Researchers discover new material that could make dental fillings more durable

By OEMUS MEDIA

A recent study has found that a compound used to make car bumpers more robust and protect wood decks could make dental fillings last twice as long. The results of the investigation will help design fully formulated adhesives to be tested in clinically relevant conditions, and as a result, dental patients could reduce the number of visits to the dental office.

A team of researchers at the Oregon Health and Science University School of Dentistry in Portland has created a filling material that is twice as resistant to breakage than conventional fillings. The new filling uses the additive thiourethane, which can also be found in protective coatings for cars and wood decks.

The team has also developed an adhesive that proved to be three times stronger after six months in use than the adhesives that are currently used to keep fillings in place. Combined, the new adhesive and the composite are designed to make more enduring dental restorations.

"Today’s dental restorations typically only last seven to ten years before they fail," said Dr. Carmem Pfeifer, an associate professor in the Department of Restorative Dentistry at the school and corresponding author of the studies. "They crack under the pressure of chewing, or have gaps form between the filling and the tooth, which allow bacteria to seep in and a new cavity to form," Pfeifer said. "Every time this happens, the tooth under the restorations becomes weaker and weaker, and what starts as a small cavity may end up with root canal damage, a lost tooth or even life-threatening infections," she continued.

The dental adhesive uses a type of polymer, known as (meth)acrylamide, that is much more resistant to damage in water, bacteria and enzymes in the mouth than the standard adhesives currently used in the dental industry. The composite material uses thiourethane, a chemical compound that can better withstand chewing.

The study describing the adhesive is titled “Use of (meth)acrylamides as alternative monomers in dental adhesive systems” and was published online in Dental Materials on Feb. 27, 2019, ahead of inclusion in an issue.

The study on the material is titled “Toughening of dental composites with thiourethane-modified filler interfaces” and was published online on Feb. 19, 2019, in Scientific Reports.
Prof. Jörg Strub receives the fifth P-I Brånemark Award

By DTI

The fifth annual P-I Brånemark Award for Lifetime Achievement in Dentistry has been given to Prof. Jörg Strub of the University of Freiburg in Germany. Strub received the prestigious accolade in absentia, with his colleague and friend Dr Kenneth Malament accepting it on his behalf.

At the award ceremony, Malament reminded an assembly of Strub’s colleagues and friends that he “is an individual who has put his whole life into dentistry—there is simply no one like him. He is the best of his generation,” Malament said.

Mark Ferber, founder of Channel3, which presents the award, told Dental Tribune International that “Jörg Strub has perfectly represented, throughout his career, the five characteristics of Prof. Brånemark, on which the award is based. Dr Strub is a scientist, a clinician, an educator, a humanitarian, and a sage.”

Strub received his DDS, Dr Med. Dent. and Dr. Med. Dent. habil. degrees from the University of Zurich in Switzerland in 1973 and 1985, respectively. Since 2001, he has been Associate Dean for Clinical Affairs at the University of Freiburg.

Established in 2015 in honour of Swedish physician and father of modern implantology Prof. Per-Ingvar Brånemark (3 May 1929 to 20 December 2014), the eponymous annual award recognises exceptional clinicians who have advanced dentistry for the well-being of society. The first award was given in 2015 to Dr Myron Nevins of Boston in the US. In 2016, Dr Tiziano Testori of Lake Como in Italy received the second award. Dr István Urbán of Budapest in Hungary received the third award, in 2017. The fourth award was given to Dr Michael Cohen, founder of the Seattle Study Club, in 2018.

This year’s award was presented in the OEMUS MEDIA and Dental Tribune International IDS media lounge on Thursday.

ROOT SUMMIT community meets at the 38th IDS in Cologne

By DTI

On Thursday, friends and members of the ROOTS SUMMIT community gathered at the 38th IDS in Cologne for coffee and croissants. The brunch provided an opportunity to discuss next year’s meeting, which will take place at the Cubex Centre Prague from 21 to 24 May in Prague in the Czech Republic.

