

EDSA

Magazine



Spring 2021

Dentistry in the Age of Mass Communication



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Editor's Word

Dear readers,

Before you lies an inspiring collection of articles, each original, innovative and interesting on its own. Created in the times of great tribulations, uncertainty, and many losses, every page of this magazine tells a story that I could only hope you would be able to see and understand. To me personally is this piece a testament of our perseverance, courage, hard work, passion for learning, creating, and writing, personal and professional struggles, but also fun and pleasure we all had.

Some of you might feel like you are living in parallel worlds, doing different things at once, managing to stay present and active in the midst of the crisis. Do not give up! Continue your journey, stay on the right path, and appreciate every part of the rocky road: every experience, every trial, every failure, every success, and every person you meet – those shape you and help you grow in a way you cannot even imagine. And always remember that you can ask for help and consultation – everything becomes easier when shared. These may be the times when we should give the most of ourselves, be there for each other (even if it feels exhausting) and make our love for each other grow even more.

At the end, I want to thank everyone whose name will be written in the history of this magazine:

Thank you to all the amazing writers Mohammed and I had the pleasure to work with!

Thank you to the EDSA Committee that believed in this project, Mohammed and I from day one!

Thank you to the most amazing co-editor I could have only asked for! Thank you for taking this journey with me unexpectedly, for taking the responsibility no co-editor has ever taken, for your ideas, comments, suggestions, advice, and the time and energy you invested in the Magazine. Thank you for your help and support when I needed them the most. I am genuinely looking forward to creating one more magazine with you.

And last but not least, thank you, truthful reader, for reading this magazine!

I encourage everyone to challenge themselves and start writing – anything you come up with could find its place among the many pages of a piece such as the EDSA Magazine.

Until next time, hopefully...

Amina Ibrahimpašić, *Editor-in-Chief*



Co-Editor's Word

Dear reader,

I hope you are able to appreciate the hours of research, editing, writing and rewriting each author of the wonderful articles within these pages dedicated; from developing their drafts and cultivating their ideas, to conducting their own studies and refining their arguments. Written works are a fascinating representation of the people that write them – their interests, dreams, fears, identities, idiosyncrasies – it is as true for the writers of ancient Greek philosophy and Victorian-age mystery as it is for the writers of today's scientific marvels. It has brought Amina and I nothing but sheer pleasure to follow each and every draft – sent in from all corners of Europe – as they transformed from bulleted thoughts and expressions to bulbous and flamboyant discussions, critiques and analyses.

Though the sun shines with increasing intensity across our continent with every day that passes, with leaves sprouting from barren trees and flowers of all colours bursting into bloom, unpredictability and uncertainty relentlessly loom over us. As students, and as human beings, brooding over the future can foster within us discordant feelings of both hopeful aspiration, and crippling anxiety. The pandemic has only exacerbated the flux around us, and catalysed a crisis of the global economic, social, environmental and intergovernmental order. Historically, it is in periods of such crises that rules are rewritten, and the future is reimagined. We hope to have captured a glimpse of this reality within this magazine issue, as we encouraged your fellow dental students to look to the horizon of the profession they will inherit, and reflect on the future of dentistry and its most pioneering aspects.

This magazine, I hope, is a worthy archive of the thoughts and expressions of dental students from Dunblane to Dubrovnik, during this most dreadful period of recent history in which many have lost our nearest and dearest to Covid-19, and many more of us have been left counting the immense mental cost of the necessary sacrifices – the need for physical distancing and isolation over the last twelve months, and the ramifications of such rules on our personal and professional lives. As some of us look forward to the world of work, while others prepare for the next academic year, and as vaccination programmes are well underway in the global north, let us actively voice our demands, not just for a healthier, brighter Europe, but for vaccine equality – and indeed access to medical and dental care, food, housing, employment, a stable climate, safety, fulfilment, love and belonging for all.

In the times that we are in, it is important now more than ever that we recognise and affirm to ourselves the hard work and commitment involved in progressing through dental school, in spite of the turbulent trials and tribulations lurking in every corner – so congratulations on getting where you are today! As parts of society start to 're-open' after an intense stretch of distancing and isolating, let's endeavour to lavish genuine gratitude and heartfelt appreciation upon those who mean a lot to us – counting down the days until we can squeeze them ever so tightly again!

Thank you for taking the time to read this magazine, and I wish you a restful and peaceful Spring break!

Mohammed Bux, *Co-Editor*



President's Word

Dear friends,
Dear Colleagues,

Just prior to writing this I have been reading the draft edition of this magazine and I have been blown away by the quality of writing and the passion of the authors; students from across the continent writing on topics as diverse as osseointegration and milk alternatives. The magazine is a testament to the dedication of Amina and Mohammed, who have worked diligently with the authors to improve the articles, as well as on making the magazine the wonderful aesthetic piece that you see before you. As we approach the EDSA Online Spring Meeting (which I hope you will enjoy with us!), do take a moment to check out the new website, our social media channels and to reach out the EDSA Committee to find out more about what we have been up to since August. I would also encourage you to register for the Summer Meeting in Košice, Slovakia, where we hope to be reunited after two long years apart.

Despite the lack of travel and the sad cancellation of the EDSA Meeting in Bucharest, there have been many optimistic notes, both for EDSA and dentistry in general. At the global level, there has been a World Health Organisation (WHO) resolution on Oral Health, which was signed by many European countries and will serve as the basis for governments to integrate dentistry and oral health with the rest of healthcare and ensure that oral health is seen as a right and not a privilege for those who can afford it. The resolution will be voted upon in May at the World Health Assembly, and I would encourage everyone to write to their governments and encourage them to sign it. EDSA has been supporting this process by working with partners such as the Alliance for Cavity Free Future (ACFF), and the Platform for Better Oral Health in Europe, contributing to discussions and policy statements supporting the resolution.

At the European level, the European Commission, which makes decisions on EU matters, has been reviewing the laws relating to dental education, and EDSA has been giving evidence to them to improve dental education, including adding the requirements for students to learn Evidence Based Dentistry and Dental Public Health, which COVID has shown to be core competencies for a dentist in 2021, as well as stronger clinical competencies.

Finally, I want to pay tribute to the EDSA Committee, whose dedication to the dental students they represent has been exceptional, especially in such uncertain and difficult times. They continue to inspire me every day to keep up the important work that EDSA carries out, both in representing the challenges students face now and will face in the future.

I hope you enjoy this magazine as much as I have, and I wish you and your loved ones a safe and enjoyable summer term.

James Coughlan, President



James Coughlan
United Kingdom
President
president@edsaweb.org



Ivana Ligusová
Slovakia
General Secretary
secretary@edsaweb.org



Louis Madden
Ireland
Treasurer
treasurer@edsaweb.org



Andrea Vrankić
Croatia
Community Manager
community@edsaweb.org



Marcel Pal'ovčík
Slovakia
Vice President of Internal Affairs
vpinternal@edsaweb.org



Neil Unnadkat
United Kingdom
Vice President of External Affairs
vpexternal@edsaweb.org



Amina Ibrahimpašić
Slovenia
Vice President for Public Relations
pr@edsaweb.org



Owens Iguodala
United Kingdom
Policy Officer
policy_officer@edsaweb.org



Dora Srdoč
Croatia
Training Officer
training_officer@edsaweb.org



Yolena Gesheva
Bulgaria
Research Officer
research_officer@edsaweb.org



Vladiana Ast
Romania
Prevention Officer
prevention_officer@edsaweb.org



Marta Adam
Croatia
Mobility Officer
mobility@edsaweb.org



Ömer Faruk Sönmez
Turkey
Volunteer Work Officer
volunteer_work_officer@edsaweb.org

Oral microbiome - what we knew and what we now know

What is the oral microbiome? What are probiotics? Understanding these complex systems may help us better prevent and treat oral diseases.



António Coimbra Amaral, Portugal

The oral cavity is home to hundreds of species of bacteria, it provides nutrients for numerous microorganisms. Oral microbiome is a term that describes a complex structure of bacteria, fungi, viruses, and protozoa that colonise hard and soft tissues of the oral cavity, making the oral cavity their habitat (Benn et al., 2018). In each of these structures, the microbes grow in a community-like form, biofilm, an ultra-organised matrix that adheres to the various surfaces of the mouth. Over time, our understanding of this complex network of microorganisms evolved, largely due to the advance in the methods of identification.

Identification solutions

The culture test was the first method for the identification of microorganisms. In this method a sample is collected and incubated in a specific culture medium at a certain temperature, which allows the microorganisms to multiply facilitating their identification. Although it was the pillar for other methods to be invented, the culture test has its limitation - it is not possible to cultivate all the species present in the sample (Benn et al., 2018).

These limitations and the discovery of DNA's double helical-structure became starting points for the development of nucleic acid-based technologies, followed by the unimaginable discoveries of biodiversity. Furthermore, the identification of the 16S rRNA gene, a conserved DNA sequence paved the way for a wider identification and categorisation of bacteria. The most used methods in this field are, DNA hybridisation, polymerase chain reaction (PCR) and DNA sequencing (Krishnan et al., 2016).

Health and disease

A healthy oral cavity is colonised by the microbiota that live in symbiosis with the host, providing a defence mechanism against pathogens. The oral microbiome changes during the lifetime of an individual (Wade, 2013). The first species colonising the oral cavity are the *Streptococcus* spp. *S. salivarius* is mostly found in saliva and on the tongue, *S. mitis* on the buccal mucosa and *S. sanguinis* on the teeth. Environmental changes caused by streptococcal colonisation (i.e., changes in the pH, redox potential, coaggregation and nutrient availability) make the host susceptible to further colonisa-

tion. *Fusobacterium nucleatum*, *Veillonella*, *Neisseria* and *Prevotella* spp. are the species that follow *Streptococcus* spp. (Belibasakis et al., 2019). When the first tooth erupts, the oral cavity is further colonised by *Prevotella denticola*, *Leptotrichia*, *Campylobacter*, *Fusobacterium* and *Selenomonas* spp. With the eruption of teeth, gingival crevicular fluid (GCF) and saliva play a major role in the integrity of gingival sulcus - the GCF contains active proteins, immunoglobulins and antimicrobial peptides that have the capacity to modulate the oral microbiome and maintain bacterial homeostasis (Krishnan et al., 2017).

Disease is associated with species that are present in low abundance and have the ability to disrupt the symbiosis pattern and convert the microbiota associated with health to a state of disease. The most common diseases caused by oral dysbiosis are dental caries, periodontal disease, and some systemic diseases.

The most common microorganisms associated with dental caries are *Streptococcus mutans* and lactobacilli. Additionally, it is now known that other species, such as *Bifidobacterium*, *Propionibacterium*, and *Scardovia* spp., can

convert the dietary carbohydrates into acids, causing dental caries. However, some species have the capacity to increase pH thus balancing acid production and maintaining homeostasis (Wade, 2013).

Periodontal disease has been associated with specific species, *Porphyromonas gingivalis*, *Tannerella forsythia*, *Aggregatibacter actinomycetemcomitans*, *Prevotella*, and *Treponema* spp. These bacteria can cause direct destruction, associated with enzymes, endotoxins and others, but they can also cause indirect destruction by cytotoxic cellular immune responses to self and pro-inflammatory responses that will cause tissue destruction and more severe cases with bone resorption and tooth loss (Newman et al., 2019).

Chronic inflammation and focal infection, associated with oral dysbiosis, can cause different systemic diseases (e.g. infective endocarditis, cardiovascular disease, pneumonia, etc.) (Pietiäinen et al., 2018).

Modulation

Modulation of the oral microbiota has been performed for hun-

dreds of years and is what we do daily when brushing our teeth. It has also been found that many active substances namely antibiotics, probiotics, and prebiotics, can be effective in modulating the composition of oral microbiota (Ulloa et al., 2019).

Although use of antibiotics in dentistry is limited, they can reduce the levels of disease-associated species, such as, for example, *P. gingivalis*, *P. intermedia* and *T. forsythia*, as an adjunct to mechanical periodontal treatment.

Probiotics are live microorganisms that can be administered to promote a state of health. They compete with other microorganisms for nutrients and adhesion sites produce bacteriocins, thus regulating the presence of pathogenic species. As such, they should not ferment carbohydrates and should adhere to the surfaces of the oral cavity and incorporate themselves into the biofilm (Zhang et al., 2018).

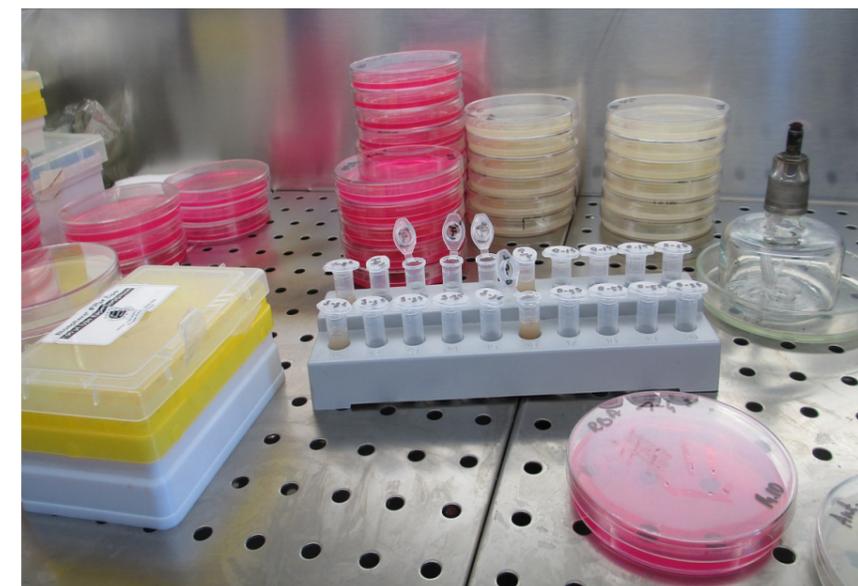
One of the most important species in modulation to reduce dental caries is *L. rhamnosus*, implementing into the oral microbiome seems to lower *S. mutans* counts (Coqueiro et al., 2018).

