Genetic discovery could lead to advances in dental treatment

Scientists find gene responsible for tooth enamel production

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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 Cip2l, 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 Science.

“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 research 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.

This research was supported by the National Institutes of Health and the OSU College of Pharmacy. The study was a collaboration of scientists from the OSU College of Pharmacy, College of Science and College of Engineering, and the Institut de Genetique et de Biologie Moleculaire et Cellulaire in France.
IADR’s Williams calls for excellence and impact in research

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MIAMI, FL, USA: The President-Elect of the International Association for Dental Research (IADR), Dr David Williams, has encouraged colleagues to focus on conducting research that has practical significance for global oral health. In his speech at the IADR’s 87th General Session and Exhibition in Miami, he said that the profession has a responsibility to ensure the continuation of research. “But in Europe we have a new mantra: Excellence with Impact,” said Dr Williams in his speech entitled Global Uncertainty and Global Challenges, which was attended by 5,000 researchers, including a large contingent from Latin American and Asian dental schools, as well as presidents of the FDI World Dental Federation and of national dental organisations.

The President-Elect said researchers as the torch-bearers of global oral health face a challenge: “We are well aware that the global burden of oral disease is immense and our leadership in these issues is essential”. He added that dental caries is one of the most common chronic diseases worldwide, periodontal disease affects up to 15 per cent of the population, and oral cancer is the eighth most common cancer worldwide.

“We need fundamental research, to improve our basic understanding of the diseases which concern us,” explained Dr Williams. “But we also need to deliver ethical, effective, evidence-based care. We need effective prevention, as well as more effective treatment, and we need to establish the kinds of workforce that are appropriate in different global settings. And all of this without thinking about the links between oral and systemic health, and the implications this could have for general health and well-being.”

In addition, the current President of the IADR Dr J. M. ‘Bob’ ten Cate of the Netherlands called for an International Year of Oral Health within five years, to bring oral health to the attention of a significantly wider audience.

The IADR’s 87th General Session and Exhibition in Miami was held from 1 to 4 April. Upcoming meetings are the World Congress on Preventive Dentistry in Phuket in Thailand, 7–10 September 2009, and the IADR General Session and Exhibition in Barcelona in Spain, 14–17 July 2010.
EU develops guidelines for use of Cone Beam imaging

New guidelines have been established for European practitioners using Cone Beam Computed Tomography (CBCT). The Basic Principles on the use of Cone Beam CT—developed by the European Academy of Dental and Maxillofacial Radiology (EADMFR) in collaboration with the EU-funded SEDENTEXCT project—strive for the safe and ethical use of CBCT in dental surgeries.

“In many European countries, dentists can purchase and use CBCT without any additional training and so there was a pressing need to establish some guidelines,” explained SEDENTEXCT coordinator Professor Keith Horner, University of Manchester, U.K. “The 20 Basic Principles are aimed at protecting the patient and guiding the dentist towards good practice, covering important areas such as justification and optimisation of CBCT examinations and training of users.”

Among the Basic Principles are guidelines about when CBCT examinations may be justified, as well as information about training, equipment and safety measures. Dr Lessmaart Figayre, EADMFR President, said he hopes the document will become a core standard within Europe for dentists, dental specialists and equipment manufacturers.

Agreement closed at Dubai meeting

Dentists from the Middle East and North Africa will soon be able to benefit from collaboration between the FDI World Dental Federation and the AEEDC meeting in Dubai. In early March, the AEEDC’s Executive Chairman Abdul Salam Al Madani and the President of the FDI Dr Burton Conrod signed a memorandum of understanding that aims to provide registered members of the FDI and AEEDC with Continuing Education Programmes. Agreements were also closed between the AEEDC and dental associations in Iraq, Iran, and other Arab and Asian countries, which will allow more dentists to participate in AEEDC Dubai in 2010.

“AEEDC Dubai managed to impose itself as a strong competitor in holding high profile conferences and exhibitions,” Dr Conrod said. “It provides an excellent opportunity for dentists in the Gulf Region to update their skills and knowledge while networking with colleagues from around the world.”

AEEDC Dubai is one of the largest dental events in the Middle East. The most recent show boasted 20,000 trade visitors of whom 6,000 were conference attendees, according to a press release. An industry review also revealed that new contracts worth US$300 million were signed between exhibitors and local dealers.

AEEDC ranks fifth in the dental meeting survey conducted by the organisation international dental manufacturers (idm). In 2007, the AEEDC organisers hosted the FDI Annual World Dental Congress.