

# Gene therapy effective treatment against gum disease

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Scientists at the University of Michigan have shown that gene therapy can be used to successfully stop the development of periodontal disease, the leading cause of tooth loss in adults. The findings will be published online Dec 11 in advance of print publication in *Gene Therapy*.

Using gene transfer to treat life threatening conditions is not new, but the U-M group is the first known to use the gene delivery approach to show potential in treating chronic conditions such as periodontal disease, said William Giannobile, professor at the U-M School of Dentistry and principal investigator on the study.

"Gene therapy has not been used in non-life threatening disease. (Periodontal disease) is more disabling than life threatening," said Giannobile, who also directs the Michigan Center for Oral Health Research and has an appointment in the U-M College of Engineering. "This is so important because the next wave of improving medical therapeutics goes beyond saving life, and moves forward to improving the quality of life."

The preclinical study offers was a collaboration with the Seattle-based biotechnology company Targeted Genetics. In July, Targeted Genetics released human trial results that showed the same gene therapy approach used to stop periodontal disease had positive affects in human patients with rheumatoid arthritis, another chronic, non-life threatening, disabling condition. The company tested 127 human subjects and showed a 30 percent improvement in pain relief, and gain of function,

among other enhancements using the gene treatment.

People with rheumatoid arthritis are four times more likely to also be afflicted with periodontitis. Periodontal disease is also linked to systemic conditions such as heart disease, bacterial pneumonia and stroke, likely due to the spread of bacteria coming from the oral cavity that invade other parts of the body.

Using gene therapy, Giannobile's group found a way to help certain cells using an inactivated virus to produce more of a naturally-produced molecule soluble TNF receptor. This factor is under-produced in patients with periodontitis. The molecule delivered by gene therapy works like a sponge to sop up excessive levels of tumor necrosis factor, a molecule known to worsen inflammatory bone destruction in patients afflicted with rheumatoid arthritis, joint deterioration and periodontitis.

The gene also delivers quite a bit of genetic bang for the buck. The periodontal tissues were spared from destruction by more than 60-80 percent with the use of gene therapy.

"If you deliver the gene into the target cells once, it keeps producing in the cells for a very long period of time or potentially for the life of the patient," Giannobile said. "This therapy is basically a single administration, but it could have potentially life-long treatment effects in patients who are at risk for severe disease activity."

The next step is additional safety testing on periodontal patients, he said.

Source: University of Michigan

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