Other species like *Bifidobacterium* spp., *Lactobacillus reuteri*, *B. animalis*, and *L. paracasei* share this ability (Coqueiro et al., 2018). New studies reinforce the modulation in controlling gingivitis and periodontitis as well. *L. reuteri* seems to be reducing the levels of periodontal pathogens, such as *A. actinomycetemcomitans*, *P. intermedia* and *P. gingivalis*, and can be added to chewing gums, for example (Zhang et al., 2018).

Prebiotics are a group of nutrients, mainly oligosaccharides, that have a preventive mode of action, inhibiting the growth of pathogenic bacteria and stimulating the growth of beneficial bacteria. These nutrients require further studies. However, xylitol, xylose, and arabinose seem to be good suppressors of *S. mutans* growth. They also potentiate the growth of beneficial strains of *Lactobacillus* spp. (Zhang et al., 2018).

Modulation in personalised dentistry

With the new methods of the identification of microorganisms, it is now possible to engineer therapeutic agents that are essential for microbiome manipulation. Understanding variations in the oral microbiome that occur in the early stages of chronic oral diseases allows doctors to prevent dysbiosis, hence preventing the disease. This could lead to a more personalised clinical approach, better prevention, and more efficient treatment of each individual. Additionally, understanding variations and pathogenesis could help prevent systemic complications (e.g. preterm birth or pre-eclampsia) (Zarco et al., 2012). ■



Natural alternatives to chlorhexidine



Ozan Karadal, Turkey



Dental caries

According to the World Health Organization (WHO, 2020), dental caries is the most prevalent oral health disease. As estimated in the WHO's 2020 Oral Health Report, more than 2 billion people across the world likely suffer from dental caries.

Dental caries or cavities are caused by harmful bacteria in the oral microbiota, and concentrated in dental plaque, such as *Streptococcus mutans*. This is a gradual process, with bacteria metabolising carbohydrates consumed throughout the day. During the bacterial metabolism of sugar substrates, acid is produced, and if this acid is not

promptly cleared, it can lower the pH of the oral cavity to below the critical level of 5.5, creating conditions that favour increased bacterial activity and tooth-tissue demineralisation (Touger-Decker and Loveren, 2003). Though caries-related tooth destruction takes time, once it extends beyond the enamel, it is a cumulative process, and without restorative intervention, will result in cavitation eventually followed by tooth loss.

Prevention

It is in the patient's best interests to avert the initiation and progression of tooth decay. The main methods to prevent this are to simply practice effective daily oral

hygiene maintenance, ensure visits to the dentist at the appropriate recall interval, and to reduce the intake and frequency of sugary and acidic foods. To achieve satisfactory oral health, one must tip the balance in favour of tooth-tissue remineralisation, through brushing with a fluoridated toothpaste, cleaning interdentally, with less snacking in between meals and more fibre-rich foods (Touger-Decker and Loveren, 2003).

In addition to brushing, mouth rinses, whether advised daily or weekly, play an important role in oral disease prevention. Traditionally, mouth rinses are fluoridated or contain chlorhexidine (CHX) at varying concentrations. Although CHX mouthwashes are shown to be effective in inhibiting the microbial colonisation of clean enamel and reducing plaque formation, CHX is not always preferred or well-tolerated due to its negative effects on tooth colour and sense of taste after prolonged use (Rugg-Gunn, 2013). Because of these unwanted side effects, scientists globally are in the search for effective and natural substances with greater biocompatibility to substitute CHX.

Alternatives to chlorhexidine

Numerous studies have been conducted throughout the years in regard to finding an alternative with greater efficacy and fewer side effects. Though there is much yet to be explored, the results of some

investigations have been promising.

According to an article in the European Journal of Oral Sciences, it has been discovered that certain kinds of berries are exceedingly helpful in preventing dental caries (Philip et al., 2018). Cranberries, blueberries, raspberries (along with other foods and beverages) are rich in polyphenols. Polyphenols are plant-derived molecules that are said to improve oral health through their antioxidant and antibacterial properties. Philip et al. (2018) have evaluated different types of polyphenols in cranberries and concluded that considerable inhibitory factors have been found in cranberries against the enzymes of *S. mutans* and other acidogenic bacteria. A-type proanthocyanidins (A-PACs) - a class of polyphenols found at high concentrations in cranberries - have significant cariostatic effects and may be used as isolated natural agents in the future. Although A-PACs are deprived of bactericidal properties, cranberry polyphenols are able to modulate the cariogenic virulence harmful bacteria, thereby reversing conditions that help induce dental caries while preserving the environment for the commensal resident oral microbiome (Philip & Walsh, 2019).

In a separate clinical study, a cranberry (*Vaccinium macrocarpon*) mouthwash showed no statistically significant difference in effectiveness compared with regular CHX mouthwash. It was therefore concluded that it may be regarded as an alternative potent actor with other systemic benefits in the fight against dental caries (Khairnar et al., 2015).

Another in-vivo study conducted in India states that

pomegranate-pericarp-extract (*Punica granatum*) mouth rinse shows similar efficacy to regular 0.2% CHX mouthwash. This was measured in this study in terms of a significant drop in the count of salivary *S. mutans* colonies in children. The authors concluded that the pomegranate oral rinse may substitute CHX and that is thought to be due to a bioactive compound present in pomegranate called 'tannin'. Tannins, it is hypothesised, pass through the bacterial cell wall, accelerate the lysis of bacteria, and by repressing the glucosyltransferase enzymes, delay the adhesion of *S. mutans* to the tooth surface (Pinni et al., 2018).

Similarly, a mixed herbal formulation containing tulsi (*Ocimum tenuiflorum*), turmeric (*Curcuma longa*), Triphala consisting of amalaki (*Embllica officinalis*), haritaki (*Terminalia chebula*) bibhitaki (*Terminalia bellirica*), and neem (*Azadirachta indica*), honey and mint leaves has been compared with regular commercial chlorhexidine mouthwash and researchers came to the conclusion that the herbal preparation may be a cost-effective alternative to CHX. Its carefully chosen ingredients have been established as beneficial according to several indices, such as their antibacterial and antioxidant properties helping to reduce plaque and gingival bleeding and pocketing scores (Vinod et al., 2018).

A recent investigation suggested that liquorice's active components licoricidin and glabridin quell the virulence of cariogenic bacterium *S. mutans*. This is explained by their ability to interfere with bacterial adherence to the hydroxyapatite crystal structure of enamel, and their ability to re-

strain acid production from glucose metabolism. Moreover, both compounds have shown lower cytotoxicity than CHX. The authors of this paper finish by asserting that in the near future, these components sourced in liquorice could be added to oral hygiene products to help prevent dental caries (Vailancourt et al., 2021).

Conclusion

While it is clear that many naturally occurring compounds in fruits and herbs are highly promising, potent actors that may replace chemicals such as CHX in dental products in the fight against dental caries, there is still a need for further investigation and many more definitive studies before they are deemed an effective alternative, and healthcare professionals are able to encourage their use widely. Scientists emphasize that there are undeniable, though not insurmountable, limitations in the use of natural products in mouth rinses, including poor shelf life, the difficulty in isolating the bio-active compounds and generally poorer cost-benefit incentives. However, this is a growing field, and with dental caries a continuing health burden for billions around the planet, we need all the help we can get from the natural world. ■

Will robots replace humans in oral pathology?

Artificial Intelligence is improving at an exponential rate. Technology has started to replace many previously human-based activities and continues to threaten the positions of humans due to their objectivity, accuracy and low maintenance demands. Will this proceed into the realms of dentistry? Will robots really end up replacing humans?



Tanaka Kadiyo, United Kingdom

World-renowned physicist Stephen Hawking offered stark, timeless words of warning (BBC, 2014) amid the rapid development of artificial intelligence that even facilitated his ability to communicate, having to depend on advanced technology following the progression of his amyotrophic lateral sclerosis (ALS). Are humans, as Professor Hawking proposed, bound to be 'superseded' by machines of their own concoction? And, how can we expect such matters to unfold as it relates to pathology in Dentistry? How will the continuous and rapid development of artificial intelligence shape the dynamics of Dentistry; the way people are diagnosed, treated and managed? Should we, as dental professionals, academics, or even patients, be worried or excited? Will it be for the better, or for worse?

A pathologist?

Before answering any questions, the most important component that underpins this discussion is defining pathology itself. Originating from the words 'pathos' meaning disease, and 'logos' per-

taining to 'study of', oral pathologists are typically dentally qualified professionals that study the causes and effects of diseases (RCPATH, 2020). The weight of the work is highly localised in the analysis of laboratory samples of oral tissue for diagnostic purposes. Specialist pathologists play an integral role in healthcare through referrals and the treatment pathway for an incredible volume of patients. Pathology is central to the work of general dentists too, and indeed it is difficult to diagnose and organise the management of any condition without a grasp of the underlying disease process and a basic understanding of pathology. The author of New York Times Bestseller 'The High Mountains of Portugal' poetically describes the life of a pathologist by expressing that: "Under the pathologist's microscope, life and death fight in an illuminated circle in a sort of cellular bullfight. The pathologist's job is to find the bull among the matador cells" (Martel, 2016).

Oral and Maxillofacial Pathology is one of the thirteen recognised dental specialties. With less than thirty specialists in the

United Kingdom, very few dentists will ever consider this specialty and very few will have had the opportunity to work alongside one (BSOMP, 2020). The oral pathologist practises an assortment of laboratory techniques to scrutinise human tissue samples of the oral cavity, jaws and salivary glands. These techniques can be labelled as macroscopic, microscopic and molecular. Macroscopic investigation symbolises gross sections of tissue, such as the appearance of white confluent patches found in Oral Hairy Leukoplakia (OHL) (Cho et al., 2010).

Microscopy includes the subspecialties of histopathology, cytology and immunohistochemistry. The histopathologist can see cellular features such as hyperkeratosis, acanthosis and "balloon cells" (Greenspan et al., 2016) - Pathology is full of strange descriptions, from 'orange peel' and 'soap bubble' to 'snowstorm'.

The case for robots

Manual interpretation of medical images is very time-consuming, requires considerable specialist expertise, and is prone to inaccur-

cy with questionable consistency. For this reason, in the early 1980s, computer-aided diagnosis (CAD) systems were developed to improve the efficiency of medical image interpretation (Bengio, 2009).

As humans, we are subject to what is widely known as "human error". This phenomenon is subdivided into either a "skill-based error" or "mistake". A skill-based error is unawareness, in the moment, of the correct protocol and can be via a slip of action or memory lapse. A mistake occurs whereby the individual commits an action that is generally accidental and can be rule-based or knowledge-based. Even if we controlled all of the knowledge in the world - all the possible causes and outcomes - it would be impossible to sustain 100% accuracy in all of our work (Henriksen and Brady, 2013). As artificial intelligence, cognitive computing and machine learning systems become better than humans at medicine and cost less, it might even become unethical not to replace people.

In manual microscopy, it is standard practice for a pathologist to "take a look" at a histological slide under a microscope. To start with, there are many issues

with microscopy alone. For example, most microscopes are not US Food and Drug Administration (FDA) cleared medical devices (they pre-date the FDA, but this is starting to change), different microscopes have different optics and sources of light (e.g. blue vs. orange light), and the microscopes in use are often not properly calibrated (Evans et al., 2018). The next task now facing the pathologist, is to assess anywhere between 500,000 to 1,000,000 cells - which may have substantial heterogeneity - and condense all the data into a simplified diagnosis.

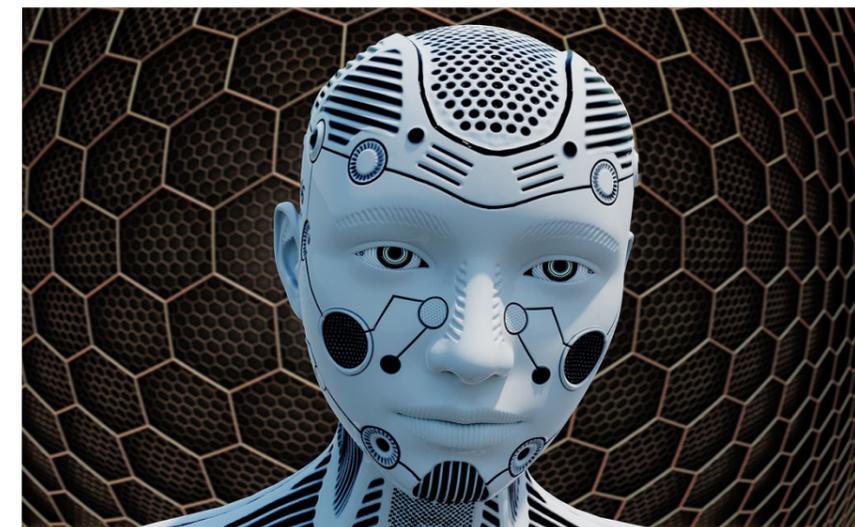
A situation where robots may be advantageous over humans is in the analysis of results, particularly when using a method such as immunohistochemistry. For example, it may be required that a pathologist dyes a potentially cancerous cell with a staining chemical (e.g., DAB - 3,3'-Diaminobenzidine). This frequently occurs with cells from a suspected oral melanoma. The pathologist then has to determine the percentage of cells that appear stained and compare this against a threshold (>10%) to see if this cell is cancerous (Lilyquist et al., 2017). This is an unbelievably challenging computational task, and without sur-

prise, leads to abnormal levels of intra- and inter-pathologist variation. Conversely, a robotic system is unlikely to have this same level of error.

Early diagnosis is the most important determinant of oral and oropharyngeal squamous cell carcinoma (OPSCC) survival outcomes, and yet most of these cancers are detected late, resulting in poorer outcomes (Ford and Farah, 2013). A potentially positive screening outcome at a routine dental check-up leads to referral to a specialist for biopsy and histopathological analysis. Artificial Intelligence (AI) systems now have the ability to combine multifactorial data streams into powerful integrated diagnostic and predictive systems spanning divergent data streams from sources such as images, genomics, pathology, electronic health records, and even social networks (Langlotz, 2019). A recent survey of the literature reported a 15% to 20% improvement in the accuracy of cancer prediction outcomes in clinical practice using AI techniques (Cruz and Wishart, 2006). To date, there are few publications on the application of these techniques to imaging in the oral cavity. In a recent study, the performance of a deep learning algorithm for detecting oral cancer from hyperspectral images of patients with oral cancer was evaluated. The investigators reported a classification accuracy of 94.5% for differentiating between images of malignant and healthy oral tissues (Jeyaraj and Samuel Nadar, 2019).

