research. Tissue sections showed that the replanted tooth was surrounded by newly formed, functional periodontal ligament fibers and new cementum, the essential ingredients of a healthy tooth attachment.

In contrast, tooth molars that were replanted without new stem/progenitor cells were either lost or loosely attached and were resorbed, Dangaria said.

The study, published in an online issue of the journal *Tissue Engineering*, was funded through a grant by the National Institutes of Health.

Dangaria said the natural surface of the tooth played an essential role in the study.

"Our research uncovered the code required to reattach teeth -- a combination of natural tooth root surface structure together with periodontal progenitor cells," he said.

To verify that the ligament was formed by the transplanted stem cells and not by the animal's own cells, [stem cells](#) were labeled with [green fluorescent protein](#) prior to seeding them on the molars and re-inserting the teeth into the animal's mouth, Dangaria said.

According to Tom Diekwisch, director of the Brodie Laboratory, who is senior author on the paper, this is the first progenitor cell-based regeneration of a complete periodontal ligament in which a functional tooth was attached.

"Our strategy could be used for replanting teeth that were lost due to trauma or as a novel approach for tooth replacement using tooth-shaped replicas," said Diekwisch, who is also professor and head of oral biology.

Provided by University of Illinois at Chicago

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