

Genetic discovery could lead to advances in dental treatment

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Researchers have identified the gene that ultimately controls the production of tooth enamel, a significant advance that could some day lead to the repair of damaged enamel, a new concept in cavity prevention, and restoration or even the production of replacement teeth.

The gene, called *Ctip2*, is a "transcription factor" that was already known to have several functions - in immune response, and the development of skin and the nervous system. Scientists can now add tooth development to that list.

The findings were just published in the *Proceedings of the National Academy of Sciences*.

"It's not unusual for a gene to have multiple functions, but before this we didn't know what regulated the production of tooth enamel," said Chrissa Kioussi, an assistant professor in the College of Pharmacy at Oregon State University. "This is the first transcription factor ever found to control the formation and maturation of ameloblasts, which are the cells that secrete enamel."

The researchers used a laboratory mouse model in this study in which this gene has been "knocked out" and its protein is missing. Such mice lack basic biological systems and cannot live after birth, but allow scientists to study what is there, and what's missing.

In this case, the mice had rudimentary teeth ready to erupt, but they

lacked a proper enamel coating, and never would have been functional.

"Enamel is one of the hardest coatings found in nature, it evolved to give carnivores the tough and long-lasting teeth they needed to survive," Kioussi said.

With an understanding of its genetic underpinning, Kioussi said, it may be possible to use tooth stem cells to stimulate the growth of new enamel. Some groups are already having success growing the inner portions of teeth in laboratory animal experiments, but those teeth have no hard coatings - the scientists lacked the genetic material that makes enamel.

"A lot of work would still be needed to bring this to human applications, but it should work," Kioussi said. "It could be really cool, a whole new approach to dental health."

Many people have problems with eroded tooth enamel, including people who smoke, drink and especially some who use illegal drugs such as methamphetamine. And most cavities start as a hole in tooth enamel that allows decay to begin.

Source: Oregon State University

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