In defence of pathologists

It is often easy to forget the breadth and depth of knowledge a pathologist possesses. Defini-



tive diagnoses are only one tool in the pathologist's toolbox. A basal cell carcinoma, for example, is a fairly simple diagnosis to deduce, even on clinical examination only. However, a pathologist's report may include further information on the staging and progression of a cancerous lesion (Dourmishev et al., 2013). A pathologist needs to be ready to investigate anything suspicious (including incipient findings) by synthesising chart review information, holding discussions with clinicians, consulting old reports and concurrent labs, judging patient-specific factors and conducting additional special investigations. At the end of

the day, the pathologist is the focal spokesperson who uses their wealth of experience to set the baseline for treatment planning. This is why it is difficult to believe artificial intelligence will inherit a greater role beyond screening, but decision-support is going to make our pathologists much more efficient, accurate and consistent. The mounting demand for and the current dearth of pathologists could stabilise more once the technology matures and develops.

Conclusion

"Could pathologists be replaced by robots" is unnecessarily alarmist, and the wrong question to be

addressing. Perhaps a more useful question is "How can Artificial Intelligence enhance the work of pathologists?"

AI approaches can rapidly analyse complex images to provide decision-making guidance. Additional studies are needed to identify optimal imaging approaches for each clinical need and to finalise the configuration and clinical guidance outcomes of AI-based algorithms. It is an exciting field with many pioneers leading the effort, but not one where humans are at risk of being 'superseded' any time soon. ■

Factors affecting the osseointegration of dental implants

An introduction to modern day implant osseointegration.



Christianna Iris Papadopoulou, Dimitrios Angelakis, Greece

Dental implants have become a more common treatment for replacing missing teeth. In clinical dentistry, the goal of dental implants is to increase patient satisfaction in terms of improved chewing efficiency, physical health, and esthetics. In 1965, Brånemark introduced the term "osseointegration" to describe the process of bone growing right up to the implant surface, with no soft tissue in between. When osseointegration occurs, the im-

plant is held so tightly in place by the bone, that there is no relative movement between the two. The process typically takes four to six months to occur.

Kieswetter et al. described this process in his article in 1996 in more detail. Some days after implantation, bone regeneration is regulated by several growth and differentiation factors that are released around the implant. In 2003 Davies stated that the process of bone regeneration is

formed either on the implant surface or from the surrounding bone towards the implant surface. Finally, bone remodeling occurs by replacing immature with mature bone at the implant site, providing biological (mechanical) stability.

To be considered successful, an osseointegrated oral implant has to meet certain criteria. As Karthik et al. described in 2013, these basic criteria are immobility, absence of peri-implant radiolucency, adequate width of

the attached gingiva, and absence of infection. A wider implant has a better long-term success than a narrow implant. Co-existing medical conditions and smoking also play an important role in evaluating the success of an implant. Additional criteria are: bone loss less than 0.2mm annually after the first year postoperative (Albrektsson et al., 1986), and no bleeding pockets exceeding 5mm of probing depth (Mombelli et al., 1994).

According to Esposito et al. (1998), failures of osseointegration can be divided into biological failures, i.e., the inadequacy of the host tissue to establish or to maintain osseointegration, mechanical failures of the components of the oral implant, iatrogenic failures (malpositioning) and inadequate patient adaptation (psychological, esthetic and phonetic problems). Biological failures can further be divided according to chronological criteria in early and late failures. Early (primary) failure is the failure to establish osseointegration, i.e., an interference with the healing process. Late (secondary) failure is the failure to maintain the established osseointegration, i.e., processes involving a breakdown of osseointegration.

Many factors affect the osseointegration of a dental implant. This article describes the most important.

Biocompatibility of the implant material

In his 1987 Dictionary of Biomaterials, Williams defines biocompatibility as "the ability of a material to perform with an appropriate host response in a specific application". One of the most significant factors for assessing biocompatibility is corrosion behaviour due to the adverse effects (e.g. allergic

reaction, increased toxicity) that metal ions can generate both systemically and in the immediately related tissue. Titanium is one of the most widely accepted materials used to manufacture dental implants since 1981. According to a recent article (Nicholson, 2020), the most used titanium alloys are cpTi and Ti-6Al-4V, which have a 99% of success over a period of 10 years. Other dental implant materials include ceramic metals, stainless steel, chromium-nickel-vanadium and tantalum.

Although ceramics are gradually becoming more and more popular, the fact that titanium is the most biocompatible material remains undisputed. Titanium has a low electrical conductivity and its electrochemical oxidation leads to formation of a thin passive oxide layer which makes it highly resistant to corrosion. Titanium has an oxide isoelectric point of 5-6 and the protective, passive layer is retained at the same pH levels as the human body. Finally, in aqueous environments Ti and its oxides have low reactivity with macromolecules due to their low ion-formation

tendency (Sidambe 2014).

Implant design

A significant function of dental implants is force transfer (Steigenga, 2003). Thus biting forces and occlusal overload are two main factors to be considered when designing implants. Implant shape impacts the distribution of stress to the surrounding tissues greatly. In particular, cylindrical and screw-shaped implants produce less stress than conical or stepped ones.

To assess the quality of osseointegration related to implant design, three tests can be applied: pull-out, push-out, and torque measurement. The first two evaluate the shear strength of the implant whereas the third refers to the resistance of loosening of the implant. According to a recent research (Kayabasi, 2020), bone to implant contact (BIC) is essential in osseointegration and more important than implant length. Due to the difficulty of performing implant tests in vivo, a variety of mathematical models is needed to ensure efficient implant design.



Implant surgical technique and training of the operator

The experience of the operator plays a great role in accurately placing dental implants with a bone supported stereolithographic surgical template (Cushen, 2013). It is undisputed that the skills of the dental specialist are vital to the success of the procedure and the subsequent osseointegration of dental implants. Additionally, basic surgical rules need to be followed to ensure successful osseointegration. These include, among others, cautious surgical handling, cooling of the drills in order to avoid overheating and prevention of contaminating the dental implants via exposure to oral fluids (Vrotsos et al., 2016).

Subsequent prosthetic design

The subsequent prosthetic design is essential to the success of osseointegration. Prosthetic planning prior to the surgical procedure is of utmost importance since it will determine the most effective position for the dental implant. Each case requires a different approach. Dentists can choose between screw-retained prosthesis, which is easier for maintenance, and cement-retained prosthesis - both can be equally effective. The main goal of the dentist should be to avoid excessive forces placed on implants as this will undermine osseointegration. Furthermore, occlusal adjustments after prosthetic placement are vital because shearing forces can overload the entire prosthetic set, leading to screw fracture, porcelain fracture, screw loosening and implant fracture (Gustavo, 2018).

Loading condition

Esposito et al. (2013) established three main protocols for implant

loading: immediate loading (within one week of the implant placement), early loading (between one week and two months) and conventional loading (after two months).

When the Brånemark implants were first introduced in 1965, the trending notion was that loading should be implemented 3–6 months after implant placement. Brånemark and other researchers concluded that earlier loading would lead to failure of osseointegration. Despite that, in 1979, Ledermann implemented the immediate loading protocol using Titanium implants with a larger surface area.

Today, the immediate loading protocol is becoming more and more popular due to its problem-solving nature for both dentists and patients. For this protocol to be successful, some guidelines should be followed: placement of an acceptable number of implants (4–10), proper distribution of implants in the bone, initial implant stability that exceeds 40Ncm and normal occlusion.

Bone quality

The success rate obtained with dental implants depends to a great extent on the volume and quality of the surrounding bone. According to Lekholm and Zarb (1985), sufficient bone density and volume are crucial factors for ensuring implant success. Bone quality is broken down into four groups according to the proportion and structure of compact and trabecular bone tissue: Type I to IV (Bone Quality Index-BQI). Clinical reports have indicated that areas with Type III or IV bone, often found in the posterior maxilla, have a higher chance of failure compared to areas with Type

II bone. When compared to the maxilla, there was a higher survival rate for dental implants in the mandible, particularly in the anterior region of the mandible, which has been associated with better volume and density of the bone (Turkyilmaz et al., 2008). Type I bone also requires a great deal of caution because its preparation may cause overheating and necrosis of the bone, which leads to early failure.

Periodontal health and infection control

The success of implant osseointegration, like in any other treatment plan, depends on periodontal health and presence/absence of infection. Patient's history of periodontal and/or endodontic disease represents one of many risk factors contributing to the failure of dental implants. Bacteria and inflammatory elements in the area (cytokines, inflammatory mediators and inflammatory cells) potentially progress deeper into the bone and undermine the osseointegration process. To avoid early failure of implant osseointegration, the dentist must make sure the area of the implant and the surrounding periodontal tissues are clear of infection. ■



Cryotherapy in dentistry

Could cryotherapy possibly be used in the future as part of routine daily practice in the dental environment?



Maria Ioana Onicaș, Romania

The term 'Cryotherapy' is derived from the Greek word "kryos" unsurprisingly meaning "cold". In medicine, it refers to local or general treatments done with, or at low temperatures. It can even refer to an ice-pack used on an injured area of the body, but the most frequent use of the term is in relation to the surgical treatment specifically known as cryosurgery - 'the use of freezing as a special surgical technique to destroy or excise tissue' (McGraw-Hill Dictionary of Scientific and Technical Terms).

Fundamentally, the way cryosurgery works is simple. Usually, an extremely cold liquid, or an instrument called cryoprobe that is cooled with cryogenics, is placed in contact with the diseased tissue. Cryogenics are substances with a very low boiling point and those commonly used include liquid nitrogen, liquid nitrous oxide, solidified CO₂ (known as 'dry ice'), a mixture of dimethyl ether and

propane, used as a freeze-spray, and compressed argon gas (Sharma et al., 2009; National Cancer Institute, 2005). Cryotherapy can be performed in both open and closed systems (Sunitha, 2010).

An **open system** involves direct application of the cryogen with cotton pellets or as a spray. The heat from the tissue is released by vapourisation due to a drop in temperature. It is generally used for the treatment of medium-to-large oral lesions with smooth or rough surfaces.

A **closed system** implies direct contact between the cryoprobe and the lesional surface. Due to the miniscule surface area of the tip of the cryoprobe, this system is suitable for the treatment of small and smooth-surfaced oral lesions. In contrast to the open system, this method is preferred when control over the depth of the lesion is needed.

Cryosurgery may be used for both internal and external le-

sions and tumours. When lesions requiring treatment are located within the body, surgeons place the cryoprobe in contact with the area in question by using ultrasound or magnetic resonance imaging to guide the position of the cryoprobe (National Cancer Institute, 2005). In this case, the frozen tissue is absorbed by the body. When target sites are on external surfaces, the iced tissue disintegrates and a subsequent crust is formed.

Physiological mechanism

After applying the cold instrument or liquid, the target tissue produces three basic physiological responses (Bazaid et al., 2018):

1. a reduction in the local blood flow
2. a decrease in metabolic activity
3. neural receptor inhibition in the subcutaneous tissues and skin.

Since nerve conduction capacity is directly diminished, cryotherapy does not require the use of local anesthesia and is a relatively painless procedure. The cold application on the epithelium triggers the thermal receptors and the stimulation of these receptors can block nociception in the surrounding tissue. The neuron is devitalised by freezing, but the axon sheath itself is resistant to cold and remains unaffected. This allows the growth of a new neuron and regeneration is often apparent after a week, with normal function expected within one to two months (Farah et al., 2006).

One point to keep in mind is that the duration of the application is critical. Performing the procedure for a greater period of time than recommended may lead to the death of the tissue due to prolonged vasoconstriction, ischemia and capillary thrombosis (Cho et al., 2017).

Oral precancers and cancers

Cryotherapy was first used in dentistry in maxillofacial surgery to treat patients diagnosed with localised cancer of the lip and oral cavity, where the usual methods of treatment had not been successful or could not be used without taking considerable risks (Gage et al., 1965). Between 1960 and 1980, the main treatment for oral squamous cell carcinoma was cryotherapy (Yu et al., 2014).

Premalignant lesions such as oral leukoplakia, when treated using either closed-system or open-system cryotherapy, showed promising results. For oral verrucous hyperplasia and oral verrucous carcinoma a combination of surgical excision and subsequent cryotherapy is needed in order to achieve complete removal of the

lesions and to minimise recurrence (Yu et al., 2014).

It has also been proven that the severity of mucositis in cancer patients who are undergoing chemotherapy and/or radiotherapy can be prevented or reduced using ice chips (Worthington, 2011).

Oral lesions

According to a review article published by Yu et al. (2014), cryotherapy has also been used in the treatment of mucoceles, oral hemangiomas, oral lymphangiomas, and for small, benign oral soft-tissue tumours such as fibromas, pyogenic granulomas, and peripheral odontogenic fibromas. It has also been used for oral lesions such as gingival melanin pigmentation, oral melanotic macules, and oral lichen planus.

Surgical extraction of third molars

Surgical removal of wisdom teeth can result in postoperative complications such as pain, swelling and trismus. Based on physiological principles, the application of ice to the extraoral site of surgery after third molar removal should induce a favourable response and minimise these complications. According to a systematic review done by Nascimento-Júnior et al. (2019), it was suggested that cryotherapy may have a small role in reducing pain after third molar surgical removal, but it is not effective in reducing swelling or trismus.

Endodontics

In the past few years, cryotherapy has found increasing usage in endodontics. It has proven its potential against *Enterococcus faecalis*, which is the species most

often implicated in persisting root canal infections. NaOCl irrigation followed by cryo-instrumentation for 30 seconds with a dental instrument equipped with a duct connected to a cryogenic fluid source and a needle which receives the fluid, significantly reduced the number of *Enterococcus faecalis* in the root canal compared to NaOCl alone, without entirely eliminating the bacteria (Mandras et al., 2013). Several studies have concluded that cryotherapy and irrigation, beside its antimicrobial properties, are effective in reducing periapical inflammation and postoperative pain following endodontic treatment (Bazaid et al., 2018; Gundogdu et al., 2018; Keskinkin et al., 2017; Vats et al., 2020).

