

Researcher uses stem cells to attack bacteria and regenerate dental pulp

February 7 2018, by Carrie Stetler



Emi Shimizu's research could someday transform a procedure dental patients dread: the root canal.

Shimizu, a faculty member at Rutgers School of Dental Medicine (RSDM), is studying how to use stem cells to regenerate [dental pulp](#) rather than removing it during [root canal treatment](#).

The good news? As a result of her research, [root canal](#) procedures would

likely be quicker, and the stem cell-generated dental pulp would dramatically reduce the risk of future infections or complications.

The bad news? There would still be no escape from the dentist' drill. Your provider would have to go in to remove infected tissue.

Root canals are performed when infection or injury from a damaged [tooth](#) spreads from the tooth's surface through its root and into surrounding nerve tissue. Dentists or endodontists, who specialize in the procedure, drill into the tooth, remove the infected tissue and fill the hollow with synthetic material. The final step is capping the tooth with a crown. The procedure is performed as a means of avoiding tooth extraction.

But although the tooth remains, it is essentially dead. Pulp maintains healthy teeth and without it, they become vulnerable to injury and cavities. No pulp means there are no nerves to detect the kind of pain that signals infection and no nutrition for teeth due to the absence of blood vessels in the canal. Left untreated, that could lead to an abscess of the bone. But the infusion of new stem cells multiplying within the mouth would attack and kill bacteria, says Shimizu, who arrived in the oral biology department of RSDM last year as a professor.

"My approach is that you should leave the nervous system, including blood circulation. inside as long as possible," she contends.

Her work involves isolating patient stem cells, which can be drawn from skin or hair, and cultivating them to form the vascular network that comprises the nervous system of dentin, the hard bony tissue beneath tooth enamel. At New York University College of Dentistry, where she worked before arriving at RSDM, Shimizu received a \$1.5 million five-year National Institutes of Health grant to pursue her research, which has carried over to RSDM. Shimizu is the only researcher in the world using

stem cells for this purpose.

Japanese researchers have made progress in the regeneration of dead dental pulp, but since the [tissue](#) is only revived, not substituted with new cells, the procedure is only successful with younger patients, whose cells are more robust, Shimizu says.

Also, [stem cells](#) that work for this procedure can only be cultivated from cells removed from baby teeth or wisdom teeth, which means the [cells](#) would have to be stored for years at high cost, according to Shimizu.

Last month, Shimizu received approvals to begin tests on mice, which would eventually lead to human clinical trials. Within 10 years, she expects the pulp procedure to be available to the public.

Her hope is that it will give patients more treatment options. "People should have a choice between a traditional [root canal](#), which would be cheaper, or a regenerative procedure. That should be worldwide," she says.

Provided by Rutgers University

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