

SPRING 2023
Istanbul, Türkiye

EDSA *Magazine*

ARTIFICIAL INTELLIGENCE

Current applications and the dental market

STUDY TIPS

Stay motivated and believe in yourself

EXTERNAL AFFAIRS HOT TOPICS

Your career and education

SOCIAL MEDIA IN DENTISTRY

Sharing is caring... or is it?



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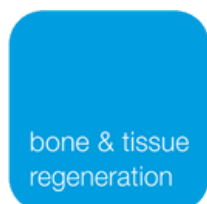
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EDSA Magazine Team



Christa Serban
Editor-in-Chief

Dear EDSA Family,

Welcome to the Spring 2023 Magazine! It is a real honour for me to take over the role of Editor-in-Chief and continue the tradition of the EDSA Magazine. This edition covers a wide range of topics and I would like to thank all the dental student writers across Europe who produced these interesting articles. In such a diverse profession as dentistry, exploring different perspectives is essential in finding solutions that benefit our patients and the population at large. The EDSA Magazine is made by dental students for dental students and I invite any interested students to contribute to future editions of this magazine. I would like to extend a big thank you to my Magazine Co-Editors Aurora Fratila and May Firoozmand, whose hard work and ideas make this publication possible, and to our sponsors for their generous support.

Whether you are reading this Magazine from the 71st EDSA Meeting in Istanbul or from home, I hope you enjoy it.

Yours truly,
Christa



Aurora Fratila
Co-Editor



May Firoozmand
Co-Editor

Dear readers,

You have in front of you the first Magazine issue of this term. The team may be new, but the interest of dental students all over the European region to contribute with amazing articles to our EDSA Magazine stayed the same. This large variety of interests of dental students from different backgrounds demonstrates once again, how passionate our future dentists are about their profession. I truly hope you enjoy your read and we'll see each other again in the Summer Issue!

With love,
Aurora

Dear aspiring dentists,

It has been a great pleasure working alongside my dear colleagues Christa and Aurora, I have been warmly welcomed to the team. In this year's Spring issue we have compiled a true diverse range of innovating and interesting articles. We offer our special thanks to all the enthusiastic writers who have contributed tirelessly to this springs issue!

We hope this Spring's issue re-ignites your passion for dentistry and encourages you to explore different fields of dentistry that maybe you had never considered.

Warmest greetings,
May



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president@edsaweb.org



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vpinternal@edsaweb.org



VP of External Affairs
Charlotte Carter, FRA
vpexternal@edsaweb.org



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pr@edsaweb.org



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Ezgi Yeşiltan, TR
community@edsaweb.org



Policy Officer
Milena Hegenauer, GER
policy_officer@edsaweb.org



Mobility Officer
Klara Križan, CRO
mobility@edsaweb.org



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prevention_officer@edsaweb.org



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volunteer_work_officer@edsaweb.org



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President's Word

Dear EDSA Family,

To begin, I would like to welcome everyone who is currently reading this in Istanbul and express my wish to meet all of you who are reading this online. I hope we will see each other at our next meeting in Liverpool.

I am very happy EDSA came back on track after a few years of ups and downs with COVID-19 and cancelling the meetings.

Currently, we are on half of this term and all I can say is that I am very happy with the Board and the work they are giving for EDSA. This year's Board members are very proactive and I can proudly say that we have launched many projects, starting with Podcast, opening Alumni Network, organising new Volunteer projects, writing new Meeting Guidelines, new Delegates' Manual, etc.

Furthermore, I am very proud of our members who are actively participating in all our projects. I have been in EDSA since 2018, and I can say that the engagement of our members is increasing yearly. We are very happy that our members are promoting one of our biggest goals – promoting dental students' opportunities as wide as possible. A living example of that is tremendous activity in all our prevention projects, volunteer projects and especially organising and applying to so many Mobility projects.

I deeply hope that our work is not going unnoticed and that we are motivating all of you to join our family.

I wish all of you a very nice meeting and I hope you will enjoy reading the rest of the Magazine!

Warm regards,

Marta Adam

EDSA President 2022/23



EDSA Board at Gala Night, 70th EDSA Meeting Palma de Mallorca, August 2022



Use of finite element method in dentistry

Marija Diković

University of Belgrade, Faculty of Dental Medicine, Serbia

What do you get when you combine dentistry with mechanical engineering?

The finite element method is a computational method that was first applied in mechanical engineering as a solution for complex calculations of bodies of geometrically irregular and complex shapes, whose mechanical properties had to be examined. Even today, this method is most widely used in mechanical engineering - in the aviation and car industries, in the design of astronaut vehicles, etc. Moreover, dentistry also encounters similar challenges.

How can the characteristics of various objects that are implanted in the jaws be examined? How can we predict the behavior of the surrounding tissues that support the transmission of forces?

The questions are endless, but the solution can be found precisely in the finite element method. Namely, for all bodies with an irregular shape, such as teeth, implants, bone and plates, it is necessary to divide them into a mesh of small geometrically regular shapes that will approximate the shape of the given object. Those small parts which will represent the examined object are called elements. Although these elements are numerous, their number is finite, which is how the method got its name. Their shape is regular, they are connected to each other in a mesh and there are nodes at their junctions. The process of translating a complex geometric body into a mesh of elements is called discretization and it enables the computer that performs the calculation to apply equations for predicting the characteristics of a given object (Figure 1).

The finite element method has found application in many branches of dentistry, such as oral and maxillofacial surgery, implantology, orthognathic surgery, orthodontics, prosthodontics, restorative dentistry, endodontics and many others.

However, it found its greatest application in the field of oral and maxillofacial surgery and implantology, where due to ethical reasons as well as the impossibility of repeating experiments on living tissue enabled success and predictability of the implants, surgical plates, potential fracture sites of already weakened bones and more.

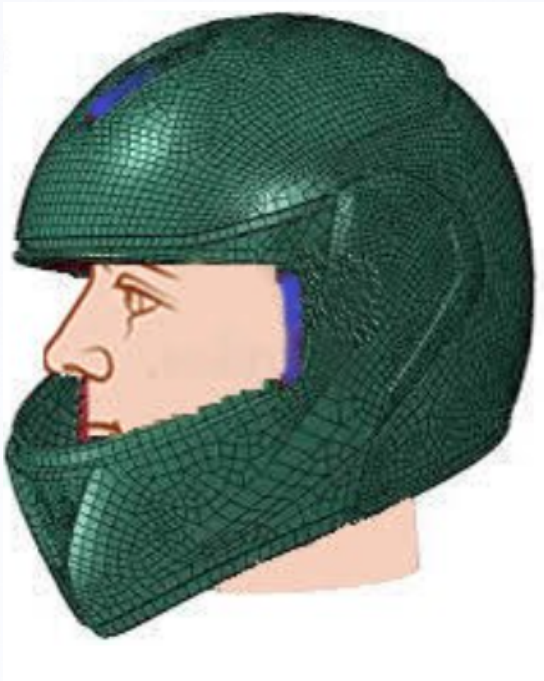
From idea to realization - let's mesh it up!

One of the most common indications for the finite element method is implantology. The constant search for the ideal shape, size, surface and thread design and implant material represents a challenge for the market. The ideal implant is the one with the most suitable response to the applied load represented by the occlusal forces and which most favorably tolerates the stresses and strains that develop in the implant itself. It is precisely these parameters that are examined by the finite element method - stress, strain and dislocation of a given implant under load, as well as stresses and strains in the surrounding alveolar bone. Mechanical analysis is complex in biological systems because of the nature of the tissues, non-homogenous environment and irregular shape.

How to simulate implant behavior under the load? Well, of course, with a mesh!

First step - Creation of a virtual model

It is the most time consuming part of the finite element method and it consists of gathering all the information about the object's geometry, designing the elements and the mesh, defining the material characteristics and expected loads as well as boundary conditions of the system. Finite element modeling represents the creation of virtual CAD models and simulation of their behavior under examined conditions, validation and interpretation of given results. Model design can be done manually through specific softwares or information about design can be implemented automatically from scanning the real objects.



Without defined boundary conditions, the calculation would have an infinite number of solutions for a given model, therefore it is necessary to define the degree of freedom for each node of the element in all three possible directions of movement in terms of possible translation and rotation. The forces that appear in the object are vectors defined with a point of attack, an intensity and a direction. The place where the load acts, for example masticatory forces is entered usually based on the clinician's knowledge of the particular anatomical region. The force can be directed in the way that the fibers of the muscle exerting the force are directed, mimicking the real masticatory forces.

Use in oral and maxillofacial surgery

How to predict the path of the fracture line during the surgery?

The best way to avoid a complication during the surgery is to predict one and prevent it from happening. As mentioned, the finite element method can be used for analysis of the potential fracture places of bones weakened by pathological process or potential places of fractures during and after surgery procedures.

Expansion of the fracture line and possibility of further fractures during surgery are being caused by distribution of stress, which can be predicted using this method. By entering the CT model of a patient's craniofacial bones with all necessary information about its density and shape contained, it enables the individualization of the treatment and precise analysis of biomechanical characteristics of stress and strains developing along the fracture line. In all the cases where great bone loss is present due to a pathological process or is necessary to fracture the bone during the procedure, for example in orthognathic surgery, the risk of complications caused by traumatic loads are high, so different surgical approaches may be necessary to consider.