Conclusion

Cryotherapy is a possible alternative management technique for a variety of lesions and conditions, and patients may prefer this approach to surgery when it is deemed to be suitable. It is of course, however, not the first-line choice for many tests and treatments and due to its limited applicability, patient selection is critical. One major drawback is that cryotherapy is especially not indicated when the diagnosis of a lesion is not certain.

What is clear, though, is that the captivating potential of cryotherapy should be further investigated through clinical studies into differing dental applications, so precise treatment protocols and an evidence-base can be established. In the future, the role of cryo-treatment in dentistry may grow, resulting in detailed recommendations for specific procedures, and adapted training programmes for dental professionals and specialists. ■

Ptyalism in patients with Parkinson's disease

Ptyalism is one of the manifestations of Parkinson's disease. So far, several pharmacological and non-pharmacological agents have been tested in the treatment of this manifestation, however, each of them has its advantages and disadvantages. This problem needs to be addressed in order to provide patients with a satisfactory quality of life.



Ana Lipovina, Montenegro

Parkinson's disease and ptyalism

Parkinson's disease (PD) is a progressive disease of the central nervous system, predominantly affecting dopaminergic neurons located in the substantia nigra, in the uppermost region of the brainstem. More familiar symptoms of Parkinson's disease that make the condition increasingly debilitating are primarily tremors in the hands, stiffness of the limbs and problems with gait and balance.

The overflow of saliva from the

oral cavity - colloquially referred to as 'drooling' - is one of the non-motor consequences of Parkinson's. Although the pathophysiology of excess saliva in PD has not been completely established, a study conducted by Sri- vanitchapoom et al. (2014) suggests the cause to be insufficient intraoral salivary clearance. It is therefore commonly referred to as a 'pseudoptyalism'. There are no absolutely effective drugs at hand for the treatment of such patients, however, various pharmacological agents and non-pharmacological methods of treatment have been studied to alleviate the severity of this symptom.

According to Parkinson's Foundation statistics, more than 10 million people in the world live with this disease. Since their underlying disease is progressively debilitating, it is necessary to find an absolutely effective (targeted) medicine that will either have no or minimal side effects. It is very important to work on preserving the psychosocial health of the patient because all scientists involved in this discussion agree that excess

saliva in PD patients significantly endangers their quality of life, regardless of its ultimate pathophysiology.

Risk factors and morbidity

Studies assessing oral health in people with PD have reported several undesirable health consequences accompanying excess saliva such as perioral dermatitis, poor oral hygiene, halitosis, increased bacterial load, difficulty eating and speaking, and increased rates of respiratory tract infections due to the silent aspiration of saliva. Dysphagia in Parkinson's disease arises from a number of factors but is primarily a result of reduced tongue mobility and delayed onset of the swallowing reflex. Impaired swallowing means greater pooling of saliva in the mouth, and the resulting 'drooling' can be mistaken for ptyalism.

Interestingly, there lies strong disagreement among researchers, with some hypothesising a strong link between dysphagia and excess saliva, while others assert that the picture is not so clear. Facial muscle stiffness can



impair lip control and reduce swallowing efficiency, and it can make people prone to anterior saliva loss too. In circumstances where a patient's body is bent forward, or if the neck is angled off-centre and the mandible is propped open there is great difficulty in holding the saliva and directing it backwards, so it is difficult to initiate the swallowing reflex. This results in 'anterior sialorrhoea'.

It is still not possible to draw conclusions with any certainty about any significant positive or negative effect of levodopa on ptyalism in PD, although it is the drug that is most often used as the first-line option to address the patient's underlying disease and its more debilitating symptoms.

Kalf et al. (2007) said that psychosocially, patients with PD who have regular episodes of excess saliva have demonstrably poor quality of life, social embarrassment, and increasing emotional distress.

Treatment methods:

Pharmacological

Various drug preparations have been trialled in addressing excess saliva in PD patients. Sri- vanitchapoom et al. (2014) emphasized that the patient must first stop using drugs that cause hypersalivation, such as cholinesterase inhibitors, clozapine or quetiapine. The researchers argue that the aim should be to improve motor symptoms by using dopaminergic drugs or by exploring deep brain stimulation. The classes of drugs studied in several trials were anticholinergics, adrenergic receptor agonists, and botulinum neurotoxin.

Acetylcholine drugs block cholinergic receptors, reducing salivary secretion. However, the

available agents are not highly selective for M3 receptors and therefore may trigger disagreeable side effects such as constipation, urinary retention, drowsiness, confusion and hallucinations. A pilot study (Hyson et al., 2002) of treating PD patients with sublingual atropine drops showed that a single drop of Atropine 1%, when used 2 times a day for a week, significantly reduced saliva production. The continuing need to find an effective drug free from unwanted side effects led the Clinic for Movement Disorders (Toronto Western Hospital) to examine the effectiveness of Ipratropium Bromide spray in the treatment of ptyalism or pseudoptyalism in patients with PD. The result, however, showed that Ipratropium Bromide spray did not have a significant effect on the weight of saliva produced (Thomsen, 2007). Following the recommendations of the MDS Foundation, the most reliable anticholinergic for the treatment of excess saliva is Glycopyrrolate. According to the results of the trial carried out by Mestre (2020), Glycopyrrolate is effective for up to 12 weeks from the start of treatment, despite the fact that this drug was previously considered ineffective for more than a week.

Botulinum toxin, on the other hand, inhibits the release

of acetylcholine, leading to hyposecretion of saliva through the counteraction of sympathetic activity. Two types of botulinum neurotoxin type A (BoNT-A), and one type of botulinum neurotoxin type B (BoNT-B), injected into the parotid glands, have been used in the treatment of excess saliva in PD. The duration of subjective and objective assessment after the start of treatment with BoNT-A ranged from 1 to 16 weeks. In the case of abobotulinumtoxinA, all studies showed that salivation was significantly reduced and that the effect lasted from one to four months. The effect of BoNT-B lasted up to 4.8 months. A step forward was made by Guidubaldi et al. (2011) who, in their work, concluded that BoNT-B was more effective than BoNT-A. However, after two months there were no significant differences between the two groups.

Non-pharmacological

Many non-pharmacological methods such as chewing gums, behavioural modifications, radiotherapy, and surgical treatment have been studied, but none of them are considered to be the first-line treatment.

Marks et al. (2001) conducted a study involving six patients with PD. The aim was to



evaluate the effect of behaviour modification - patients had to consciously swallow saliva when they heard a specific sound. The results showed that there was a significant reduction in deep brain stimulation. The authors agreed that self-motivation was very important and that the success of the intervention depended on it. Postma et al. (2007) followed 28 patients and concluded that there was a significant improvement after radiotherapy with the effect lasting a year. There were no significant side effects, such as loss of taste or dry mouth.

Dihydroergotoxine mesylate: a viable alternative?

According to the scientific work of Cheng et al. (2019), dihydroergo-

toxine mesylate is an alpha-adrenergic drug that acts agonistically on dopaminergic and serotonergic receptors and antagonistically on alpha-adrenergic receptors in the brain. This was the first time that this drug has been tested in the treatment of excess saliva. The study consisted of two phases, using 2.5 mg oral dihydroergotoxine mesylate twice daily. There were no significant side effects. However, this is currently the only work that fully recommends the use of an alpha-adrenergic drug.

It is possible that this study will be crucial in the treatment of patients with Parkinson's disease and encourage further research, because dihydroergotoxine mesylate has been shown to be safe and effective in the limited

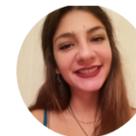
data available.

Conclusion

Excess saliva is a common manifestation of Parkinson's disease. Even though patients generally tolerate this problem well mentally, its consequences on speech, swallowing, and oral health (perioral dermatitis, poor oral hygiene, halitosis) require attention. It is very important to develop a treatment strategy for these patients and prevent possible complications. All the therapeutic procedures that are currently available have advantages and disadvantages, so there is a serious need for further research on this topic in order for these patients to have the best possible quality of life. ■

Hyaluronic acid: a minimally invasive approach to papilla reconstruction

The reconstruction of deficient interdental papillae poses a great challenge in patient's treatment plans for clinicians today.



Ioanna Mitsika, Greece

According to a 2009 European Journal of Prosthodontics and Restorative Dentistry survey, open gingival embrasures rated as the third most disliked aesthetic problem below caries and apparent crown margins during prosthetic treatment. The loss of inter-

denal papilla can also negatively affect the health of periodontal tissue. This deficiency leads to the accumulation of food debris and dental microbial plaque, since it is difficult for patients to clean the interdental spaces. Furthermore, this may cause hardship in the

pronunciation of some letters of the alphabet. It is readily perceptible that the interdental papilla, especially in the anterior dentition, is an important part of smile aesthetics and periodontal health.

Towards the end of 1998, Nordland and Tarnow suggested a

classification system regarding the papillary height. This classification is based on three identifiable anatomical landmarks: (1) the interdental contact point, (2) the facial apical extent of the cemento-enamel junction (CEJ), and (3) the coronal extent of the proximal CEJ. Under normal conditions, the embrasure space to the apical extent of the interdental contact point is occupied by an interdental papilla. The system includes three classes:

Class I. The tip of the interdental papilla is placed between the interdental contact point and the most coronal extent of the interproximal CEJ (space present but interproximal CEJ is not visible).

Class II. The tip of the interdental papilla lies at or apical to the interproximal CEJ but coronal to the apical extent of the facial CEJ (interproximal CEJ visible).

Class III. The tip of the interdental papilla lies level with or apical to the facial CEJ.

The classification of 1998 provides useful information for shaping diagnosis, prognosis, treatment planning, and communication between clinicians.

Which techniques are followed?

Based on the anatomy of interdental papillae, there are currently many treatment options to rebuild the aesthetic zone, including orthodontic treatment, restorative intervention, laser and periodontal surgery. These methods mostly focus on reshaping the interproximal contact area or increasing the soft tissue volume.

Orthodontic treatment can reduce the interproximal space by realigning or rotating the tooth. The decreased angle of the adjacent roots loosens the trans-sep-

tal fibers, which fill the open embrasure and push the interdental papillae in an incisal direction. As far as restorative dentistry is concerned, restorations with composite resins may be used in order to shorten the interproximal space by reshaping the interdental contact point. Some case studies demonstrated that the interdental papillae could be reconstructed with an underlying subepithelial connective tissue graft. However, due to the low blood supply and the anatomical restriction of the gingival papilla, the result is unpredictable.

McGuire et al. 2007, developed a type of haemo-therapy, called haemo-laser therapy. This lower-level laser treatment stimulates gingival blood flow and promotes blood clot formation in open embrasures. Haemo-laser therapy may promote the accumulation and survival of stem cells that are released from the blood clot. It is proposed that these stem cells can regenerate the deficient interdental papillae.

Another treatment option with a positive effect is the local injection of hyaluronic acid in soft tissues. This minimally invasive approach was reported by Becker et al. in 2010.

Is HA a recent scientific acquisition?

Hyaluronic acid (HA) was a discovery of Karl Meyer and his colleague John Palmer in 1934. The scientists isolated a chemical substance from the vitreous jelly of a cow's eyes. They proposed the name hyaluronic acid, derived from Greek word *hyalos*, which means glass, and uronic acid which is one of two sugar molecules of the substance. Naturally, HA is an essential high molecular weight glycosaminoglycan of



the extracellular matrix of many tissues in the body, including the periodontium. In human gingiva, HA is present as 5.2% and 3.6% of the total glycosaminoglycans of epithelium and connective tissue respectively. The majority of cells produce this in their own membrane during several phases of their cycle.

Nowadays, HA is one of the most widely used agents for soft tissue augmentation and regeneration. It has a remarkable role in cell proliferation, migration and interaction with several growth factors. Moreover, HA's hygroscopic nature helps in space-filling, which is essential in the increase of tissue volume. HA regulates osmotic pressure and enhances tissue lubrication and resiliency, which helps in maintaining the structural and homeostatic integrity of tissues. These properties play a crucial role in HA's selection as an agent in soft tissue remodeling. HA preparations arise from bacterial or animal sources. However, for ethical reasons and to minimize the chance of allergic reactions, the non-animal-based gel is preferred.

Which is the protocol of the procedure?

Although there is no standard procedure, studies describe a specific pattern in several protocols. In the preoperative phase, the first visit starts by collecting detailed medical and dental history, and completing the dental and periodontal charts. Next steps include patient motivation, oral hygiene instructions, full mouth supragingival scaling and, if needed, periodontal therapy. Once the patient's motivation and oral hygiene habits are deemed satisfactory, the treatment of recessed papillae may be commenced.

On the day of the intervention, it is very essential to take clinical photographs for comparing results. During the procedure, the patient firstly receives local anaesthesia. Then, 0.05-0.1ml of 16mg/ml hyaluronic acid gel is injected into the base of every recessed papilla, and papillae are massaged for one minute. Increased local pressure, caused by the injection of HA gel, causes ischaemia which typically lasts up to 10 minutes. Bleeding is expected only at some injection sites and can be easily managed by applying pressure on the wound without the sutures needed. After the first intervention, a noticeable increase in the

volume of the gingival papillae is not observed. The postoperative instructions include (a) avoidance of mechanical plaque removal in the area, and (b) use of soft toothbrush after the first 24 hours and for 2 weeks. Two additional injections are scheduled 3 and 6 weeks after the initial injection, following the same procedure. Clinical photographs are repeated at 4 and 6 months.

Different effects were observed in several studies

According to the results of Awartani's 2016 study that included 9 female patients with class I or II interdental papilla loss, differences in the papilla volume and height from the initial were statistically significant between 4 or 6 months ($p < 0.0001$). In the period between the fourth and sixth-month follow-up, no statistically significant difference was observed ($p > 0.12$). The reduction of open gingival embrasures at 4 months was over 50% with two of these having complete papilla fill. Additionally, the findings of Jing Ni et al. (2019) indicate that patients with thick gingival biotype respond more effectively to treatment with HA, which was not supported previously. Becker et al. (2010) reported a study including 14 sites (4

natural teeth and 10 implants), 11 of which had up to 88% improvement. Moreover, papilla augmentation has demonstrated stability for 2 years postoperatively. However, Bertl et al. (2017) came up with the opposite conclusion that the gently invasive HA technique did not cause any change of the deficient papilla volume of the maxillary anterior implant-supported crowns. A literature review revealed that the results of gingival papilla improvement differ due to the diversity of procedure protocols and inadequate follow-up time.

