Genetic variation linked to increased periodontitis risk

Study findings suggest genetic testing can play central role in personalized prevention strategy

Study results published in June in the Journal of Dental Research demonstrate — possibly for the first time — the role genetic testing can play in the prevention of periodontitis, which reportedly affects 47 percent of adults in the United States.

The study looked at the benefits of creating personalized preventive dental treatment plans based in part on a patient’s genetic makeup. Researchers explored the influence of three key risk factors for periodontal disease and tooth loss — smoking, diabetes and genetics — in relation to varied frequencies of preventive dental visits that included cleanings.

Part of the intent of the research was to accumulate data that would help measure societal costs and benefits of scheduling two preventive dental visits per year, the standard for patients covered by typical dental-care plans.

The researchers examined claims data from 5,147 patients who had not previously been diagnosed with periodontitis. By tracking 16 years of claims history and conducting genetic testing, researchers determined that patients with genetic variations of the IL-1 genotype, or one or more of the other risk factors examined, were at significantly increased risk for tooth loss and could benefit from greater frequency of preventive care. The IL-1 genetic variation, which nearly one in three Americans reportedly carry, was identified as the most prevalent risk factor.

At the other end of the spectrum, the data indicated minimal benefit in scheduling two versus one preventive visit for patients that remained free of the three risk factors targeted. The researchers did note, however, that the study was isolated on tooth loss as the measurement of the effectiveness of long-term preventive care. Other potential benefits of two or more annual preventive dental-care visits by patients not showing any of the three risks analyzed were not considered. For example, caries prevention might have been considered.

See PERIODONTITIS, page A2
Periodontitis, page A1

was not considered separately. Another study limitation listed by the researchers was the inability to determine from the data exactly why tooth loss occurred, because of no uniform use of diagnostic codes being in place. The researchers also acknowledged that they were not able to compensate for potential selection biases across the study populations versus being able to examine data derived from a true random sampling across the treatment groups being analyzed.

But even with the limitations, the researchers concluded that the study’s findings “may provide a proof-of-principle” that there is opportunity to provide more effective preventive oral care through the use of risk-based patient assessment that includes genetic testing.

The research was conducted under the direction of Dr. William Giannobile, Najjar endowed professor of dentistry and biomedical engineering and chair of the Department of Periodontics and Oral Medicine at the University of Michigan. Dr. Daniel Dufﬁe, professor emeritus of molecular medicine at the University of Sheffield (England) and co-author of the paper, said, “Personalized medicine is an important frontier in oral health care driven by the clinical application of genetic and molecular information. Genetic-based risk assessment has long promised to improve prevention and treatment of chronic diseases.”

Dr. Kenneth Kornman, CEO of Interleukin Genetics, the company that developed the genetics test used in the study, points to the study’s ﬁndings as representing feedback from professional organizations that are in place. “Dentistry has long been a leader in the delivery of preventive health care to patients,” Kornman said. “The ﬁndings of this study provide dental clinicians with additional two dental cleanings per year did significantly greater value than two cleanings per year.”

Periodontitis initiation and progression is driven by two factors: bacterial plaque that initiates the disease and the body’s inﬂammatory response to bacteria, which, when overly aggressive, can cause breakdown of the bone and tissue that support the teeth. This inﬂammatory response varies greatly within the population and is signiﬁcantly inﬂuenced by individual genetic makeup.

Genetic testing can identify patients who have an increased inﬂammatory response to oral bacteria, which signiﬁcantly increases risk of periodontitis and tooth loss. Smoking and diabetes also contribute signiﬁcantly to the risk of periodontal disease.

“Ultimately, patients should be evaluated by their dentist regularly and receive needed preventive care before any symptoms of periodontal disease appear. This disease can result in disﬁguring bone loss around teeth and has been implicated as a risk factor for multiple systemic conditions that beneﬁt from early stage prevention,” said periodontist Donald S. Clem, DDS, diplomate, American Board of Periodontology and past president of the American Academy of Periodontology.

“Historically, we have lacked the prognostic tools to effectively identify patients at greatest risk for periodontitis. This study underscores the need to adopt a genetic, risk-based approach and gives patients a compelling new reason to visit the dentist for a comprehensive periodontal evaluation. As we see with other chronic diseases, identifying and understanding genetic predisposition to disease is a critical component of long-term prevention.”