The finite element analysis can also be used not only as a tool when trauma already happened but also as a powerful tool for prevention of such events. In all contact sports protective gear is designed so that it enables maximal protection on those places prone to fractures caused by great forces applied in that particular activity. For example, industry for fabrication of protective helmets impregnates the design based on the most common places of direction of excessive force action which usually cause zygomatic bone and orbital bone fractures (Figure 2.)

There is always a place for improvement!

The need for stable and predictable results has always been an imperative in dentistry. The modern approach and precise computation of this method enables a detailed insight into the mechanical characteristics of each object placed inside the oral cavity, as well as the biomechanical response of surrounding tissues to its presence. Non-invasiveness and reliability make this method ethically and financially convenient, but time-consuming. It is necessary to be experienced in software design and to be familiar with tissue characteristics in order to achieve precise and correct computation. Although it enables individualization of a complex surgery approach, because of the time-consuming design, its use is still the most dominant in the sphere of implantology, where it unlocks numerable abilities for improvement of its design and characteristics.

Alveolar bone characteristics can be set up in the software or implemented from digital radiography methods such as CT. CT is often used for individual treatment plans in different types of surgeries, where virtual bone density and design is defined using the Hounsfield units and design from the patient. Translating the geometry of a physical body into an finite element meshed model involves the division of that object into smaller elements which contain nodes at the point of element contact. A node is a coordinate point where stress, strain and displacement are defined by the load acting at the given point.

Loads are representing occlusal or any other expected forces. Different numerical simulations can show the place of the least resistance of the examined implants, teeth, surgical plates, bone etc. but as well as the most affected parts of implant-bone interface. Inside each designed meshed object different geometric shapes of elements are used. As previously explained, models are defined as three dimensional, so are its elements. The mesh of the analyzed object represents an approximation of the real object. The mesh can be more precisely designed (with a bigger number of smaller elements) in the zones of particular interest and less precisely designed in some other parts of the object (smaller numbers of bigger elements), which makes computation more accurate and effective.

After the formation of the network, data on *the property of the material* is entered. Of particular interest are the linear elastic properties of materials such as stretching and compression, which occur in response to body loading. The two most frequently used properties are Jung's Modulus of Elasticity and the Poisson's ratio. Jung's Modulus of Elasticity represents the force that is necessary to deform the body elastically. As the body has a higher modulus of elasticity, a greater force is needed to deform it, that is - it is less elastic. Poisson's ratio shows how much the material shrinks if it is stretched, and how much it expands if compressed, and represents the ratio of side lateral and axial deformation.

Step two - Let's create the environment for the object

Boundary conditions are conditions that limit the movement of the body as a whole - movement restrictions, and conditions of the load.

For references:





Study tips for dental students

Sofja Sevalkina
University of Tartu, Estonia

Sometimes, it's really hard to combine your studies, work in the clinics and your leisure time. Also, it's really hard to keep your focus on important things, while there are so many distractions around you: friends, social media, your phone and your own procrastination. Moreover, all of the dental faculties have not only dental but also the general medicine subjects, which both are really hard and professors are so demanding, so a fresh dental student will dive in this huge amount of information and can easily lose their interest and motivation to study just from the beginning (cause the real medicine is not the one we are shown in Grey's Anatomy TV show). We are all young, we are determined, we don't want to wait but get everything here and now, in other words, we're just tearing between lots of things and staying with nothing in the end.

Here are some top tips that will help you to stay on track with your studies:

DON'T COMPARE YOURSELF WITH OTHERS

Everyone has their own life = priorities, goals, hobbies, background. If your classmates have already read the whole book, while you have barely coped with half of it - don't panic! Yes, you still should be aware of it, to stay competitive but take your time and hold your own pace. The only person you should look at - is you. So, be proud of it and go on!

PLAN YOUR LIFE

Write down your schedule, all the tasks, assessments, exam periods, holidays and other important things in advance to make your life easier. Sacrifice some time to plan your day, week, month and semester, and save much more in the future. Good time-management will help you get everything done on time, not forget anything and keep you away from unnecessary stress. So daily planners or online calendars might be your choice.

STORE YOUR MATERIALS WISELY

Try to copy everything to your cloud, where you have access from all your electronic devices. Make a folder so you don't lose all the important links, instructions, books, professors presentations, trustworthy articles you have been searching on your own and which can be useful in the future at your dental practice. Add there Anything can happen but you will still have all the materials doubled. Moreover, you can return to this cloud later, when you finish your studies.

DON'T BE AFRAID OF THE TEACHING STAFF

Ask questions if you don't understand something. Professors are there to help, not to torture you. Sometimes, they are even waiting for someone to share their knowledge with, so be curious and they will give you way more information than you expected to get.

FOCUS

While studying, try to take away all the things that can disturb you, warn your parents or dorm neighbors that you are busy right now. Try to find or create a place for yourself that gives you a studying atmosphere. Set a timer for studying-resting periods, use Pomodoro Technique, Pareto Principle or focus apps, find the best way of memorizing information and revising the material for yourself and be clear about what you want to achieve.

NOT EVERYTHING IS WHAT IT SEEMS

Doing academic work, try to always check the information and find different resources to confirm it and be concerned. Think critically!

BE SOCIALISED

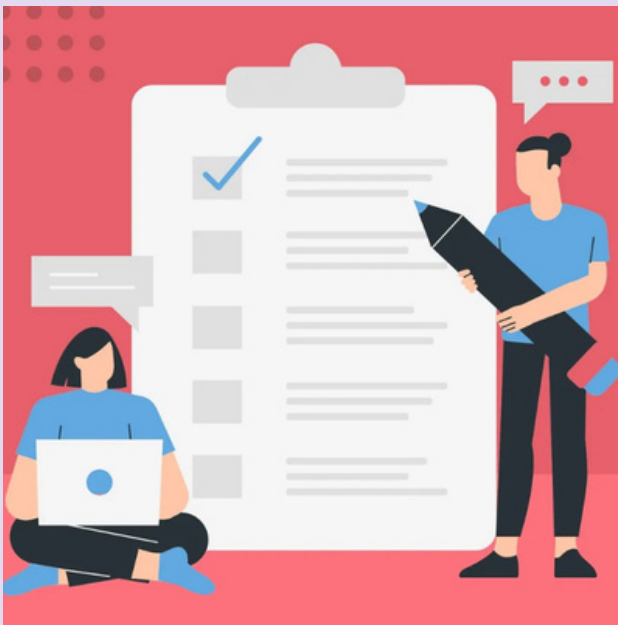
University – is a great period to find different interesting people and discover something new for yourself. So take up a new hobby, become a part of a student organization, participate in university events, go out and be open to making new friends. Experienced students from higher dental courses will give you useful advice on how to survive in the university or share some insights with you: how to pass an exam, where is the best cafeteria located or what is the ideal place to study. Perhaps, some of them will even share their notes or presentations with you. Making friends with your course mates is also crucial, because you can study in a team, divide the tasks effectively, help and support each other.

KEEP HEALTHY

Session period can appear to be pretty harsh, but the golden rule is to stay disciplined no matter what and follow your own daily routine. Try to go to sleep and wake up at the same time each day – good sleep is the key to a good day; do sports, because a healthy body = healthy mind; eat healthy and balanced food; have a walk in the fresh air.

DO SOMETHING APART FROM YOUR STUDIES

Life has so many things to offer and university is only a part of it. Try to find a balance between everything. Becoming a good doctor and being a professional in your field is important. But if you dedicate all your time and thoughts to it, you will get burned out and lose interest too fast. So separate your studying and resting days, reward yourself, fill your week with interesting events or meetings with friends that will motivate you to get your tasks done faster and have a well-deserved rest.



BE CALM

You missed an obligatory seminar, didn't send your homework on time or failed your exam?

First of all – it's not the end of the world and there is always a second chance. Second of all – we are all people, we are all making mistakes and we all have to accept that we can't be the best at everything. So one thing we can do is to analyze the situation and learn from them. That's all experience. And remember: if the situation is shit, it's still a good fertilizer for your future.

STAY MOTIVATED AND BELIEVE IN YOURSELF

When you start to feel down, surround you with good examples of people who succeed no matter what. Listen to the podcasts or interview with them, read biographies, talk to the graduated students.

Surround yourself with dentistry: watch the videos on YouTube, start to follow some doctors on Instagram to watch their cases and take pictures of your work to see the progress. And of course, believe in yourself! Because you are the only person, who was, is and will always be alongside you. So if you don't believe don't yourself, who will then?

All in all, being an active dental student is hard but still possible. And there is only you to decide what student and eventually what type of dentist you want to become, what goals to set and what to achieve during your studies. Everything is in your hands, so try to enjoy every day and take everything from your unrepeatable student life.



EXTERNAL AFFAIRS HOT TOPICS



CHARLOTTE CARTER

Brest Dental University, France

Your EDSA Vice President of External Affairs is coming to you with some hot topics that have been discussed in the last term in the hopes to tickle your interest on what is happening concerning your career and your education.

1 – WHO Global Oral Health Status Report

Coming on top! The WHO Global Oral Health Status Report has been talked about all throughout the dentistry field in the past months. The WHO Global oral health status report reviews the most recent data on major oral diseases, risk factors, health system challenges and opportunities for reform. It highlights the major areas of action that need to be taken. To find out more about this topic head over to the interview with Benoit Varenne from WHO.