Conclusion

The HA approach of papilla reconstruction is another weapon in the armoury of the clinical dentist. Nevertheless, future clinical trials that might include a placebo group are needed to assess long-term outcomes and compare the success and effectiveness of different materials and methods available. Such studies should incorporate multiple pertinent factors, including patient desires and expectations. This way, strong clinical evidence will be produced to maximise the knowledge around and the predictability of this approach. ■



Going to the electric toothbrush

curaden
academy

More and more patients want to switch to an electric toothbrush. Whilst a manual brush is perfectly fine to use, there are benefits that electric toothbrushes bring that make them worth considering. Easy to use, reach hard-to-reach spots, various cleaning modes, different brush heads and convenient travel case, are just some of the features that make a difference. The combination of a well-designed electric brush and daily interdental cleaning can be a breakthrough for many people.

Studies show that sonic toothbrushes clean up to 10% better than manual brushes, and the best devices reach up to 42,000 brush strokes per minute.



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The Hydrosonic Pro comes with three specialised brush heads created with high-density Curen® filaments – Curaprox's softest and most advanced material used in toothbrushes. The innovative waterdrop-shaped design of the «sensitive» and «power» brush heads envelops each individual tooth.



Power: A soft and powerful brush head for everyday use.



Sensitive: Extra-soft Curen® filaments for sensitive teeth and gums.



Single: Ultra-high-density filaments for precision cleaning around hard-to-reach areas.

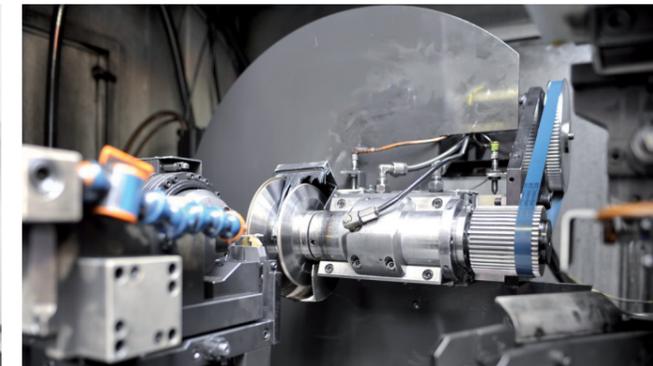
All brush heads are tilted at a slight angle to ensure they can better access all areas of the mouth with optimal cleaning angles. Reaching back molars or around braces or implants won't be a problem.

The Hydrosonic Pro is powered by a high-speed precision motor that translates motion onto the brush head. Each movement of the motor is the equivalent of a brush stroke, and the Hydrosonic Pro goes as fast as 42,000 strokes per minute. At this speed, the vibration of the brush head creates a hydrodynamic effect that leads to a dramatic increase in cleaning efficiency.

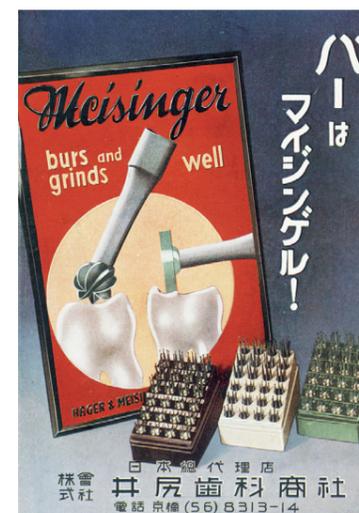
The motor runs in seven intensity levels from 22,000 up to 42,000 motions per minute. For weakened enamel and gums, use of the sensitive brush head and the second mode, which is 32,000 low-amplitude strokes, ensure the gentlest cleaning action. High speeds are perfect for strong teeth and gums.

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In Germany MEISINGER is already well known for its workshops and lectures at universities – especially in the field of implantology and oral surgery. With our Young dental experts camps we also succeeded in putting together a premium program especially meant for students in their clinical semesters as well as for medical assistants.

We are looking forward to meeting you at the next EDSA Meeting. There we will inform you about our activities regarding international students and answer your questions in person.

Until then you can contact our student supervisors Lutz Grätz and Yannick Wienecke:

Lutz Grätz

Phone: + 49 2131 2012 120
Mobile: Mobile: + 49 151 40232 444
E-Mail: lutz.graetz@meisinger.de

Yannick Wienecke

Phone: + 49 2131 2012 582
Mobile: + 49 151 145 556 17
E-Mail: Yannick.Wienecke@meisinger.de





To drink or not to drink: the effects of alcohol on oral health

What do researchers say about the most widespread socialising tradition - does it really affect our oral health?



Petroulia Paraskevi, Greece

Drinking alcoholic beverages is one of the oldest and most widespread forms of socialising practice and bonding traditions. According to the World Health Organisation, there are almost two billion people worldwide who consume alcohol regularly. It is also, however, commonly abused, and almost 80 million people are diagnosed with “alcohol abuse disorders” (WHO, 2004). Excessive alcohol consumption is related to more than 60 different systemic pathologies, such as high blood pressure, liver disease, and depression (NHS, 2018).

There are permutations to oral health too, with an associated increased risk of developing dental caries, erosion, periodontal diseases, and oral cancer (Priyanka et al., 2017). These problems are related to a greater extent to people who consume alcohol beyond the advised limit of 14 units

per week regularly, and even more so in combination with smoking. They are more vulnerable to disease within the oral cavity because alcohol’s ingredients disturb the oral environment.

In chemistry, alcohol is defined as an organic compound that carries at least one hydroxyl functional group (-OH) bound to a saturated carbon atom. Alcoholic drinks contain ethanol ($\text{CH}_3\text{CH}_2\text{OH}$), which can be metabolised by the human body. It is often produced, at home or on an industrial scale, through the fermentation of carbohydrates, grains, fruit or other sources of sugar, and can be further distilled.

According to the World Health Organisation, the harmful consumption of alcohol is accountable for 7.1% and 2.2% of the global burden of disease for males and females respectively. But what are the exact oral health

consequences of long-term alcohol drinking, and how people can protect themselves from them?

Caries and tooth erosion

Unsatisfactory oral hygiene and the consumption of alcoholic drinks, which are acidic and high in sugar, could potentially lead to an increased risk of dental caries and erosion. Oral acidogenic bacteria metabolise the sugars to acids, making the oral environment more acidic. This results in enamel demineralisation. The saliva slowly neutralises the pH of the mouth and stimulates remineralisation. However, if the cycles of these ‘acid attacks’ are repeated too often, the remineralisation process is hindered, leading to mineral loss and consequently dental erosion and caries. Dental caries can lead to a small hole in the tooth, called a cavity (NIH 2019). If not appropriately treated, this cavity

can become deeper, reach the pulp of the tooth and become the entry point of bacteria, causing pain, infection, and eventual tooth loss without restorative intervention. This process can be accelerated with the simultaneous consumption of tobacco.

Periodontal diseases

Alcohol abuse creates a greater risk of periodontal diseases such as gingivitis and periodontitis. Gingivitis is the inflammation of the gums. Periodontitis is a multifactorial inflammatory disease associated with a dysbiotic bacterial biofilm in a susceptible host leading to the progressive loss of the supporting structures of teeth (Caton et al., 2018). The gums become swollen, red and more prone to bleeding, with increased recession, tooth mobility, gingival pocketing and alveolar bone loss. Drinkers without pre-existing periodontitis saw an increased incidence of gums that bled (Chicago, 2015). The effect of alcohol use on periodontal disease is still being investigated, with the findings of recent studies being inconclusive (Gay et al., 2018; Wang et al., 2016). Some long-term studies have shown positive associations between alcohol consumption and periodontitis (Nishida et al., 2008; 2010; Wagner et al., 2017).

Dry mouth

Alcohol consumption is a major risk factor linked to xerostomia (dry mouth) - a subjective sensation of oral dryness. It may also lead to symptoms such as salivary gland inflammation, difficulty swallowing and dehydration (Tanasiewicz et al., 2016).

Alcohol is one of the main causes that prevent the salivary glands in the mouth from making

enough saliva to sufficiently lubricate the oral cavity. Saliva helps prevent tooth decay by washing away food particles and neutralising acids produced by bacteria, thus limiting bacterial growth. Hyposalivation, caused by alcohol consumption, leads to plaque accumulation, tooth decay, gum disease, and their respective disease sequelae.

Erythroplakia and oral cancer

Alcohol, especially combined with unsatisfactory oral hygiene and tobacco consumption, is a significant factor in the development of precancerous lesions and carcinoma.

Dysplastic leukoplakia is the most common precancerous lesion with tobacco and alcohol as the main etiological factors (Ivoš et al., 2018). It presents as thick, white or grayish patches attached to oral mucosa. The exact cause of leukoplakia is still unknown (Luo, 2019).

Erythroplakia is a relatively rare lesion of the oral cavity with a very high malignant potential. (Villa and Abati, 2011). Clinically, it appears as a flat or slightly elevated red lesion on the oral mucosa, sometimes associated with leukoplakia (Bouquot, 1994). Pathologists have not yet isolated their exact cause, but they strongly believe that alcoholic beverages play a significant role, because ethanol, found in all alcoholic beverages, acts as a procarcinogen (Pflaum et al., 2016). Alcohol may increase the penetration of carcinogens across the oral mucosa by either increasing their solubility or by increasing the permeability of the mucosa by dissolving the lipid component of the epithelium that normally acts as a protective barrier (Ruiz et al., 2004).

Oral cancer appears as a growth or ulceration that does not go away. It is usually found on the lips, tongue, cheeks, skin, and floor of the mouth, as the permeability of these non-keratinised tissues is much greater than that of the thicker, ortho- and para-keratinised tissues (Squier et al., 1991; Reidy and McHugh, 2011). Shockingly, smoking and the excess consumption of alcohol could increase the risk of mouth cancer by up to 30 times as stated by the Oral Health Foundation.

Conclusion

To conclude, high alcohol consumption has a significant impact on oral health. The consequences of heavy drinking include dental caries, dental erosion and possibly periodontal disease, as well as the heightened risk of developing cancerous lesions of the oral cavity. The systemic morbidity and mortality associated with it is also remarkable, as well as the strain of alcoholism and diseases associated with alcoholism on health systems worldwide. It is up to each individual to protect themselves and their oral health by moderating or avoiding alcohol consumption, following a rigorous daily oral hygiene regimen, and never missing routine check-ups at the dentist. Dental professionals on the other hand should inform their patients about good oral hygiene habits and about the risks of excessive alcohol consumption alongside smoking cessation advice. It is especially important that professionals in primary care are able to recognise when a referral to addiction and rehabilitation programmes may be indicated. In such cases, it is important to be sensitive and considerate, and to refrain from criticism and condemnation. ■

Milk alternatives - dietary high caries risk?

Soy milk, almond milk, oat milk and hundreds more... Whether you're lactose-free, vegan or you have an allergy, grocery stores will likely fill your needs. But the question is: Are these milk alternatives any healthier than cow's milk and do they impact our oral health?



Katarína Vendelová, Slovakia

Milk is an essential component in the diet of around 6 billion people globally. Although mammals produce milk to feed their offspring, in many areas of the world humans continue to consume milk throughout their lives. In addition to milk, several dairy products such as cream, butter, yoghurt, kefir, and cheese have been produced and consumed worldwide for millennia (Visioli and Strata, 2014).

Milk and dairy products may be delicious, but they are often also a significant component of people's diets, offering an accessible source of calcium as well as other essential nutrients, fats and proteins. Calcium, however, is a unique mineral supporting vital metabolic processes, and ninety-nine percent of it is stored in the body's bones and teeth, according to the National Institute of Health (2020).

However, it must be emphasized that lactose intolerance is widespread throughout the world and that a significant proportion of the world's population - possi-

bly up to 65% - would not benefit from any putative benefits of milk and dairy products (Malik and Panuganti, 2021).

Even those who are able to digest lactose might wish to reduce or eliminate their milk and dairy intake because of other factors, such as health, veganism and animal welfare, and concerns regarding the environmental costs of intensive farming. A combination of these priorities has been the driving force behind the growth of dairy-free alternatives to the milk of farmed animals.

The dietary relevance of milk

While many foods and drinks contain calcium, most people currently find consuming milk and dairy to be the easiest way to meet their recommended daily amount. According to the study of Dr. Wu (2019), dairy products like cheese, milk, and yoghurt provide a variety of benefits to dental health.

They contain casein proteins that form a protective film on the surface of teeth. These proteins can protect the enamel from

decay. They are mostly pH-neutral and can help neutralise acidic or sugary food and drinks. All dairy products are rich in calcium and phosphorus too, which helps the remineralisation of tooth enamel, but also have a role in the growth and development of bones pre-adulthood.

The implications of milk alternatives for oral health

Aside from allergies and intolerances, consumers choose milk alternatives for religious, ethical, environmental, and perceived health reasons. However, Daly (2020) explored some of the limitations to these arguments. For example,



although the production of plant-based milks (PBMs) releases half the greenhouse gas emissions and requires substantially less water and land compared to cow's milk, the necessary ingredients often must be transported from across the globe. The possibly adverse health effects of phytoestrogens (a plant compound analogous to oestrogen) are also debated. Although these compounds may reduce the risk of cardiovascular and metabolic disease, they have been associated with an increased risk of infertility and some cancers.

A brief look at any supermarket's milk aisle suggests rising demand for milk alternatives, ranging from options made with soy, almonds, cashews, hazelnuts, coconuts, macadamia nuts, rice, flax, oats or hemp. While there are archives of research on mammalian milk, research on PBMs is scarce and limited.

In a study (Daly, 2020) of branded plant-based milks, the sugar content in PBMs ranged from 0g to 8.7g per 100ml. Unlike lactose found in dairy milk, the sugars found in PBMs are free sugars - simple sugars added during or after the production process and, therefore, possessing greater cariogenicity. These 'free sugars' are also regularly found in PBMs labelled with 'no added sugars' or 'natural sugars'. The 'unsweetened' varieties generally do not contain these cariogenic sugars.

Lots of milk alternatives were found to be fortified with calcium to a similar level as found in cow's milk. However, this added calcium is less bioavailable than in dairy milk, possibly due to the presence of natural fats in cow's milk, meaning that any preventative benefits are reduced. Unlike dairy milk, PBMs are fortified with

vitamin D. Even so, the concentration is such that the consumer would need to drink one litre of a PBM to reach the recommended daily intake.