After the success of ROOTS SUMMIT 2018, the anticipation for next year’s event is high. Co-chairman Stephen Jones said, “Before ROOTS SUMMIT 2018 had finished, we began planning ROOTS SUMMIT 2020. We knew we were going to have a challenge matching the quality and depth of the programme we had in Berlin, but our scientific chairman, Dr David Jaramillo, has managed to put together another outstanding programme. We have nine of the top speakers in endodontics, and we also have the pleasure of having Dr Maxim Belograd give us his perspective on how to increase your endodontic success from a restorative point of view.”

Other notable speakers at ROOTS SUMMIT 2020 include Dr Jaime Silberman and Prof. Matthias Zehnder. A final programme will be available on www.roots-summit.com within the next few days, and registration will open on 21 May 2019. More information about the event can be found on its Facebook page (@roots-summit2020).
Interview: “We definitely passed a tipping point for 3-D printers”

By Brendan Day, DTI

Powered by 3D Systems’ proprietary Figure 4 technology, the NextDent 5100 is a high-speed dental 3-D printer designed to save time for both patient and practitioner. Dental Tribune International spoke with Rik Jacobs, dental and 3-D printing manager at 3D Systems; Sebastiaan Cornelissen, CEO of Cordent and Core3dcentres; and Dr Michael Scherer, an American prosthodontist, about the NextDent 5100 and future trends in dentistry.

Is the NextDent 5100 designed specifically with the dental lab in mind, or can it be used in a dental practice as well?

Rik Jacobs: Essentially, I designed this product to be used by both labs and clinicians with success.

Sebastiaan Cornelissen: We found that the most important thing was to have a system that can incorporate multiple machines and multiple materials if necessary. This flexibility was the main feature that we were looking for, and the NextDent 5100 delivers this.

What are the benefits of the NextDent 5100 for dental labs?

Cornelissen: In the dental lab, you have similar time pressure issues to a dental practice. You need to be able to produce things fast, in multiple colours and often in large quantities. To be frank, these are all easily achievable with this printer.

Often, a dentist will send some scans to us so that we can quickly create a smile design for the dentist to print a mock-up of in his or her office. Though we are based in the Netherlands and have clinicians working with us from Germany, the NextDent 5100 allows for this entire procedure to be conducted in less than 2 hours.

What has the feedback been since the launch of this printer? What have customers most liked about it?

Jacobs: What was important for us, besides what these gentlemen had already mentioned, was that the printer have a high level of accuracy. With ten years of experience in the 3-D printing industry, I’ve learnt that a lot of printers work fine in the beginning but lose their accuracy over time. When 3D Systems acquired my company, we decided to make sure that our printer would work without issue, day in and day out, for at least three years. Flexibility, speed, accuracy and, ultimately, affordability of the machine and the materials—these, along with training and ongoing support from our outstanding resellers, are the foundations of the NextDent 5100.

We got a lot of feedback from users of this printer, like Michael and Sebastiaan, and thankfully our R & D team in San Diego really listened to what they asked for. What the market asked for I think this is what our company should always do: listen carefully to our customers and deliver what they need and want.

Are software updates included? Jacobs: Automatically. As long as the user is connected to the Internet, he or she will be able to have the latest updates automatically downloaded to the printer.

It’s predicted that, within three to five years, more than 50 per cent of dental labs globally will have an in-house 3-D printer. What, in your opinion, is driving this growth?

Jacobs: Well in 2018, we definitely passed a tipping point for 3-D printers here at 3D Systems. Thanks to easier registration, certification, improved ease of use, and a range of other factors, it has become much more achievable to integrate a 3-D printer into one’s daily workflow.

Scherer: Clinicians are now expecting dental labs to be digital and to have printing capabilities. It’s no longer a case of whether a lab will take your files, but rather if they print themselves or still outsource it. That’s how fast 3-D printing has grown in dentistry.