2 – New guidelines and recommendations are pending – EFP (European Federation for Periodontology) / ESE (European Society of Endodontics).

In the last few months, EDSA has been involved in working groups with EFP and ESE for new recommendations in the periodontal and endodontic fields. It is important to study these recommendations and ensure that we keep up with the latest scientific data in our daily practice. Many different topics were covered and we hope that all the fruitful work is soon to see the light in the coming months.

3 – Student poverty and the impact of inflation

It is not news to anybody, the impact of inflation throughout the countries has hit many families and students. Sadly, many students have been affected by this and most importantly in regards to the energy costs. Having access to higher education is becoming more and more difficult for those who are less off. It is for these reasons that different actors in the student world are working hard to accompany and help those in need, all while bringing forward testimonies to higher officials.

4 – Student congress

Recently, IADS (International Association of Dental Students) held their Mid-Year congress in Northern Cyprus. They elected their President-Elect : Lamis Elsheikh, the current President, shall be continuing for another term. EDSA looks forward to continuing to find ways to collaborate with them.



Charlotte Carter and Ivana Ligusova at the FDI Meeting in Geneva in September 2022.



Deniz Naz Bilgic and Charlotte Charter at CED Meeting in November 2022 in Brussels.

5 - Interprofessional education

It has been discussed before but it remains on the table : working with all the different actors of the healthcare fields is important to optimize the care and treatment of our patients. The dental associations continue to assess and discuss this topic and mostly how we can implement global healthcare treatment within our studies early on. In regards to Public Health and the aging population, it is necessary to imagine how we can accompany the future generations.

6 - Dental education

It is not a myth to anyone - the education and the curriculums in our different member countries differ. Whether it be our clinical formation or our theoretical lectures, even though we are all following the same topics, the content can vary. Many associations are discussing the differences, mostly in clinical practice, between the students of European countries. Are students ready to pass onto professional work? Have they received enough training? Associations such as the ADEE are doing their best to look out for us and implement educational standards in the community.

7 - Refugees

Sadly, the past years and months have experienced natural disasters, conflicts and inflation. This has impacted the movements of the different populations throughout the world. Adapting to a new influx of refugees can be difficult and so it has been crucial to highlight the best ways to help people in need. Volunteer projects are booming and on a student level, EDSA hopes to support any of the people in their community if they are in need.

9 - Sustainability

Sustainability is still a hot topic ! Ensuring that we protect the planet and its population is still a recurrent topic in the dentistry and student worlds. Whether it be through the student associations or all of the other actors in dentistry, ecology and sustainability are still assessed and talked about : how to improve our practices, how to ensure sustainable help to different populations, how to be mindful in regards to sustainability... For more information about these topics, we invite you to take a look at our recent podcast with YSOH (Youth for Sustainable Oral Health).

10 - Digital Dentistry

Last, but definitely not the least, Digital Dentistry ! We are hearing more and more about digital dentistry and it is necessary that we try and offer all of our students an access to this speciality. It is for this reason that we have created ties with the European Association of Digital Dentistry and hope to come back to our community with interesting projects in the near future.



Charlotte Charter represented EDSA at the FEDCAR Meeting in December 2022 in Paris.



GREEN DENTISTRY IN DENTAL EDUCATION

Saulė Skinkytė

Institute of Dentistry, Faculty of Medicine, Vilnius University, Lithuania

Global warming, pollution of the atmosphere and increase of waste in landfills, all define the crisis of our generation's time. Climate change and its diverse effects on mass food production and access to fresh water sources have the potential to make planet Earth inhospitable to live (1). Dentistry as a resource-intensive field contributes to massive greenhouse gas emissions, produces pollutants, and generates significant quantities of non recyclable waste (2). To reduce negative environmental impact caused by oral healthcare and to promote sustainability, implementing green dentistry into daily clinical practice and dental education must be considered. Today, curricula of oral health professionals across the globe lacks incorporation of such subjects (3). Considering the variety of accessible resources, the ways to approach the inclusion of green dentistry in dental education can be adapted to each educational system individually. By contributing to this massive change, dental schools are taking the first step in motivating future specialists to make environmentally conscious clinical decisions and to carry out sustainability driven responsibilities.

Developing curriculum that includes green dentistry

Although many dental educators are motivated to contribute to the wellbeing of our planet by teaching younger generations about applicable principles of green dentistry, the gap in the knowledge of environmental sustainability and a lack of educational strategies act as barriers to implementing these goals into reality (4). A clear need has to be established for the creation of teaching materials and guidance for educators and those responsible for curriculum development (5). To begin with, educators should consider using policy documents in response to the climate emergency produced by multiple national and international stakeholders as a base for longitudinal integration of green dentistry courses across the educational material.

Dental schools should focus on the suggestions provided in the Joint Stakeholder Statement for Consensus on Environmentally Sustainable Oral Healthcare 6. Learning outcomes, teaching and assessment activities could be developed and shared collaboratively with dental students (7). Student-centered approach to curricula may lead to encouraging students to get more involved in raising awareness about sustainable practices to the wider society and it could present more opportunities for educators to logically embed environmental sustainability within their curriculum.

Encouraging students to get involved

Cocreation of resources—both between student colleagues and with teaching staff, means that student involvement in the exercise can be assessed, as the quality of potential outputs. Several strategies that include making quizzes, applying flipped learning can be tied together in innovative ways, such as asking the students to make environmentally conscious reflections on clinical observations across a number of activity domains. Discussing the negative environmental impact of travel, waste and energy utilization can provide new insights and propose practical solutions to resolve the problems (8). As students prepare to move into a clinical environment, environmental sustainability could be incorporated as a part of key areas such as patient care planning, preventive dentistry, and decontamination (2; 9). Teaching materials and resources that allow staff and students to develop a basic and common understanding of green dentistry should be introduced first, then over time, this can be built on to include other learning and assessment strategies. Therefore, a diverse approach of combining opinions and suggestions coming from different backgrounds on ways of engaging the oral healthcare community to actively apply green dentistry principles in clinical practice can result in getting as many future dentists involved as possible (10).

A multi-faceted approach to integration of Sustainable Development Goals (SDGs) in dental education supports a shift to a green economy and is necessary to develop evidence-based approaches to clinical practice for successful outcomes regarding the current state of the environment (11).

Green dentistry in educational dental practice

Higher education institutions and dental educators should motivate and empower students to be advocates of green dentistry to drive sustainable change. Future dentists should be encouraged to consider the environmental impact of the products they use and to be motivated to choose alternatives that have a lower one whenever possible. Raising awareness about green dental materials like composite fillings made from renewable resources can consequently lead to sustainable outcomes 12. Educational institutions should consider providing their students with options to choose between using eco-friendly, biodegradable, or recycled dental materials during their clinical practice. In addition, dental schools must consider prioritizing the use of artificial intelligence as it is decreasing the environmental impact that dentistry is currently accountable for (13). Both, digital x-rays, and computer-aided design, reduce the need for physical materials, such as x-ray films and impressions. Artificial intelligence also provides more accurate treatment planning. It minimizes the overall need for repetitive clinical procedures that decreases waste related to dentistry in the landfills (14). Dental students should be encouraged to apply the principles of green dentistry in their profession by learning about its benefits to the economy. Many environmentally friendly dental materials and technologies are more durable and require fewer repairs as they can be more cost-effective in the long run (15). Dental schools should opt for using energy-efficient lighting and appliances, water-saving technologies, and recycling materials to set a followable example for students to do the same after they graduate. By choosing eco-friendly products and artificial intelligence, dental practitioners can save