"The bioavailability of calcium may be different when it is fortified compared to when found naturally, and this is a big issue with some of these products," says Dr. Gallo, nutrition scientist from George Mason University's department of nutrition and food studies in Virginia, US in an article for BBC. However, what is clear is that more research is needed on PBMs, including on their comparative cariogenicity and buffering capacity relative to cow's milk.

Optimal oral hygiene

Whatever your dairy-related preferences, you will not necessarily be missing out on vital nutrients if you eat a balanced diet. In most cases substitutes can be used in place of milk without an increased risk of forming dental caries. According to Dr. Virtanen (2019): "It is not necessary to avoid milk but it is also not necessary that we drink milk, either. It can be replaced with other products - there is no single dietary component or food that is absolutely necessary to our teeth's strength and health overall."

More pertinent considerations to dietary habits are frequency and timing. A diet that promotes good oral health is not just about the foods you eat or avoid, but when, how and how often you eat them. According to Dr. Wu (2018): "Food and beverages sequencing is important and may help to prevent tooth decay. Try eating acid neutralizing foods after a sweet meal or dessert as this will prevent prolonged acid attacks to your teeth and therefore

help prevent cavities."

Reducing the frequency of eating fermentable carbohydrates during the day by restricting them to mealtimes, and eliminating snacking in between, is essential in allowing salivary pH stability and enamel remineralisation. Also, drinking water during and after meals to help wash away sugars and acids is really important (Wu, 2018).

Calcium obtained through dairy or non-dairy products is a fantastic way to enhance dental and general health, but they are no more than one component of a balanced diet. What is key to optimal oral health is an effective and disciplined daily oral hygiene regimen coupled with the reduction in the amount and the frequency of intake of sugars throughout the day. ■



Dentistry in the age of mass communication

From the 'Hollywood smiles' of yesteryear to the 'Instagram glow-ups' of today, how has social media impacted dentistry and oral health?



Büşra Akarsu, Turkey



Social media, constantly evolving and taking new forms and shapes, has changed the face of much we take for granted and has a considerable impact on the world today. It is estimated that more than 45% of the world's population are social media users, equating to billions of people of differing cultures and nations. The impact of social media communication platforms such as Facebook, WhatsApp, Snapchat, Twitter, Instagram and more recently TikTok on the realities of various professions, and general market relations, is immense. In-

deed, we should consider the adverse consequences of these platforms as much as we extol their virtues, and the supposed benefits and opportunities we derive from them. After debating the true nature of the beast, and describing the context of the social media age, it is important to consider its implications on dentistry from the perspectives of both patient and clinician.

The Internet

The rapid growth of the internet since the early 1990s multiplied exponentially since the advent of

the first social media platforms, and the simultaneous development of handheld communication devices catalysed this immense global rush towards mass communication. Users are able to interact with, listen to and share content from whoever and whatever they want, while themselves being able to post to their heart's content whenever they desire. It is this reality that gave rise to a world that profits from clicks and contact-time, and the need to constantly feed this growing ecosystem gave rise to the internet's own 'content creators', from models to bloggers, product-testers, analysts, artists and much more. Every ecosystem has its death-traps and quagmires, and the internet is teeming with its own - cesspits of hatred, conspiracies and disinformation. It has therefore become imperative for professions and experts of their respective fields, to defend fact and strip away the fiction, and to arbitrate between truth, falsehood and uncertainty. From medical doctors to nutritionists to those in the dental community; from the healthcare sector to the pharmaceutical industry, companies, organisations and people in these fields have built

significant profiles on the internet and through social media platforms. However, objectives matter, and even in the content put out by health professionals, the lines are often blurred between the need to inform, and the market imperative to drive growth, create demand, compete - and sell.

Social media and marketing

The literature indicates that lack of opportunity and a greater demand than supply for resources and employment drives rural-to-urban migration. As the labour market adapts, industry and other sectors congregate around population-dense metropolises. This clustering establishes a newly emerging consumer base (Ventola, 2014). The competition to compete for the market share within and between sectors for consumers encourages the development of new methods and techniques to drive profitability and growth. The birth of social media platforms facilitated a new arena for this economic imperative, allowing marketing and data mining by corporations and professionals alike.

Due to the fact that more than 2 billion people around the world use social media (Stephen, 2015), the centre of the advertising world shifted away from traditional means to these channels where millions of people are active for hours every day, clicking, scrolling, browsing, reviewing, buying, selling and chatting. Rendering data from the behaviour, preferences and activity of individual users allows for the marketing they receive to be shaped by their perceived needs and desires (Dwivedi, 2015). However, the fact that the flow of information is much faster and more eco-

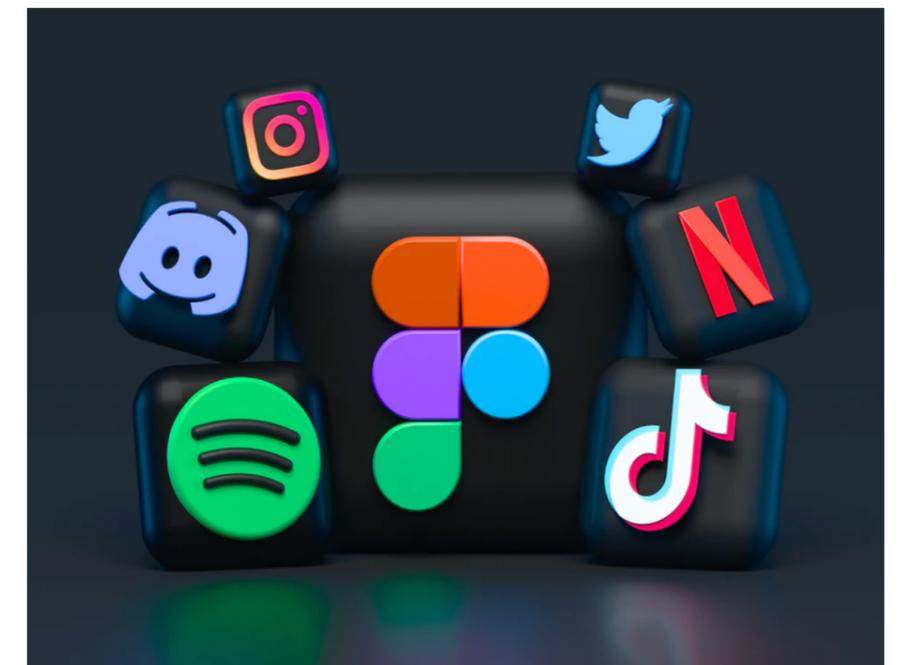
nomically than other channels has led to the exponential development and growth of these media, and their use for driving profitability (Dwivedi, 2015). This increase is also reflected in the health sector. In a study conducted with over 4000 physicians, 90% of the individuals were found to be social media users for personal purposes and 65% for professional purposes (Ventola, 2014). The online advertising sector is getting more and more significant for the dental community, with treatments, materials, equipment and reviews plastered all over virtual walls or 'timelines' across social media. Today, dental equipment companies, dental health product conglomerates, dental corporations and private dentists use social platforms to grow their market share of the consumer base by creating visual and interactive content, targeted and tailored to specific audiences.

Beauty standards

One of the most observable evolutions that emerged with the rise in social media is the perception of

beauty. Beauty perception, especially for young females but for all ages and genders, is often increasingly held according to a universal standard. Through models and celebrities to influencers and those with lavish lifestyles, the materialist market imperative has institutionalised the parameter of beauty to be defined as entirely physical. This has resulted in comparisons between the self and others to an unprecedented extent in human history, catalysing widespread epidemics of self-consciousness, self-hate and self-doubt. Common metrics of 'beauty' in the age of Instagram are thin bodies, proportional facial features, and straight, white smiles (Chang, 2016). With thoughts of being perceived, there is often an aspiration to replicate the 'highlight reel' lives of those with the largest audiences on social media platforms, who have often established themselves as thought-leaders and arbitrators of what is 'cool', 'in' and 'chic'.

Thankfully, in recent times there has been a greater appreciation of body positivity, self-care



and its links with mental health. In this context, the attention on oral care and hygiene, and the conversation around the conservativeness of cosmetic dental treatment gains a heightened importance. Evolving beauty standards have often compromised oral health, with dental health rarely prioritised in the aesthetic objectives of cosmetic interventions. In order to fulfil beauty standards, patients have been more than willing to opt for destructive treatment methods and indirect restorative options, and unfortunately, many - though not all - dental professionals, have been more than willing to market these techniques and profit from these interventions. Dentistry is primarily healthcare, and this principle should not be lost in the chaotic arena of social media. There should be a pushback against those within the dental profession who prey on evolving beauty standards to profit at the expense of what would truly be in the interests of patients. However, there are a rising number of techniques in cosmetic dentistry that are not counterintuitive to opti-



mal oral health, though the ethical question remains: 'Should dentistry insist on reinforcing beauty standards made unrelentingly prevalent by the growth of social media?'

Health education and promotion

Social media provides a global network thanks to its widespread use by both physicians and patients all over the world. 8 out of 10 internet users search for health information online, and 74% of these people use social media (Ventola, 2014). Over 4 billion videos per day are watched by 800 million unique users on YouTube (Gupta, 2013). These figures show that the masses influenced by social media are expanding day by day. Such a great amplitude of engagement provides an important opportunity for physicians to distribute evidence-based information to counter inaccurate material on the internet - indeed, it could be deemed their professional duty to maintain the integrity of their science (Ventola, 2014). Especially in microblogs such as Twitter and YouTube, and forums like Reddit that do not restrict the flow of information, patient-doctor communication must improve. In these channels, content created by academics and physicians in accordance with the guidelines in place could provide health education and promotion rather than marketing, outside of the profit motive and with patient interests at heart. Social media and mass communication corporations have a moral duty to facilitate such initiatives, and as many have done during the Covid-19 pandemic, to prevent the dissemination of outright lies and misinformation. But besides all these important



advantages, because social media in dental education is still in its infancy, research should be undertaken to determine optimal ways for incorporating principles of health promotion into both traditional and social media platforms (McAndrew, 2011).

Conclusion

Social media and online world are fundamental cornerstones of society today. In terms of preserving the integrity and principles of healthcare, of the need to 'do no harm' and put patient interests first, it has relentlessly thrown questions of professional ethics and moral responsibility at the dental profession, and many of those questions remain unacknowledged and unanswered. However, what is certain is that isolating ourselves from these channels or taking a prohibitive approach is not proactive, and is an abdication of the responsibilities upon health systems and healthcare professions in terms of communicating with patients and the outside world. As with many fields and occupations, dentistry is yet to have found a reasonable balance and appropriate relationship with social media. ■

The relationship between volunteering and dental students' academic performance

An analysis of the results obtained from a survey that was done among students of the Faculty of Dental Medicine, University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania



Măriuca Rizea, Florin Froimovici, Romania

Introduction

Caught up in the demanding intensity of dental school, students are reluctant about actively committing time as volunteers in student associations. It is often felt, understandably, that the effort and time volunteering activities require has a detrimental impact on academic performance. This was a hypothesis worth exploring, as volunteering could also be conversely construed as a positive influence on the performance of dental students in their studies. A survey to gauge an association between the two factors felt worthwhile.

It is widely acknowledged that during University, getting involved in a volunteer program can help you discover yourself, strive for ideals, dedicate yourself to a cause and acquire both academic and non-academic skills. You enjoy the opportunity to put your own projects into practice, you have the opportunity to support those around you, interact with people with whom you will

be able to discuss topics of shared interest and participate in important events. In addition, you are able to network and create lasting relationships and connections that may prove beneficial in the future. You collect impactful memories, invaluable experience and moments that are unmatched. To be a volunteer means to experiment, to create, to innovate, to develop and, hopefully, to be fulfilled. With a survey planned that explored this association, we felt there was scope to challenge the presupposition that volunteering inevitably leads to poor academic performance.

The survey

A questionnaire was put together and distributed among the students of all years of study in the Faculty of Dental Medicine, University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania. The questionnaire consisted of 5 multiple answer questions that regarded academic performance, volunteering activities and the students' perception of their

correlation, therefore providing an overview of the relationship between volunteering and academic performance:

The answers provided were in-

1. "Have you been an active volunteer in an association during 2018-2019?"
2. "What was the average of your grades between 2018-2019?"
3. "Did you have other extracurricular activities that you practiced in 2018-2019?"
4. "Do you spend more time learning or volunteering for associations?" and
5. "Have you ever missed courses or internships in favour of volunteering within an association?"

tended to assess the composition of academic involvement with the average grades, using the Romanian national grading system.

There was also the subjective self-definition of a ‘volunteer’ by the survey respondents, with the minimum being someone who helped organise at least one project during the year in question.

Results

The form was completed by 192 dental students. The collected data was compiled using Microsoft Excel and the following results were obtained:

- 85 students (44.2%) taking part in the study had been actively involved in an association during the academic year 2018-2019.
- 67 students (34.9%) participating in the study had an average grade between 9 and 10 in the academic year 2018-2019. 39 of those students (58.2%) were actively volunteering in an association during the same academic year.
- 85 students (44.2%) participating in the study had an average grade between 8/10 and 9/10 in the academic year 2018-2019. 33 of those students (38.8%) were actively volunteering in an association during the 2018-2019 academic year.
- 40 students (20.9%) participating in the study had an average grade lower than 8/10 in the academic year 2018-2019. 13 of those students (32.5%) were active volunteers in an association during the respective academic year.