Interview: “We intend to ultimately develop a daily use oral care product with a natural substance”

By DTI

The fight against dental caries has produced a variety of innovative ways in which patients can protect and improve their oral health. After much interest and a number of published articles on a study into the potential use of berry extract to combat decay-causing bacteria, Dr Neville, vice president and general manager spoke with lead researcher Dr Nebu Philip, from the University of Queensland in Australia, to discuss this new discovery in more detail.

Dr Nebu, the study sounds very interesting. How did the idea for the research topic arise, and who are you working with?

We were interested in developing natural products that could potentially be used to complement fluoride in dental caries prevention. Although there has been extensive literature suggesting the use of natural products for preventing dental diseases, the vast majority of natural product research studies in dentistry are laboratory-based and have not progressed to clinical usage.

I am part of the broad research group called Advanced Materials and Technologies, which is headed by Dr Laurence Walsh. Under this group we had a sub-group focusing on natural products and dental caries — which includes Drs Walsh, Leishman, Randara and myself. I was the lead researcher of the natural product study, with the group coming together three years ago at the beginning of my PhD programme.

What was the basis of your research concept?

We sought to identify an appropriate natural product. Dark coloured fruit berries are known to contain a variety of phytochemicals beneficial to health. The availability of commercial fruit berry extracts with standardised phytochemical concentration offered the possibility of testing these polyphenol-rich extracts against key cariogenic bacterial virulence properties. We progressed from a series of laboratory studies to a double-blinded randomised controlled trial in high caries-risk patients. We have presently completed all these studies and are planning our next clinical trial in a larger cohort of patients.

What do you think the most interesting results were?

The ability of the berry extracts, especially the cranberry extract, to significantly inhibit Streptococcus mutans virulence without affecting bacterial viability was probably the most interesting result. This suggests the possibility of incorporating the cranberry extracts into a daily use oral care product, for example a mouthwash or dentifrice, to reduce cariogenic virulence without affecting health-associated bacterial species in dental plaque, an important advantage over commonly used synthetic biocides, like chlorhexidine.

Do you have further research plans to develop a new oral health product?

The results of our first clinical trial were encouraging. After further clinical studies, we do intend to ultimately develop a daily use oral care product with a natural substance incorporated into it to protect against dental caries. Watch this space!
New realistic mouth models aim to improve dental education

By DTI

BIRMINGHAM, UK: New research being carried out in collaboration with the University of Birmingham will allow dental students to train on dental models that possess the tactile qualities of real mouths. Among the applications will be learning how to use periodontal probes to check for periodontal disease. The project is being run by Dr Michael Milward, a reader and honorary consultant in periodontology at the university’s School of Dentistry. Dr Paul Cooper, Professor of Oral Biology at the school, and Richard Arm, a senior research fellow at Nottingham Trent University in the UK. The models feature realistic gingivae and tongues to allow students to learn how to examine the mouth and check for disease safely. Both the tongue and the gingivae are made from synthetic gels and fibres and vary in hardness to mimic living tissue, whereas the teeth and jaw bones are made from bone-simulating resin.

“These models meet an unmet need in dental education and will allow us to better prepare our students for clinical work,” said Milward.

“The feedback we have received from students and staff has been extremely positive and the final version has already been introduced into undergraduate teaching,” he continued. “While some models are commercially available, no models combine the replica hard and soft tissues in this way to provide a realistic learning experience.”

According to Milward, these developments provide a huge step forward in dental education and benefit not only dental students, but also the retraining dental workforce and patients. The researchers aim to further enhance the models to allow dental students to evolve additional clinical skills.

“The aim is to give students the psychological experience of how it feels to perform real dentistry, but in a safe learning environment,” said Arm. “Until now, current dental models haven’t provided a realistic enough experience for students and the inclusion of a tongue will mimic the challenge which dentists face and better prepare them for their first clinic.”

The mouth models replicate hard and soft tissue to provide dental students with a realistic learning experience. (Photograph: University of Birmingham)