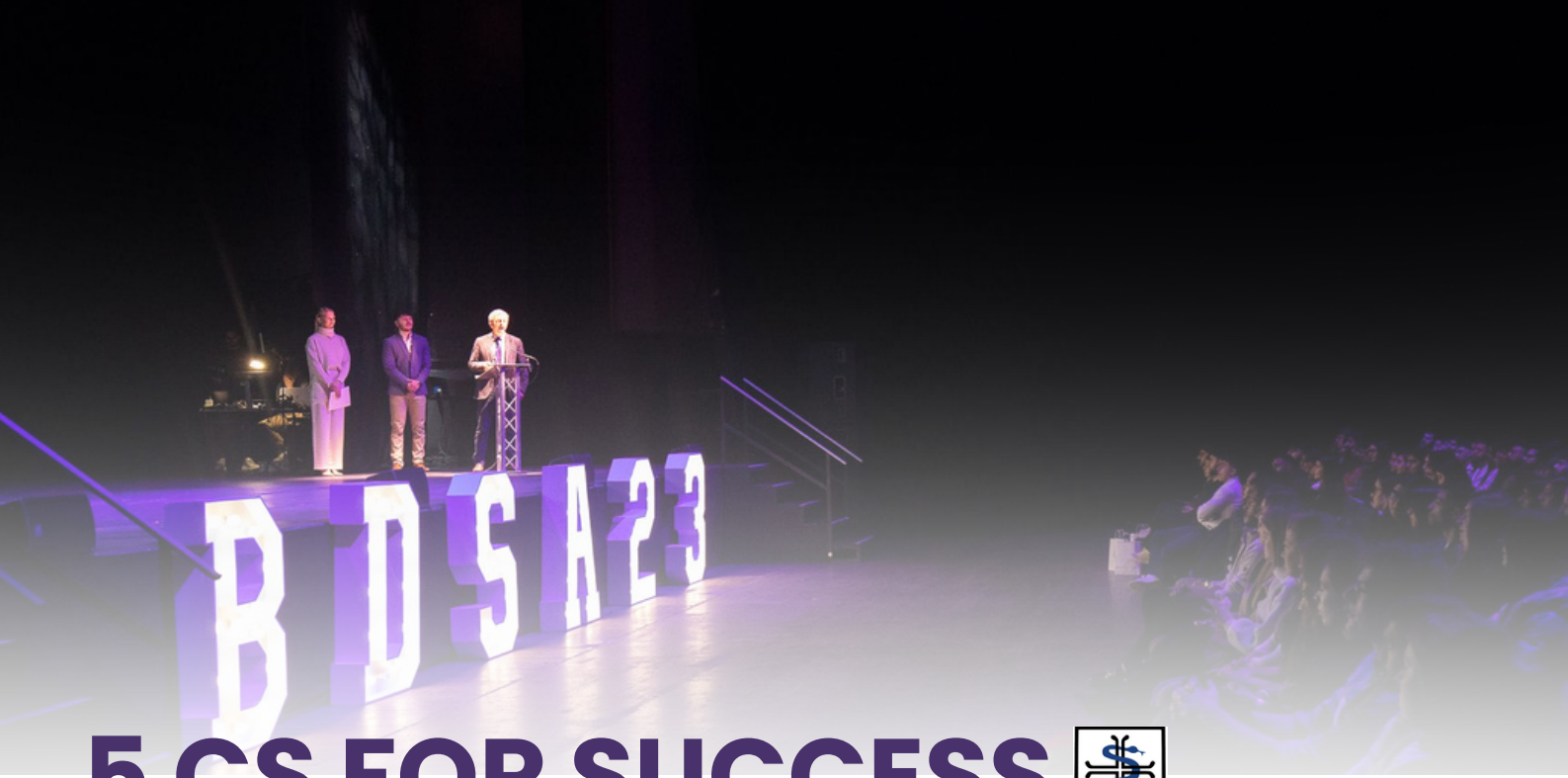
money on materials and energy costs and decrease their overall operating expenses (16). Following up the inclusion of green dentistry in the curricula of oral healthcare professionals dental schools oversee educating a new generation of dentists who prioritize preservation of our planet and its limited resources. Future oral health specialists who practice green dentistry are more likely to act sustainable whilst focusing on a patient's wellbeing, and combining the usage of environmentally friendly dental materials and technology during their clinical practice.

Conclusions

Climate change is happening and dentistry, as a profession, should be doing its part by joining the green shift in reducing the environmental impact it causes. By embedding high-tech approaches also known as green dentistry into dental curriculum, educators can ensure that the service model for dentistry that supports and maintains wellness is encompassed. As the demand for green dentistry grows, it is important for dental schools to be provided with proper educational tools and methods to motivate students to become environmentally friendly practitioners whilst they are still learning. Education programs should include training on green dentistry principles and promotion of sustainable dental materials and technologies. By incorporating green dentistry in dental education, future dental professionals will be better equipped to provide environmentally friendly and cost-efficient care to their patients as well as single handedly fulfilling their duty of first doing no harm (Classical Latin: primum non nocere). Incorporating green dentistry in dental education is a key to make a significant shift in the course where regular dentistry negatively displays itself at. Practicing environmental sustainability in day-to-day practice has desirable impacts that reach well beyond the environment and include society, profession and wider economy.

For references:





5 CS FOR SUCCESS

JOSHUA KENNEDY
QUEEN'S UNIVERSITY BELFAST, UK



In March 1942, the British Dental Students' Association (BDSA) was founded in Manchester, United Kingdom (UK). The BDSA continues to promote the educational and social interests of the dental students of the UK as well as represent dental students on a national and international level. Goals for 2022/2023 are community, communication, collaboration, charity and certification.

Community will be achieved through the organisation of the BDSA's two popular annual events: Conference and Sports Day. The BDSA Conference will be hosted by the University of Plymouth and the BDSA Sports Day will be hosted by the University of Leeds this year. Additionally, I have proposed the formation of a BDSA Alumni Network so that members can remain actively involved in the Association.

Communication will be achieved through the launch of the BDSA website in 2023; a working group has been formed, led by my predecessor Jitesh Jassal, to make continual updates and developments to this throughout the year.



The website endeavours to be a professional platform for both the student-body, sponsors and the public to learn more about the BDSA and the work it does. The work of Jitesh Jassal on the website will be supported by the Communications Officer, Gurleen Muker, and Communications Co-Lead, Afra Rahim, who also both have their own independent goals regarding Communications for the BDSA. Gurleen Muker is working on the launch of a BDSA E-newsletter to be circulated to all dental students across the UK, providing updates and news on existing and upcoming BDSA events and projects. Afra Rahim is keen to create an online forum that will allow dental students across the UK to engage with one another and discuss academic, social and wellbeing related matters. The Communications team this year will also continue to enhance networking and engagement on the various BDSA social media platforms. For more information, please visit the BDSA Linktree ([linktree/bdsaofficial](https://linktree.com/bdsaofficial)).



Community Communication Collaboration Charity Certification

Youseff Al-Wahab is the Treasurer of the BDSA this year and one of his main responsibilities is to oversee the distribution of Douglas Jackson Grant. This Grant has been available to the student-body since 2015 and presents the opportunity to dental schools to receive funding and support for the organisation of larger scale events that help to bring dental students from different schools together.

Collaboration is to be accomplished through work with the BDSA's various UK and international partners and sponsors, which the BDSA is hugely grateful for and looks forward to cultivating stronger relationships with this academic year.

I am delighted that the BDSA and the British Dental Association (BDA) Students Committee are thriving as students are our future. The BDA Future Leaders Programme commenced in November 2022, providing career development opportunities for selected UK dental students. The BDSA continues to raise awareness of the BDA Benevolent Fund, a charity supporting dental students, dentists and their dependents.

The BDSA works alongside other organisations in the UK including the Dental Schools Council (DSC), College of General Dentistry (CGDent) and Diversity in Dentistry Action Group (DDAG).

Outside of the UK, I have held meetings with members of the Union Nationale des Etudiants en Chirurgie Dentaire (UNECD). The French national dental student association carries out a range of impactful projects. I hope that this synergistic collaboration allows for shared resources, the overcoming of obstacles and a greater community awareness of the activities of both organisations.

The EDSA is an example of a longstanding partner of the BDSA. Jitesh and I will be attending the 71st EDSA meeting Istanbul in April 2023 alongside other selected UK students. This meeting will be an excellent opportunity to network with and learn from the members of other national dental associations across Europe. With the 72nd meeting of the EDSA being hosted in Liverpool this year, the BDSA hopes to strengthen relations with the EDSA.

Charity, as per Article 17 of the BDSA Constitution, is at the heart of everything the BDSA aims to achieve with 30% of all profits made every academic year going to the BDSA's annual Chosen Charity. Last year, the BDSA donated £2,924.09 to CLEFT (<https://www.cleft.org.uk/news/links-with-the-bdsa>). CLEFT aims to provide long-term, sustainable ways to improve cleft care both in the UK and overseas. The Chosen Charity for 2022/23, proposed by Emma Ross from the University of Glasgow, is Chris's House. This is a centre for help, response and intervention surrounding mental health and suicide. More information about the amazing work this charity does can be found at <https://chrisshouse.org/our-story/>.

In addition, through the introduction of the BDSA Charity Awards, I hope to both commend an individual dental student and dental society for their outstanding contribution to charity endeavours. In doing so, the final goal of Certification will be achieved. This will be an annual award from 2022/23 presented to a dental student and President of the dental society who has not necessarily raised the highest sum of money, but one who has gone above and beyond in effort to make a significant charitable difference.

In conclusion, success has a variety of interpretations that depend on the perspective of the person/group of people trying to achieve it. I trust that these "5 Cs" ensure that the BDSA achieves its core aims; to promote unity and liaison between dental students in Britain; to promote the educational and social interests of the dental students of the UK; as well as represent dental students on a national and international level.



Artificial Intelligence in Dentistry: The Future Is Now

A Quick Look Through the Past, Present and Future of AI in Dentistry

Can Kozanli

Istanbul Medipol University, Faculty of Dental Medicine, Türkiye

Since ancient times, humanity seems to have a passion for making creations that resemble themselves. This phenomenon appears even in Greek mythology when Hephaestus creates Talos, a giant bronze automaton, at the request of Zeus, to protect Europa in Crete from invaders and pirates. Humanity has also been writing its perspectives on how it would be like to have robots around since the 1920s, pioneering with 'R.U.R' by Karel Čapek*. Our fondness for this quest is very probable to have elicited the concept of AI long ago. Apart from mythology and popular culture, it all started with the predecessor of the modern computer -the enigma machine- an invention which led to the idea that machines can think and participate in decision-making.

Research reached a milestone when John McCharthy developed a programming language and co-founded AI as an academic discipline with Marvin Minsky. It was boosted with the advent of the Internet and digitization, which rendered a vast amount of data. Although it had its ups and downs, it is at the pinnacle due to the increased CPU and GPU of computers today.