Analysis

Within the participants of this survey, there was a substantial cohort of students with higher grades, who were also active volunteers. This result may be explained by the idea that students with greater academic ability have a higher skill of time management, or need to spend less time committed to academic work, allowing them to include more activities in their schedule. It is also possible to suppose that volunteering provides a relaxing, beneficial experience that increases satisfaction and improves learning abilities and multidisciplinary involvement. One of the most interesting findings of our study, highlighted in Figure 1, is the general increase in academic performance with the increase in the composition of volunteers within the cohort. There have been

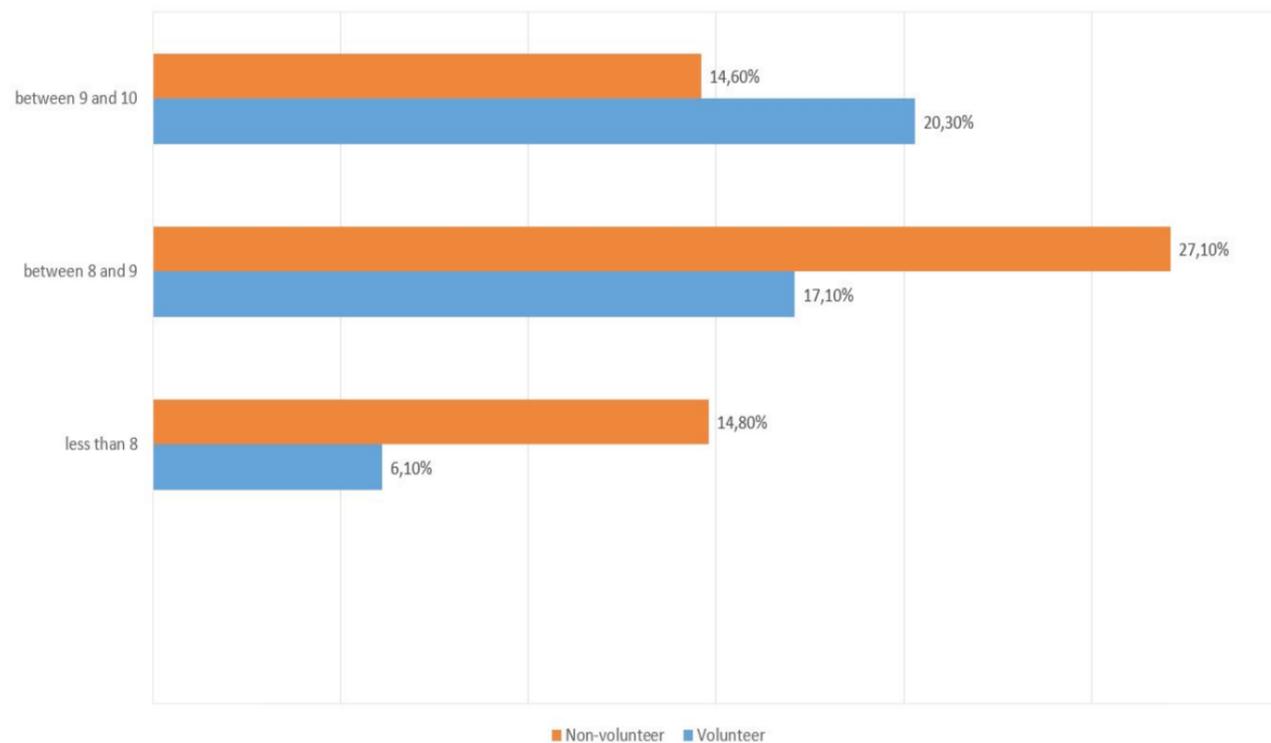


Figure 1: Composition of Grade Averages according to volunteering status; percentages displayed are according to total respondents



many studies that underscore the importance of the reciprocal influence of “volunteerism” and “academics”, where student’s academic performance is enhanced by drawing on volunteer motivations and fulfillment. These results and assessments are generally contrary to the belief that volunteering activities lead to lower academic results, by the sheer consumption of time (Veerasingh and Singh Jassel, 2013).

Discussion

Numerous studies in the literature (Grubisich, 2017; Astin et al., 1999) highlight the link between higher grades and volunteering. Suggested reasons for this asso-

ciation consist of higher motivation, and a more purposeful and goal-focused approach from the students that are volunteering. Moreover, in the field of dentistry, volunteering in professional associations brings invaluable benefits to the students in areas such as diplomacy, negotiation, leadership, teamwork and project-management, greatly improving in essential domains of independent practice (Automation Industry Association, 2010).

However, there are many limitations of this survey. There was no room to factor in the extent of volunteering, and it can be argued that there comes a point at which a dental student may en-

counter negative academic consequences as a result of overexertion in other pursuits. Moreover, dentistry is overwhelmingly clinical, and therefore the performance of dental students cannot be analysed from an academic perspective alone. There was also a limited number of participants, and the results collected were entirely subjective and therefore more prone to error and chance variability. It is difficult to establish a direct correlation through a survey and more clear and developed criteria are needed, possibly through multicentric studies with control groups in place. Though the results of the survey cannot establish a causal relationship between volunteering and academic excellence, they can hopefully help negate the converse hypothesis of there being an inherent causal relationship between volunteering and poor academic performance. Volunteering, in its many aspects and inflections, is central to a holistic experience at University for all students, and dental school students are no exception. ■

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Barriers to dentistry for black dental students

As Budding Black Dentists, we aspire for there to be a more representative number of black people in dentistry and dental academia, both in the UK and across Europe. The onus is on our institutions and indeed our entire profession to make this a reality, and with urgency.



Jade Kwaku, Obioma Ukoha, United Kingdom

According to Norrie (2017), the 2nd most ethnically diverse occupation in England and Wales is dentistry, with 39.5% of the workforce being non-white. However, on further inspection, the General Dental Council's (GDC) annual Registration Statistical Report (2020) states that only 2% of dentists and dental care professionals, registered with the GDC, identify as black. This is a very small proportion and given the advantages of having a more culturally competent health service, it would benefit the UK healthcare system and society as a whole to train and employ more black dentists.

Culturally competent healthcare is defined as “the ability of systems to provide care to patients with diverse values, beliefs and behaviours, including the tailoring of healthcare delivery to meet patients’ social, cultural and linguistic needs” (Building a Culturally Competent Organization: The Quest for Equity in Health Care, 2011). The UK is steadily becoming more diverse, and according to Kings Fund in their

analysis, Demography: future trends (2021), the percentage of minority ethnic groups residing in the UK should rise from 11% to 15% by 2031. Qualitative studies (Gibbons et al, 2000; Newton et al, 2001) have found that the black community and other minority communities experience barriers to accessing dental care, including language difficulties, cultural misunderstanding, and dental anxiety. To provide culturally competent oral care to patients, dentistry will have to become more inclusive as a profession. This would facilitate a system where clinicians are able to customise and influence healthcare and health promotion to better suit the needs of their patients, and bridge the disconnect between the dental profession and the black community.

In order to employ more black dentists, more black people must qualify as dentists. The most current statistics tell us that the number of black students studying ‘Clinical Dentistry’ in higher education is 125 out of 5035 students in the UK – approximately 2.5% (HESA, 2021). This is a figure that

can be improved upon, but only with a greater understanding of the motivations that encouraged current black dental students towards dental school and an appreciation of the barriers they faced. The student-lead, non-profit organisation Budding Black Dentists, sent out a questionnaire to black dental students about their journeys to and throughout dental school, with an emphasis on their motivations, perceived barriers and any support they received. In this article, we will be analysing the information received and identifying key themes and lessons that aid us in understanding better how to support members of the black community in progressing through the dental profession.

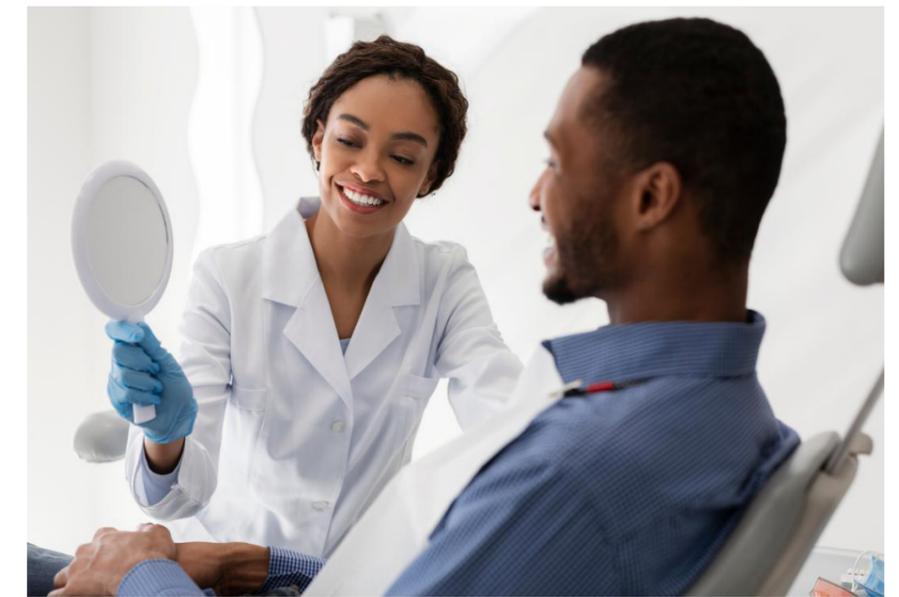
Encouragement with applications

Regarding responses surrounding academic assistance with applications, the cohort was skewed towards primarily seeking online support. Many named organisations such as the African Caribbean Medical Mentors (ACMM), or individuals privately offering

application support via social media platforms. One respondent wrote, “It was hard as I could only go to the Internet for help and I didn’t know anyone in the sector”

One particularly prominent barrier cited by multiple respondents was the lack of assistance received from their sixth forms and colleges. A common revelation was that the greatest obstacle in successfully applying for dentistry, was being assigned severely underpredicted A-Level grades. This factor - almost obstructing the chances of applying to dental school for many, and preventing many more entirely - is evidence of institutional racism in many of our schools. An interviewee recounted that their school put her in contact with a black dental student who previously attended the same school. She “solely depended” on the guidance and advice of this student alumnus who coached her throughout the dental application journey.

“The black dentists and dental students I met along the way definitely motivated me and inspired me to go for it and apply, no matter how hard or deterring the application process might be. If they could get there, with their help, I knew I could too.”



Exposure to the excellence

For the majority of survey participants, the trigger point of when they actively began to consider dentistry as a vocation was their first interaction with a black dental clinician or healthcare professional. The visibility of a black role models, through media outlets, served as the most recurrent medium to attract students to pursue dentistry. TV cosmetic dentist, Dr Uchenna Okoye was one of few positive representations of the black community across the European media in the early 2000s. She proved an excellent “dental role model to young black females” and essentially was a symbol of divergence from the conceptualisation of dentistry being a “white” profession (Adams, 1998). The importance of familial clinical role models is also an influence which shouldn’t be disregarded. One member had “never met a black dentist” nor “seen any on social media or any media at all”. Instead, she was inspired by her mother whose occupation as a pharmacist who “...encouraged [her] to go down a similar path in healthcare”.

Under-represented in the classroom

The visibility of positive role models for young black students, is perhaps testament to the “powerful, often subconscious impact of doctor role-modeling in medical education” (Passi, 2016). However, this behavioural trend is still perpetuated throughout dental education, demonstrated through the inequitable ethnic distribution of clinical academics. According to a recent survey by the Dental Schools Council, 0.9% of clinical academics across all grades in the UK identify as black. The conglomeration of generalised ethnic discrimination and the denial of equal opportunities in employment, as made evident in the book ‘Racism in Medicine’, is one theory that may explain this statistic (Bhopal, 2007).

For some current Budding Black Dentists, they report the difficulty in being severely under-represented in their field - often single-handedly shouldering the burden of “everyday racism” (Beagan, B.L. 2003). The trauma and psychological stress left from encountering recurrent racism via

evident biases, microaggressions and direct racism in their formative dental school years, perhaps acts as a repellent to then become clinical academics in the future (Berger and Sarnyai, 2015).

Effective emotional assistance

Individual interactions can be emotionally damaging too. Applying to dental school despite discouragement from dentists - who underestimated an applicant's chances of success - was truly detrimental to the self esteem and confidence for one respondent. One student who reapplied to dental school for a second time noticed a support system really helped attaining an offer at university for dentistry. They deemed the "painful" first attempt "would have been different had [they] had such a support system".

Ideally, a holistic support system should be made available to applicants tailored to their circumstances that incorporates both emotional support and encouragement for the applicant in tandem with the academic assistance and help through each stage and requirement of the application process. Throughout their career progression, mentorship, counselling and therapy may prove necessary when encountering habitual racism in the form of micro and macro aggressions.

As Budding Black Dentists (BBD), we note that black dental students in the UK share similar backgrounds, ethnicities and thus experiences of racial prejudice, albeit to different extents depending on their external environments. Whilst the introduction of each individual into dentistry may seem somewhat divergent, one cohesive theme was the profound impact their heritage had on their

journey thus far.

Reflection

The scarcity of quantitative data regarding the career progression of black dental professionals across Europe is testament to the dire need for more research to delve into this area of interest - including an analysis of drop-out and expulsion rates according to ethnic background. Nonetheless, the qualitative intelligence gained from listening to the experience of the black community, is equally compelling in discussions of racial inequity. Amplifying these marginalised voices allows for insight into how to best to rectify the inequalities within dental profession in the UK and throughout Europe. In the future, BBD will look to add to this body of research and widen the study population to a

greater variety of black dental students and professionals from different countries and backgrounds. It will be insightful to find how the inherent intersectionality and multifacetedness of identity plays a part in the experiences of black students and professionals around the world. As a harmonious dental collective, we should endeavour to alleviate the barriers that disproportionately affect the black community to one day see a more diverse, inclusive and equal dental workforce. It is our ethical duty to strive towards a high quality, culturally competent service that universal healthcare systems ought to be. ■



Selective mutism in children

What are the causes of selective mutism and can it be prevented or treated? What signs should a dentist pay attention to? Which are the appropriate approaches to a SM patient in the dental office?



Laura Elena Narita, Romania

Selective mutism is a childhood disorder affecting mostly children entering school age. It is a rare condition that makes children unable to speak in certain social situations, while in more comfortable settings (e.g. at home) they speak normally. Selective mutism results in significant social and academic impairment in those affected by it. This disorder was first identified in the 19th century when Kussmaul named it "aphasia voluntaria" in 1877 to describe the condition where individuals would voluntarily not speak in certain situations. In the early '30s, the disorder was renamed "elective mutism" (Wong, 2010).

Selective mutism is classified in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text revision (DSM-IV-TR), under the category of disorders first diagnosed in infancy, childhood or adolescence. In order for one to get diagnosed with this condition, the symptoms must be present for a minimum of one month, excluding the first month of school.