Periodontitis is a bacterially induced chronic inﬂammatory disease that destroys the bone and gum tissues that support the teeth. It is one of the most common chronic diseases of the body. It causes bleeding and swelling of the gums, loose teeth, bad breath and can ultimately lead to tooth loss. According to the researchers, severe periodontitis has been associated with increased risk for a number of other diseases, including cardiovascular diseases, diabetes and rheumatoid arthritis.

The entire research paper, “Patient Stratification for Preventive Dental Care,” can be viewed on or downloaded from the Journal of Dental Research website at www.jdr.sagepub.com.

The Journal of Dental Research is a peer-reviewed scientiﬁc journal focused on emerging knowledge relevant to dentistry and the health and disease of the oral cavity and associated structures.

Highlights of the study
• Explores the frequency of preventive dental visits (dental cleanings) in adults and the role of three key risk factors: smoking, diabetes and genetics in the progression of periodontal disease leading to tooth loss.

Stresses the importance of dental visits to diagnose the disease before symptoms present.
• Findings represent how genetics can be used to prevent a disease that is preventable, costly and prevalent.

For patients with one or more risk factors categorized as high risk, the traditional two dental cleanings per year had signiﬁcantly greater value than one cleaning in preventing tooth loss.
• For high-risk patients with two or more risk factors, two cleanings per year did not appear to be sufﬁcient to adequately prevent tooth loss.

About Interleukin Genetics
Interleukin Genetics develops and markets a line of genetic tests under the Inherent Health and PST brands. It markets its tests through partnerships with health care professionals and other channels. Products include a proprietary genetic risk panel for periodontal disease and tooth loss susceptibility sold through dentists. It is headquartered in Waltham, Mass., where it also operates a DNA testing laboratory certiﬁed under the Clinical Laboratory Improvement Amendments (CLIA). Learn more at www.ilgenetics.com.

(See Journal of Dental Research and Interleukin Genetics)

A recent study conﬁrms that genetic testing can identify patients who have an increased inﬂammatory response to oral bacteria, which can signiﬁcantly increase their risk for periodontitis and tooth loss. Photo by Dana Roth, www.dreamstime.com.
1913 Rolls-Royce used as frontline dental surgery in WWI sells at auction

A Rolls-Royce used as a mobile dental surgery during World War I sold for more than $1.1 million at the Bonhams Goodwood Festival of Speed Sale on July 12. The winning bid fell within the pre-auction of estimate of $925,000 to $1.23 million.

The winning bidder was described by the auction company as being a car enthusiast with no connection to dentistry. The 1913 Rolls-Royce 45/50hp “Silver Ghost” London-to-Edinburgh Tourer was originally bought by a wealthy Englishman in September 1913, before passing to its second owner, Auguste Charles Valadier, in October 1915.

Valadier, a French American living in Paris, would become instrumental in pioneering the development of maxillofacial reconstructive surgery to treat service personnel injured during World War I.

With the outbreak of hostilities in 1914, Valadier was eager to help the war effort in some way. He volunteered his services to the British Red Cross Society in Paris, which accepted him for duty in October of that year.

Valadier established the first unit dedicated to the treatment of facial injuries, with the unit’s work contributing to the later progress of plastic surgery for use in facial reconstruction.

By the end of 1916 Valadier was stationed at Boulogne and the Rolls-Royce — then bodied in limousine style — had been modified to incorporate a dentist’s chair in the rear.

A colleague who worked alongside Valadier at the time said, “In Boulogne there was a great fat man with sandy hair and a florid face, who had equipped his Rolls-Royce with a dental chair, drills and the necessary heavy metals. The name of this man was Charles Valadier.”

Valadier would serve throughout the war, earning the Chevalier of the Legion of Honour in 1919 and being knighted in 1921, having been granted British citizenship the previous year.

After Valadier’s ownership, the Rolls-Royce was returned to limousine coachwork and later served as a breakdown vehicle, complete with jib crane at the rear.

The late Denis Flather, a wealthy industrialist based in Sheffield, England, bought the car in 1965. He rallied it extensively in England and other countries for more than 25 years. Flather’s son placed the car with Bonhams for auction.

The 1913 ‘Silver Ghost’ London-to-Edinburgh Tourer was once the property of a pioneering French-American dentist who volunteered for the Red Cross during World War I.

(Source: Bonhams)