But how does this relate to dentistry? Before addressing this probing question, we must first clarify some terms.

"What we want is a machine that can learn from experience..."
-Alan Turing (1947)

Technicalities

Artificial Intelligence is defined as 'the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages (1). Currently, there are two versions of AI utilized in healthcare services: physical and virtual. Physical AI applications are an integration of robotics with AI whereas virtual AI is mostly software-type algorithms that are employed in supporting clinical decision-making processes (2). Moreover, virtual AI is essentially subdivided into knowledge-based and data-driven AI, also known as machine learning (3). The first entails knowledge acquisition with manual initial effort and development time (4). The latter runs on data elicited from human activities. Due to the surging digitalization trend in both dental and medical records, data-driven AI catches the most attention among all other forms (5),(6). Data-driven AI improved with the architecture of artificial neural networks which are a set of algorithms to compute signals via neuron-like nodes(nonlinear units) to imitate the human brain (7). A more enhanced form of neural network design is a deep neural network that is also named deep learning. It uses multiple neural layers to yield multiple hidden patterns between the input and output (8). Today, state-of-the-art convolutional neural networks that can handle large and complex data sets are the most widely used data-driven AI architecture in dental research (9).

Academia and Future Prospects

Now that we have covered the tedious details, we can move on to the intriguing part. Since the last decade, there is a more-than-ever increase in the number of research conducted in multiple fields of dentistry on AI. Most of this research appeared to be in the field of oral diagnosis and radiology with the least being pedodontics and oral pathology (10),(11). A plethora of empirical research has been carried out so as to further understand AI's potential for a wide range of applications.

It is predicted that within 10 years time AI will be developed enough to do most of our daily tasks without our help (13). With the combination of Internet of Things (IoT) fashion, cloud storage and AI, we might be able to evaluate patients' oral hygiene habits in terms of preventive dentistry (14). Some papers even mention that we are likely to have AI-supported and individualized all-comprehensive care systems to assess patients pre-,intra-and post-appointment in the future (15). Nonetheless, some other papers emphasize that the lack of standardization concerning data security, privacy, ethics and transparency should be addressed before further clinical implementation of AI (16),(17),(18).

Current Applications and Dental Market

From a clinical standpoint, AI-based algorithms have been around for a while. There are numerous clinical decision support systems with many futures to encourage faster and more accurate diagnoses as well as relieving the workload in clinics with hectic schedules (19). They offer assistance to dental professionals in various areas such as intraoral monitoring with OraCheck®, interpretation of 2D and 3D scans with Diagnocat®, restoration margins with PrepCheck®, CAD/CAM with Exocad®. What's more, some of these AI-based softwares even propose complete treatment plans such as ClinCheck®. Today, AI applications in dentistry have reached such a point that even patients can download apps to their smartphones to get feedback about how their treatment progresses. Additionally, AI-integrated electronic toothbrushes, IO® and Genius® series by Oral-B, are on the market with a view to foster better oral hygiene habits. Hence, it would not be assertive to claim that AI has passed preclinical years in some areas and already gained a foothold in clinical dentistry, teledentistry and dental public health.

Applications in Education

In both preclinical and clinical years of dental education, students are expected to gain certain sets of skills to become qualified dentists. As a part of this demanding education, preclinical students practice on manikins in order to become familiarized with the morphology of human teeth and working positions in dental units. AI-based haptic systems such as simodont® by Nissin and Virteasy® by HRV came into use to provide a better insight into working on real human teeth and clinical working positions. It affords a better feel of enamel, dentin and pulp with supervision on preparation and restoration techniques. In addition, AI-enhanced humanoids, like simroid® by Morita and Dentaroid® by Nissin, have also been developed to heighten students' skills before moving on to the clinics. In contrast to simodont® which is a form of AI-supported virtual reality, simroid® and dentaroid® are an integration of AI with robotics to mimic patient behavior and stress. As a matter of fact, Kobra® by Forslund which is solely designed for oral surgery training purposes has long been on the market. Also, an AI-based software, called CranioCatch®, is launched to help teach students 2D and 3D radiography interpretation better.

The future of AI

The idea of AI originates back to ancient times. It was brought to reality with the advent of modern computers and has already entered different dental fields with a multi-faceted approach. Even though there are still concerns regarding data security, ethics, privacy, and transparency, AI is sure to expand its applications in dentistry with the resolution of these issues and further technological advancements. We may not be far away from the future in which we will have AI-based dental assistants in clinics and dental education all around the globe that will benefit its merits more. Dental professionals and students should adapt to its revolution in order to fit in with the ever-changing dental world.

"AI is the new electricity. It will transform every industry and create huge economic value."

-Andrew NG (2017)

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OCCUPATIONAL HEALTH PROBLEMS OF DENTISTRY

Fatih Sevban Melemen

Marmara University, Faculty of Dental Medicine, Türkiye

Nowadays, it is of major importance as health is greatly affected by the work done (1). In terms of scientific studies, psychosocial, personal, physical and organizational factors, as well as insufficient rest periods, inconvenience of working environment order and lighting conditions are the risk factors that threaten the health of individuals (2). Inadequate working conditions cause healthcare providers to be adversely affected (3). Scientific studies have shown that dentists experience more frequent and more severe health problems than other medical professionals. A variety of harmful environmental factors have been proven to affect dentists' physical health or aggravate existing conditions (4). Dentists get tired physically and mentally because of treating a narrow area in the mouth. The exhausting working conditions can cause health problems in dentists over time. In a study, 43% of dentists stated that the most negative aspect of the dental profession is the health problems that occur in time (5).

All employees in the dental team should have the knowledge of the risk factors associated with the profession. These include injuries to the eyes (physical injury, microorganism-laden aerosols, lasers), ears (continuous high-frequency noise), factors affecting the hands and fingers (physical injury and infection), diseases transmitted through blood and aerosol (AIDS, hepatitis B or C virus, tuberculosis and similar diseases), allergies (from latex gloves, methyl methacrylate and hexachlorophene sources), musculoskeletal disorders (lower back pain, carpal tunnel syndrome), toxicity (mercury vapor) and stress. Sitting or standing for long periods of time is characteristic of dentistry. Depending on the working position in dentists, vascular diseases such as varicose veins may develop, especially in the legs (6).

Infectious Diseases

Dentists and other healthcare professionals should be aware of the various infectious agents that can spread by dental instruments. AIDS, hepatitis, tuberculosis and syphilis, which are potentially contagious, are critical due to being the first symptoms of many infectious diseases in the mouth (7).

Viral hepatitis is defined as an infection caused by a group of viruses with affinity for the liver. There are at least six various hepatitis viruses. Hepatitis A (HAV) and hepatitis E (HEV) are minor infections from which full recovery is expected. On the other hand, hepatitis B (HBV), C (HCV), D (HDV) and G (HGV) can cause serious disorders that lead to chronic complications. Since there is no definitive treatment for viral hepatitis, it is important to be aware of these forms in terms of protecting the health of those working in the dental area (8). Hepatitis B vaccine is an effective method to protect against HBV and HDV. However, there is no vaccine for HCV.



Tuberculosis is an air-borne bacterial infection caused by mycobacterium tuberculosis. Many infected people do not develop tuberculosis (TB) and these people do not pass on the disease. Nonetheless, once infected, there is a risk of developing active disease in the future. Oral lesions can also be seen in tuberculosis. The tongue, lips, buccal mucosa and palate are the parts where oral lesions are most common. (8) Aerosols should be used as limited as possible in patients suspected to have tuberculosis. In order to minimize the risk of tuberculosis transmission, it can be attained by treating the patient in the appropriate position, using a rubber dam, and limiting the use of ultrasonic and high-speed handheld devices. Despite the mask being used routinely in dental units, additional methods for preventing air-borne transmission of tuberculosis should be applied.

AIDS (Acquired immune deficiency syndrome), moniliasis infection, which is one of the first signs of AIDS that develops in the mouth in HIV-positive individuals, can be diagnosed by the dentist. The American Dental Association (ADA) has commented that there will be no risk of disease transmission in dental units that take general protection measures (7).

Dentists should be well aware of the oral manifestations in different stages of syphilis. The surface of a syphilitic ulcer or the mucous patches of secondary syphilis are highly contagious. Examination of suspected patients with a previous history of salivary or blood-containing stab wounds, chronic ulcers on their hands or fingers should be performed with caution (9).

Musculoskeletal Pain

Since most dentists stay in the same position for a long time, musculoskeletal pain is one of the main health problems for them. In a study conducted by dentists in New South Wales, it was found that a large number of dentists suffer from musculoskeletal disease (10). The same health problems have proven to be present in dentists in the United States of America and Norwegian dental practitioners (11). Some surveys suggest that the musculoskeletal disorders are caused by sitting position and work habits.

Carpal tunnel syndrome is a peripheral neuropathy caused by compression of the median nerve passing through the carpal tunnel. Although this syndrome is more common in the dominant hand, it is frequently bilateral (12). The pressure in the carpal tunnel is at an all-time low when the wrist joint is in a neutral or functional position, in which case there is insignificant flexion and a slight ulnar deviation. The pressure in the tunnel increases with movements that cause more bending or opening as it is in the neutral position. In professions where small hand tools are used, such as dentistry, it is almost impossible for the wrist joint to maintain its neutral position (12).

Dentists who try to stand up from leaning forward while treating patients in a supine position may experience lower back pain. A possible cause of lower back pain is the strain caused on the posterior spinal ligaments and extensor muscles of the back while working in several positions. With the bending of the spine, the facet joint surfaces are complicated and become less stable, resulting in strain. Prolonged pressure in the facet joints causes inflammation and when the body is brought to an upright position, the joints do not shut properly and the lumbar lordosis is repositioned.

The following measures can be taken to prevent back and waist pain: since it is inconvenient to stay in the same position for a long time, it is necessary to change positions frequently and stretch the waist during dental work. Working out should be taken up as a habit in order to keep the posture healthy and the body moving. In order to maintain the strength and flexibility of the body and extremities, taking up a sport or going to the gym may help in this regard (12).

Eye Problems

Although most eye problems are observed among the general community, some studies have shown that dentists develop eye problems (13). Dental procedures such as removing old fillings, removing excess filling materials, polishing fillings or bone tissue surgery require the use of high-speed burs. This provision significantly increases the risk of substances or tissue fragments injuring the physician's eyes. In most cases, foreign materials enter the conjunctival sac or cornea, causing pain, watering, and redness in the eyeball.

Wearing safety glasses is the simplest way to protect the eyes. Efficient safety glasses should have hard plastic lenses and the edges should fit the face perfectly. Such safety measures can fully protect the physician from droplets, hard particles and spray (14).

Hearing Loss

Ultra High frequencies cause hearing loss in dentists. The loudest sound level that the dentist can hear is between 80 and 90 decibels (DB). Continuing high levels of noise throughout the working day can cause hearing damage. In order to avoid this situation, the tools with the rotating head should be properly maintained. Ceilings in dental clinics should be acoustic and elastic materials should be used on the floor. Compressor and other noisy devices should be placed appropriately and the noise level should be reduced (15).

Percutaneous Exposure Incidents

From an occupational point of view, a percutaneous exposure incident is the main source of blood-borne infection transmission between patients and health care workers. It may be a particularly common problem in dental personnel. (16) Few studies suggest that about half of all dentists report a recent percutaneous exposure incident, particularly needlestick and sharpinjuries, in both the United Kingdom and in Thailand (13). Dentists may be exposed to suture-percutaneous injuries due to sharp, penetrating instruments such as burs, injectors and suture needles that they use while working. In a study, it was determined that the instrument causing the most injuries in dentists was the probe. Dentists should protect themselves from accidents that may occur by taking the necessary precautions during the examination and treatment of patients (5).

Conclusions

The physician is primarily responsible for restoring the patient's health without harming him. Likewise, the physician should not risk his own health while treating the patient and relieving him of his pain. Dentists should protect their health in the best possible way, and take necessary precautions when they start to experience health problems. Dentistry faculty students should be taught about occupational risks that they may experience in the future and ways to prevent them.

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Guided biofilm therapy: A logical approach of periodontal disease

Theodoros Jokas

National and Kapodistrian University of Athens, Greece

We all know that dental plaque can lead to a myriad of problems in the oral cavity. Can Guided Biofilm Therapy be a game changer?

For the clinical cases, I would like to thank Dr Ioannis Karoussis, who specialises in Periodontology-Implantology and is a Periodontology Professor at the University of Athens.

New vs. Old

Scaling and root planing (SRP) is the gold standard in treating periodontal diseases effectively. Although the clinician can achieve maximal results using the classic SRP, there are still some disadvantages in this method that make it difficult sometimes and even inconvenient for the patients. For instance, SRP is often time-consuming, requires experience from the clinician and may cause pain or discomfort for the patient (1).

In order to overcome these obstacles in the clinical practice, a new system of treating the periodontal diseases has entered the dentist's arsenal, that offers comparable or better results than the classic SRP, reduces patients inconvenience and removes a significant amount of periodontal pathogens (2). This new system is called Guided Biofilm Therapy. Besides treating periodontitis, it can be also used in the treatment of peri-implantitis, since the SRP can present the dentist with several challenges, such as the position and morphology of the remaining teeth, their periodontal situation, the pocket depths which are sometimes difficult to reach and the microbial colonisation of the supporting teeth in the immovable restorations (3).

Steps of the therapy

Guided Biofilm Therapy is composed of 8 steps that can be altered depending on the clinical case or the difficulty of the occasion. These steps are:

1. Diagnosis of clinical case (similar to classic and newer methods)
2. Apply disclosing agent to make the biofilm visible
3. Motivation of the patient
4. Supragingival removal of biofilm and stains from natural teeth and implants
5. Subgingival removal of biofilm from deeper periodontal pockets and around implants
6. Calculus removal
7. Reassessment and redisclose
8. Schedule recall appointment

Exposing the dental plaque

As it is well known nowadays, the main cause of the periodontitis and peri-implantitis is the dental plaque as its evolution and growth of which leads to gradual bone loss (4). The application of a disclosing agent helps the patient recognize the dental plaque and its preferable places to grow, so they get motivated to practise oral hygiene more effectively (1).

It is also proven that disclosing agents improve the clinical case, because they help the dentist observe immediately the positions of the plaque, so they can remove it more efficiently (2). The disclosing agents that are commonly used are the monotonous ones, such as mercurochrome or Bismark brown (1).

Supra/subgingival removal of biofilm

This stage is performed by the Airflow device for the removal of the biofilm and the stains on the dental surfaces and implants.

The Airflow device includes 2 handles, one for the supragingival and one for the subgingival treatment. The powders that are commonly used during GBT are:

- NaHCO₃:
 - Chiselled shape with sharp corners, destined to be used for supragingival treatment, extended usage may cause structural alterations on the enamel, dentin or the root and can be corrosive to restoration materials, such as amalgam or composites
- Glycin:
 - Similar shape with NaHCO₃ but less chiselled, low dissolving in water (which has a major clinical use, since the supersonic devices usually work under continuous water spraying), 80% less corrosive to restoration materials than NaHCO₃
- Erythritol:
 - It is smaller and is more stable than glycine, it is shown that removes a significant amount of P. gingivalis⁵, more tolerable on behalf of the patients, it causes the least structural alterations on dental tissues and it leads to gradual reduce of pocket depth 12 months after the therapy (6).

It should be also noted that increased pressure leads to more efficiency to the usage of Airflow, as long as it is being used for a certain amount of time(1). The subgingival nozzle, which is called Perioflow, has its own unique structure and can easily enter periodontal pockets, overcoming the obstacles of the classic SRP (1, 2). It should be also used under continuous water emission.

Calculus removal

The calculus removal follows the classical method using the Piezon device. This device carries its own tips, which are especially designed for GBT.

Case number 1:

Plaque is located on the implants' surface, which have recently undergone peri-implantitis therapy in order for their lifespan to be expanded (Figure 1). The purple disclosing agent indicates the places that the plaque has accumulated. The powder that we used during the therapy is erythritol, which has the most advantages in comparison to the other components and it doesn't cause corrosion to the implant surface. Finally we can successfully remove the cause of the inflammation.



Figure 1: Indicates a case which has undergone peri-implantitis therapy

Case number 2:

The first picture in Figure 2 indicates a deposit-free oral cavity. But after the application of the disclosing agent it is proven that there is a need for GBT. The final picture in (Figure 3) is taken right after the completion of the protocol (Figure 2).



Figure 2: Shows the sequence of the application of GBT.



Figure 3: The case shows the final result

Case number 3:

Calculus is visible through simple observation (Figure 4), although through the application of the disclosing agent it is clear where there is a need for the GBT protocol (Figure 5). In this case GBT had only supragingival use, because we had no indication of periodontitis, such as deep pockets or loss of attachment.



Figure 4: Shows calculus is visible through simple observation



Figure 5: Shows the direct application of the disclosing agent hence an indication for GBT protocol

Case number 4:

The deposits on the dental surfaces are quite clear before the application of the disclosing agent (figure 6). Clinical examination indicated periodontitis plus gingival subsidence in the first quarter, as shown in (Figure 7). For an effective debridement, both the AirFlow and PerioFlow were used.



Figure 6: Application of the disclosing agent



Figure 7: For effective debridement, the use of a combination of airflow and periflow is shown.

Case number 5:

The protocol was applied for peri-implantitis treatment. (Figure 8) indicates deep pockets and significant gingival subsidence. After the treatment was over, sutures were placed.

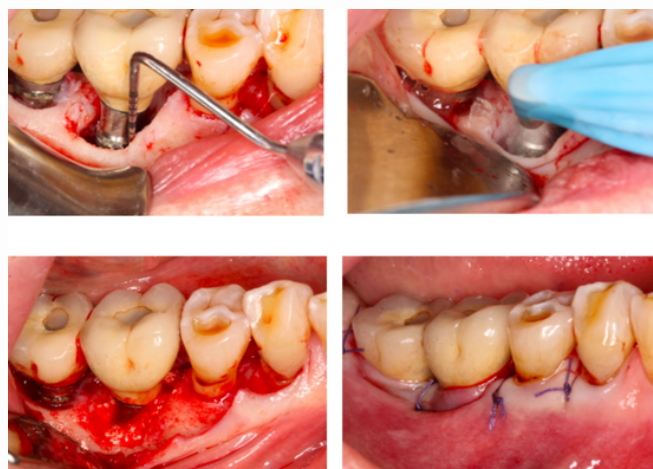


Figure 8: Shows the protocol applied for peri-implantitis treatment.

Is Guided Biofilm Therapy the way forward?

GBT can be used in most Periodontology cases, regarding the inflammation control and during the conservation of the treatment outcome. It is easy for the clinician to use, since it saves a significant amount of time and doesn't require the same experience as a perfect SRP, and more tolerable for the patients, because it is less harmful. The advantages this protocol provides make it a must for an periodontologist to successfully face every periodontal inflammation case.

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AMALGAM: Current updates on dentistry's old workhorse

Buse Saraç

Zonguldak Bulent Ecevit University, Türkiye

In the 500s people who used to have toothache were so desperate that the only solution they had were extractions. In 659, the first dental amalgam was used in China, documented with a medical text and after that it appeared in Germany in 1528. In the 1800s, amalgam became the dental restorative material of choice due to its low cost, strength and durability.¹

So What Really Is Amalgam?

Dental amalgam fillings are a combination of 50% elemental mercury, 35% silver and some amounts of tin, copper and other metals. It has been used for dental fillings for so many years but after the new filling materials were introduced, amalgams have become less and less popular. But why is that? Why did dentists stop using amalgam for fillings?

As a filling material it has advantages but many disadvantages as well. It can last at least 6 to 10 years, can withstand the chewing forces and it is cheaper than the other filling materials. But there are many disadvantages too. The most important of these is releasing mercury in the form of a vapor that can be inhaled by the patients and dental professionals. As we all know mercury is one of the top 10 chemicals which threatens public health according to the World Health Organization (WHO). It can also lead to tooth structures, fractures, allergic reactions, poor aesthetics and corrosion.²

What Is The Latest News About Amalgam Use?

Now we all know that amalgam restorations are durable and cost-effective but have poor aesthetics. But there is currently no direct filling material that has the wide indications for use, ease of handling and good physical properties of dental amalgam. The restorative materials currently available as alternatives to dental amalgam significantly increase the cost of dental care. So, because of these reasons it has been used for many centuries.

Of course there are always some concerns about amalgam fillings because of its contents. According to FDI and WHO, amalgam restorations are considered safe but the components of amalgam may cause some problems like local side effects called 'amalgam-tattoo' or allergic reactions. And unfortunately, the small amount of mercury is being released from amalgam restorations, especially during placement and removal but the researches are not showing any other health effects about it on the patients at all.²

And there is a potential health risk to dental professionals from mercury exposure if working conditions are not properly organized. Meanwhile there are so many concerns about using amalgam because of the risk of environmental pollution. Right, using mercury in dentistry may contaminate the environment with the disposal of waste products from dental clinics but there are equipment which are available to collect metallic waste generated during dental amalgam placement and removal. And appropriate collection and recycling technology is also available to reduce mercury pollution of the environment.

Due to publicity in the mass media, the situation in countries which have undertaken restrictive action is often misinterpreted, leading to numerous inquiries about the safety of dental amalgam and a demand for removal of amalgam fillings. The current weight of evidence is that contemporary dental restorative materials, including dental amalgam, are considered to be safe and effective. However, adverse biological reactions to the materials do occasionally occur and they must be treated personally for each patient. WHO recognizes the importance of the continued monitoring of the safety and effectiveness of all dental restorative materials.²

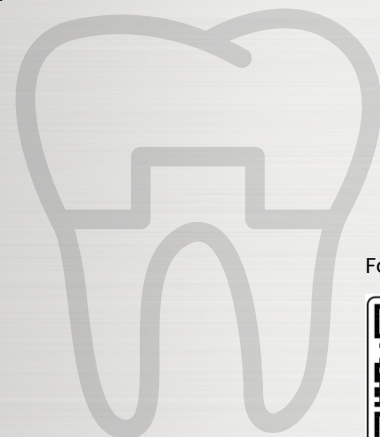
The rate of amalgam use is continuing to fall in 2023. Dental professionals are mostly using composites instead of amalgam fillings now due to their high aesthetics but according to the research it is safe to keep an amalgam restoration if there isn't any problem with the restoration. If there is, then it must be removed by the dental professionals with precautions.

So today, there is considerable exchange of information on dental amalgam around the world. For environmental reasons some countries are restricting all uses of mercury, including dental amalgam. And some dental professionals do not suggest using amalgam fillings for treatment of deciduous teeth of patients under age 15 and women who are pregnant or breastfeeding except when considered necessary by the dental practitioners and based on the needs of the patient.³

And How Can We Remove Amalgam Fillings ?

Some dentists thought that there is no scientific evidence that supports the removal of dental amalgams and if you already have amalgam fillings, it can be more harmful to remove them. Nowadays the dentists follow a protocol like if there isn't any problem with the restoration, there is no need to remove the amalgam fillings. But if there is a problem with the restoration, it can be removed and changed with RBCs easily by using the protocol called SMART (The Safe Mercury Amalgam Removal Technique).⁴

According to this technique we need to protect our patients and ourselves first. An amalgam separator must be properly installed to collect mercury amalgam waste so that it is not released into the air from the dental office. Windows should be opened to reduce the mercury concentration in the air. All the dental professionals should use non-latex nitrile gloves, face shields and head, hair coverings and should definitely use a rubber dam for isolation and in order to protect the patient's skin and clothing; a full head, face and neck barrier need to be utilized under the dam. ⁴



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SOCIAL MEDIA: SHARING IS CARING.. OR IS IT?

TANISHA PATEL

CARDIFF UNIVERSITY, FACULTY OF DENTAL MEDICINE, UK



Is social media helpful or harmful in the dental world when it comes to promoting good oral health care and managing behaviours and expectations of professionals?

There is no doubt that social media is one of the most powerful and fastest growing tools that we have in today's day and age. Despite the fact that it has not been around for a long time, platforms like Twitter, Facebook and Instagram have had a colossal impact on the world. Every industry relies on social media in some way and dentistry is no exception to this. With the simple press of a button, healthcare professionals have the power to shape public behaviours and perceptions by sharing health information. This also means that there is a great deal of professional responsibility placed on those who choose to share such information.

Building an online portfolio

While many people choose to use social media on a personal and more private level, some dental care professionals use it to advertise the services that they provide and to grow a public online following. With the ongoing rise of the 'dentfluencer' we are seeing a growing number of dental care professionals posting regular content surrounding their clinical activity and the treatment that they are providing their patients with. This allows them to network with others from all over the world and contribute to an online community that can help to promote good oral health care.

Who is watching?

As much as there are benefits of social media in the dental world, there are also a few drawbacks. Professionalism is one of the most fundamentally important aspects of being a dentist and has great pertinence when it comes to the use of social media.

The General Dental Council are the regulators of dental professionals within the United Kingdom and take great responsibility in ensuring the health and safety of the general public is sustained. As stipulated by their 9 standards we must behave in our personal lives in a way that gives patients the greatest confidence in us and the dental profession¹. This can be largely reflected through our online profiles as social media pages are a way for people to see who we are on a more personal level, so it is vital that what they are seeing is appropriate and portrays a good image.

Fitness to Practice

One of the General Dental Council's key messages outlined in their 9 standards concerns the use of social media and the sharing of information in a manner that maintains patient confidentiality².

Since the General Dental Council's introduction of its social media guidelines in 2013, there have been a number of Fitness to Practice issues pertaining to an inappropriate usage of social media. Research found that at a specific point in time, out of all of the fitness to practice cases on the GDC website, 2.4% were concerning violations of the social media guidelines². This highlights that there is a continual need for Continuing Professional Development (CPD) to include social media training and guidance for dental care professionals.

An abundance of information – which is correct?

It is important to recognise that spreading health information and spreading correct health information are two very different concepts.

Nowadays we are finding more and more oral health-related products, which aren't necessarily good for you, being promoted by people who are not dental care professionals. An example of this is the advertisement of charcoal-based toothpaste and mouthwashes through social media platforms. The issue with this is that according to the latest research, the benefits in terms of safety and efficacy of using these types of products have not been clearly ascertained and thus feeds many people with the wrong information when it is published on big social media pages³. This is just one example of how social media can be damaging when it comes to promoting good oral health care.

Trends, trends and more trends

There is always something new trending on social media that gathers the attention of many. In recent times, dentistry has been trending via the term known as 'Turkey Teeth'. For some time, people have been documenting their journeys of going abroad to get, what is in essence, a full smile transformation although a lot of the time this involves rather destructive dentistry. Despite the dramatic nature of this, in recent years, we have been seeing an increasing trend in the number of dental tourists seeking treatments like these, with a 2022 survey by the British Dental Association reporting that 94% of 1000 dentists had examined patients who had made trips abroad for this very reason. One of the key factors they felt contributed to this rise was practices abroad using social media advertisements to foster the idea that they could give patients a 'perfect' smile⁴.

The spread of such content no doubt raises ethical concerns. The FDI World Dental Federation's stance on the matter is laid out in one of their policy statements which upholds that any advertising should be based upon factual information, obeys the law, protects the wellbeing of the general public and maintains confidence in the dental profession⁵.



An educational adjunct?

Social media also provides a contemporaneous method of teaching and learning for dental professionals and students as outlined in the Association for Dental Education in Europe's framework 'The Graduating European Dentist'. The guidance acknowledges that a large part of dental education stems from students accessing content remotely and independently, and then sharing their ideas through virtual platforms. The framework also reinforces the importance of ensuring that the content being shared is secure and that appropriate consent has been obtained prior to its distribution⁶.

Despite some of its drawbacks, social media has the power to revolutionise how we get to see modern dentistry. With a simple search and a few clicks, you can instantly view thousands of posts about any dental topic of interest as well as meet and engage with other like-minded professionals. There are advantages and disadvantages, of course, but as long as social media is used in an appropriate manner that helps and doesn't hinder, it is a valuable asset in the ever-changing world that we are living in.



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3D PRINTED COMPLETE DENTURES: A PRIMARY IMPRESSION

GABRIEL SCIBERRAS

UNIVERSITY OF MALTA, FACULTY OF DENTAL SURGERY, MALTA

A Dental Student's Guide to the Possibilities and Implications of Digital Dentistry in Prosthodontics

Putting a Finger on Digital Dentistry

Considering the fact that edentulism is a growing concern among the aging population and is a global phenomenon, the clinical ability to fabricate complete removable dentures will remain an essential competency for future dentists. However, alongside the conventional techniques based in melted waxes and acrylic, 3D printed complete dentures are a thrilling development which complement and work in tandem with traditional techniques under the banner of the digital dentistry revolution.

Approached as a field in itself, 'digital dentistry' is a contemporary term devised to describe the integration of digital technologies and modalities within conventional methods and approaches in dentistry¹. Correspondingly, the utilization of computing in this field may be separated into computer-aided design (CAD) and computer-aided manufacturing (CAM), often combined to form the term 'CAD-CAM'¹². In the context of modern dentistry, CAD-CAM technologies present themselves as an ideal medium for the digital designing and manufacturing of surgical guides, orthodontic treatment plans, fixed prosthesis and restorations (1).

As supported by an extensive and growing number of studies, CAD-CAM dental workflows offer the advantages of decreased chairside and laboratory time, economic benefits, reduced material waste and an unprecedented level of precision and clinical accuracy (1, 3, 5, 7, 8, 9, 11, 12).

With regards to CAM, 3D printing is only one of two means currently being evaluated and developed. Specifically, once a 3D image has been obtained, usually through intraoral scanning, computer-aided manufacturing offers two avenues to contrive prostheses. Namely, these are additive manufacturing (3D printing) and subtractive manufacturing (milling).

The Basics of 3D Printing

Moreover, 3D printing may be described as the construction of a three-dimensional object through the agglutination of multiple thin layers in succession^{1, 6}. To expand further, there are two differing technologies, SLA (stereolithography) and FDM (fused deposition modeling), used by 3D printers which are relevant to dentistry (1, 2, 4, 6). Offering a limited use in dentistry, FDM 3D printers extrude filaments of thermoplastic materials at high temperatures in sequential layers.

In comparison, SLA presents itself in multiple forms, such as SLA-Laser, Digital Light Processing (DLP), Liquid Crystal Display (LCD) and Polyjet (Stratasys), all of which involve the incremental and precise curing of resin monomers into polymers^{1, 2}. Duly, by using the science of photochemistry, incredibly accurate 3D models may be fashioned.

So, once a 3D image has been acquired, either through CBCT, intraoral or facial scanning, one may then manipulate the digital files (typically formatted as STL, OBJ, PLY or DICOM).

Paired with clinical findings, a treatment plan may then be designed (CAD) which possibly integrates 3D printing (CAM) as a means to produce a final prosthesis. Nevertheless, any treatment plan must involve discussion and teamwork from the dentist and dental technologist, celebrating a multidisciplinary approach.

A Digital Workflow Blueprint

As a reminder, the traditional fabrication of a complete removable denture involves multiple steps, including a primary impression, secondary impression, bite and OVD registration, a try-in and a final delivery appointment coinciding with laboratory steps. Let's take a look at an example of a digital workflow which makes use of 3D printing, referencing the novel biofunctional prosthetic system, suction effective mandibular complete denture technique (1).

Intraoral scanning may be used in the first appointment to record a digital impression of the oral cavity. To elaborate, an intraoral scanner is a handheld device used to directly create digital impressions, doing so through image sensors which interpret and process thousands of images. In the case of an edentulous patient, one may either scan the ridges in a zigzag pattern, considering the lack of teeth which are ideal landmarks, or scan a former prosthesis for relining. Beyond the intraoral scan of the intaglio surface, certain scanners allow for bite occlusal registration also. In addition, facial scanners provide extraoral soft tissue information which is essential for success of the prosthesis, while also registering landmarks such as the bipupillary and alartragal line.

Once all the data is digitally pooled, the dentist may then design special trays depending on the particular impression material to be used, adjusting the tray parameters. Consequently, using a stereolithography 3D-printer and biocompatible custom tray resin, the special trays may be fabricated. If required, one may choose to integrate a gothic arch tracing device through CAD.

After the secondary impression is taken in a subsequent visit, and a bite registration if not recorded earlier, the impression is then digitized either through scanning the impression or the stone cast. Now, using all of the gathered information, an SLA 3D-printer may be used to fabricate a monoblock (denture base and teeth constructed from the same material) try-in of the final prosthesis which is assessed in a try-in appointment.

Following a satisfactory try-in appointment, any final changes may be made digitally before the production of the final removable complete denture. Currently, the evidence points towards milled (subtractive manufacturing) monolith dentures, milled from modified polymethyl methacrylate being technically superior to 3D printed dentures.

To reiterate, the aforementioned workflow is only an example, especially considering the versatile nature of digital dentistry. Other treatment plans include alterations such as eliminating the try-in appointment, 3D printing the final prosthesis and other variations – potentially reducing the number of appointments needed from five to three (7).

The Advantages of 3D Printing

When comparing the traditional fabrication of complete removable dentures to a 3D printed version, comparisons harp on the contemporary nature of 3D printed materials. Correspondingly, despite a proven higher color stability over time, better surface roughness, favorable reparability and financial benefits, modern heat-cured PMMA simply offers better strength, accuracy, aesthetics and bond strength to various denture teeth (2, 3, 4, 6, 7, 9).

Although an emerging study described a reduced rate of ulcer lesions and pain in 3D printed dentures compared to conventional dentures, further research is needed to substantiate such observations (3, 9).

Furthermore, growing evidence supports milling as a superior means to produce complete dentures over 3D printing technologies, being more comparable to conventional methods (1, 8, 11, 12).

Final Prosthesis Fabrication – 3D Printing or Milling?

As a form of subtractive manufacturing, milling involves removing material from a block of material using rotating cutting tools programmed to utilize every axis to generate the desired figure.1 As an alternative to 3D printing, multiple studies have analyzed and compared complete removable dentures produced utilizing both technologies.

Although milling (also utilizes PMMA) produces a higher degree of waste, this is accompanied by lower monomer concentrations, superior resolution and improved retention on the intaglio surface of complete dentures comparable to conventionally processed dentures (1, 4, 8, 10, 11, 12). Yet, these improved technical parameters come at a financial cost far superior to 3D printed and conventional means.

In addition, despite extensive discussion between CAD-CAM printed, milled and conventional complete dentures, certain studies have found that regardless of workflow, patient satisfaction and denture retention were not significantly influenced (5, 8, 10, 12).

3D Printed Complete Dentures – Blossoming Research

Indeed, the efficacy and accuracy of digital dentistry technologies such as 3D printing and milling remain highly reliant on the aptitude of the clinician as studies have shown that both means offer comparable and clinically acceptable accuracy. Suitably, clinical intuition lends itself to the ideal selection of materials while accounting for clinical factors, just like conventional dentures – digital dentistry is another tool in the arsenal of a dental clinician.

Overall, the future integration of 3D printing technology to the extent of fabricating the final prosthesis promises to harness the advantages of digital dentistry by improving patient satisfaction, treatment plan flexibility and limiting manual labor compared to conventional means while reducing waste. In short, potentially revolutionizing the way we go about treating edentulism.

Special thanks goes to Professor Arthur Rodriguez Gonzalez Cortes for his valued and pertinent guidance.

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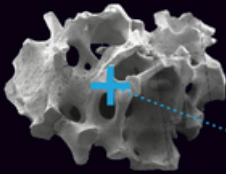
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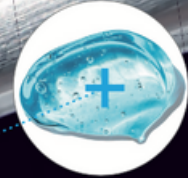
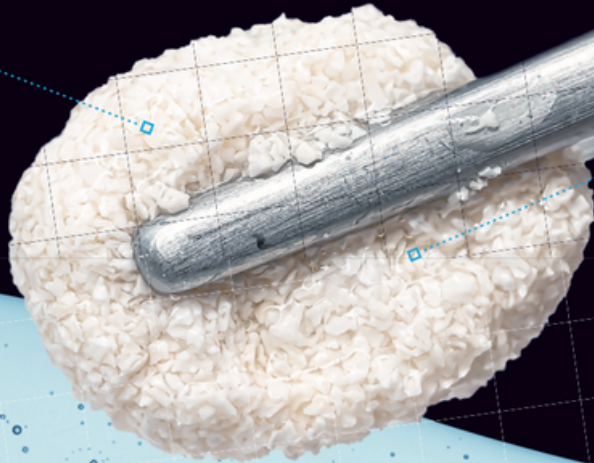


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