The prevalence of social mutism ranges from 0.47 to 0.76% of the population based on pooled

case studies from the United States, Western Europe and Israel (Wong, 2010). The onset of the condition typically occurs between ages 3 to 6, but it is mostly discovered after the child enters school. It is slightly more common in girls than in boys, although the difference may be accounted for by research limitations. The disorder can occur over a few months or persist for several years (Nieves and Beidel, 2012).

Theories regarding etiology

Therapists and psychologists have yet to agree as to the actual cause of selective mutism. In reviewing the literature, there appears to exist a large etiological spectrum of theories concerning this disorder. Around 1990, regarding the onset and persistence of this disorder, there were three major theoretical schools of thought: (1) hostility and control, (2) anxiety and social phobia, and (3) family communication. In recent times, the developmental psychopathology framework aims to integrate perspectives as: biological, genetic, behavioural, developmental, psychodynamic, family systems, and ecological factors at the root of

this condition (Wong, 2010).

a) Psychodynamic theory: this refers to the concept of unresolved conflict, often between parent and child. The articles describing some of the plausible hypotheses for selective mutism present this condition as a coping mechanism of the child for any anger or anxiety they are experiencing. According to this theory, the child is focusing negative emotions towards the parents, with the intention of punishing them. However, there is insufficient data to reinforce this hypothesis.

b) Social phobia and social anxiety: this theory proposes the idea that selective mutism might be a symptom of social phobia characterised by excessive social anxiety. It has been found that the severity of social anxiety is positively correlated with the severity of mutism. They based this theory on data showing high incidences of selective mutism in families with social phobia. Powell and Dalley (1995) reported that the nonverbal behaviours involved in selective mutism have been linked to anxiety and fear, and can be viewed as

a developmental variant of social phobia. However, the relationship between the two factors is unclear, with the onset of social phobia manifesting around the age of 11, while selective mutism is usually noted in a child between 3 and 6 years old.

c) Family systems theory: parents showing symptoms of obsessive compulsive disorder (OCD), expressing an unreasonable desire to control their child, as well as ambivalence and associated dependence, can result in confusing the child and developing unhealthy intense attachments characterised by extreme interdependency and subsequent fear and distrust of the outside world, fear of strangers, language problems and difficulties assimilating. According to this theory, the child is like a sponge that absorbs ways of expressing themselves from other family members. The family might exert upon the child the fear of “saying the wrong thing” which leads to selective mutism. Some studies have found that children with selective mutism reported significantly less acceptance from parents than normal children

(Yeganeh et al., 2006).

d) Post-traumatic stress theory: as patients with post-traumatic stress disorder (PTSD) may experience severe anxiety, avoidance symptoms, selective amnesia, scientists associate it with selective mutism and some of them consider the latter as a symptom of PTSD. When patients find themselves interacting with the circumstances or individuals responsible for the PTSD, they may become selectively mute.

Clinical assessment

Evaluating a patient with selective mutism must be through a multimodal approach - the patient's history should be assembled with the information collected from the patient, patient's family, teachers, and different specialists. The mother is also asked about the prenatal and perinatal history to screen for neurological, speech and language difficulties and assess trends in meeting developmental milestones (Dow et al., 1995).

A key element in achieving



a correct diagnosis is direct observation - it provides the physician a sense of the child's overall temperament. A series of cognitive, hearing, speech, and language tests are indicated (Lang et al., 2016). Additionally, a structured diagnostic interview is used to rule out trauma, neurological injuries, shyness and psychological and psychiatric conditions.

Treatment options

a) Non-medicinal interventions are based on psychotherapeutic approaches (Wong, 2010):

- **Psychodynamic therapy:** relies on the interpersonal relationship between the patient and the therapist. This therapy uses psychoanalysis adapted to a less intensive style of working and it wishes to expose deep, subconscious intrapsychic conflict.

- **Behavioural therapy:** specific techniques including reinforcement, stimulus fading, token procedures, shaping or prompting, contingency management, self-modeling, psychomotor treatment and response initiation provide more data substantiated efficacy. (Esposito et al., 2017)

- **Family therapy:** this option is indicated especially when the factor that triggered selective mutism is the family. It involves family members, but also the child's school entourage who is informed about the condition and asked to participate in breaking the chains of negative reinforcement.

b) Medication-based treatment: most of the drugs are related to the connection between social anxiety and selective mutism. A major drug group prescribed to children with this condition are antidepressants (e.g. selective serotonin reuptake inhibitors, SSRIs), which

have had positive results in children with selective mutism (Mayo Clinic, 2019). This type of antidepressant typically causes fewer side effects than others. Their mechanism of action is based on increasing serotonin levels in the brain by inhibiting serotonin reuptake from synapses into the neurons. Anti-anxiety drugs have also been proposed by some doctors (Mayo Clinic, 2019).

Managing selective mutism in the dental practice

Due to the extremely limited evidence-base on the specifics of selective mutism as a condition, as well as its appropriate management, there is little scope for a well-established and universal method of approach to be detailed with any certainty. Each and every child should be treated according to their individual needs and circumstances, though a dental professional should consider certain steps. Chief of all is completing a thorough history, involving the patient and those they live with. Some pertinent questions to consider include:

- Does the child have speaking difficulties restricted to certain social environments?
- Has there been evidence of selective mutism before, and if so, when was it first noticed?
- Have there been major instances of psychological trauma involving the child?
- Have they been assessed by a specialist, especially regarding developmental milestones?
- Has the child previously, or do they currently, take psychotropic medication?

As with managing anxious chil-



dren, the dentist's attitude and tone should be especially calm and friendly, giving the patient space to familiarise themselves with the dental clinic and clinicians. Different techniques can be used such as child-friendly language, constant communication, the use of mini-games or allowing children to hold objects that they feel comfortable with, such as their favourite toy. In some cases, the presence of one parent next to the child can be very helpful. Offering the child certain rewards, such as stickers, will build greater rapport between the child and the dentist.

Conclusion

Selective mutism is an interesting childhood disorder that is both difficult to classify, and which leaves many questions unanswered. One of the central reasons behind this lack of clarity is that selective

mutism is a rare condition that is easily overlooked, and therefore the data is very limited. So far, it is certain that the environment in which the child is growing up, the parent's attitude towards them and certain possible psychological traumas are the causative factors behind the development of such a disorder. It is important that the people around the child comprehend the necessity of seeking treatment for this condition as it is imperative for the child's health and development, whether they opt for a medicated or non-medicinal approach, or a combination of the two. Without a doubt, there is a great need for more research in this field to elucidate the biological and psychological components of selective mutism, so that it may be better understood and the respective children better engaged with in the dental chair. ■

Dental trauma in contact sports

No matter how old you are, sport is an indispensable part of everyone's life. Injuries occur not only to the body, but also to the oral cavity - to the teeth, and they need special protection.



Danica Izgarević, Montenegro

Most common aetiological factors for dental trauma. Such sports are defined as those in which there is direct interaction between participants, with physical methods permitted to stop or tackle the opposing player or team (Dorney, 1998). Epidemiological studies indicate the annual inci-

dence of dental trauma globally is at about 4.5%. Approximately one third of children and toddlers (primary teeth) and one fifth of adolescents and adults (permanent teeth) sustained a traumatic dental injury. Greater than 5 million teeth are avulsed in the United States every year, accruing nearly \$500 million in cost of care

(Pope, 2016). With understandably heightened media attention and professional concern regarding the long-term consequences of repeated concussive head trauma in contact sports, including its increasingly conclusive link with Alzheimer's and other early-onset degenerative brain diseases, dental trauma in contact sports is also a



timely discussion.

Dental trauma in sports

Dental injury statistics in sport are difficult to obtain. Studies of orofacial injuries published over the last forty years reflect various injury rates dependent on the sample size, the age of participants, and the specific sports. A considerable number of papers have appeared in the dental literature highlighting the dangers of participation in such sporting activities, particularly traditional 'stick' sports such as lacrosse, and field and ice hockey (Bowers et al., 2008).

Basketball, football, hockey, martial arts and boxing carry the greatest risk for dental trauma. Heintz (1968) and Clegg (1969) first claimed that certain contact sports, such as rugby, football and ice hockey, have been consistently associated with dental trauma in published research (Newsome, 2010). It has been estimated that players of such sports have a 10% chance per playing season of sustaining an injury and up to a 50% chance of injury in their playing career (Dhillon et al., 2014). A New Zealand study of insurance claims for sports-related dental trauma showed rugby led all sports (22%-33%), followed by water sports. Basketball and hockey represented only 5% each of insurance claims, though this may be skewed by sports preferences in this country (King et al., 2017).

Common injuries, symptoms and therapy

Common dental injuries in sports include tooth (crown) fractures, tooth avulsion, intrusion, extrusion, luxation and subluxation and avulsion.

A cracked or fractured tooth, which has wildly varying

levels of severity, happens most often during sports when the participant sustains an abrupt blow to the face and a tooth injury of this nature can cause various long-term problems. A cracked tooth involves a crack or split that occasionally begins at the crown of the tooth and extends downward into the tooth. Sometimes, the fracture line is limited to the root, whether horizontal or vertical. Symptoms associated with a fractured tooth include a sharp pain when biting that dissipates afterwards, tooth pain exacerbated by hot and cold and the possible presence of a tooth fragment consisting of tooth tissue relevant to the fracture classification. Class I is restricted to enamel, Class II involves the dentine, and Class III is the presence of pulpal exposure. Pulp survival on complicated crown fracture is 98% (Viduskalne, 2010), and for crown root fracture pulp prognosis is dependent on the level of root fracture, but pulp necrosis happens in 20-40% of cases (Andreasen et al., 1985-86).

Fractures have variable prognoses for the teeth in question. While fractures limited to the crown of the tooth may be more easily restored, the management of horizontal and vertical root fractures is often more difficult and capricious. The outlook is determined by the precise location of the fracture. Management of dental fractures range from simple restoration, to extraction, to root-canal treatment with or without splint stabilisation.

Tooth intrusion occurs when the tooth has been driven into the alveolar bone due to axially directed impact. As with other categories of dental trauma, maxillary central and lateral incisors are the primary victims of in-

trusions (Andreasen et al., 2006). This is the most severe form of displacement injury in terms of eventual tooth vitality. Pulpal necrosis occurs in 96% of intrusive displacements and is more likely to occur in teeth with fully formed roots (Kracher et al., 2003). Immature root development will usually mean spontaneous re-eruption. Where apical development is complete, the tooth will require repositioning, surgery, and splinting or orthodontic extrusion. In dental extrusion, the tooth is partially displaced out of the socket, often in an occluso-palatal direction. Treatment includes gentle repositioning of the tooth and the need for root-canal therapy often follows (IADT, 2020).

Luxation injuries involve the displacement of the tooth from its normal position. They most commonly involve one or more maxillary incisors and may also involve root or crown fractures. These injuries are usually the result of a direct blow. In many cases, and with proper treatment, healing occurs without any further complications. For permanent dentition pulp necrosis occurs in 58% cases, root resorption in 27%, inflammatory resorption 3% and pulp canal calcification 28% (Andreasen and Pedersen, 1989). For subluxation there is a much lower risk of complications.

One of the most dramatic sports-related dental injuries is the complete avulsion of a tooth. If the periodontal fibers attached to the root surface have not been damaged by rough handling, an avulsed tooth may have a good chance of recovering full function. After one hour, the chance for success is greatly diminished. Statistics show that the patient can have a 90% success rate if the tooth is

placed back in the socket within twenty minutes. Success decreases 10% for each additional 5 minutes that the tooth is out of the socket (Anderson, 2013).

Preventing injuries

The single most effective prevention strategy is simple enough that every sportsman and sportswoman should have it. A *mouthguard*. Mouthguards were first introduced in 1892 by Woolf Krause, a London dentist, as a means of protecting boxers from lip lacerations. Not long after, mouthguards were used in many sports. By the end of the 20th century, companies were starting to invent different types of mouthguards with the rise of thermoplastics, which led to the invention of the 'boil-and-bite'.

Ideally, mouthguards should be custom-made through accurate modelling of the patient's mouth. Nevertheless, many opt for the DIY option. And the difference in price often decides for them, with custom-made mouthguards being up to five times more expensive. However, many may not even consider mouthguards because they deem them to be expensive, or unaesthetic and inconvenient. To ensure greater compliance and less traumatic injuries, policy-makers must consider funding for sports teams to ensure protection, and possibly insurance-related permutations for neglecting this precaution much like refusing to wear a seatbelt when driving.

Indeed, while new concussion protocols are put in place across the sporting world, there is scope for the advancement of better dental health and oral health-related quality of life too. There is a clear case for dental assessments to be incorporated in the protocols, with tooth vitality

and survival often hinging on the speed of identifying and managing the problem, and mobile teeth even posing a risk of aspiration.

However, Desiderius Erasmus famously said: "*Prevention is better than cure*"; and it is as true for dental trauma as it is for any other medical pathology.

Given the relatively high incidence of dental injury in all sports and the potential of mouthguard use to reduce the incidence and severity of the trauma, use of mouthguards among participants should be mandatory in both training and every competitive encounter. ■



"Trust me, I'm a dentist" – common dental misconceptions debunked



Ridah Hasan, United Kingdom

Your mouth is the gateway to your body – literally. Maintaining good oral hygiene isn't just important for your teeth and gums but can also improve your health holistically.

Sadly, there are many misconceptions that can have a detrimental effect on the way people may choose to look after their oral health.

This article aims to set the record straight on the different dental myths commonly parroted by patients. This inexhaustive list has been compiled through experiences in dental school, though after reading below, you can debunk the misconceptions yourself, wherever and whenever you come across them.

Misconception 1:

Wisdom teeth cause crowding

This complete myth is worthy of starting with, considering the fact that it is widely prevalent and – at least on the surface – logically credible. It might make sense that wisdom teeth erupting at the back of the mouth push the rest of the teeth forwards and therefore lead to crowding of the incisors. However, an article in the British Journal of Orthodontics (1991) by Vasir and Robinsons explains the multifactorial aetiology responsible for the crowding of anterior

teeth in adulthood. They quote nine factors that contribute to crowding which range from anterior remodelling and growth of the mandible in adulthood, to soft tissue maturation and even evolutionary causes such as the difference in the rate of reduction of tooth and jaw size.

This paper highlights that the association between impacted wisdom teeth and crowding of the front teeth is not significant and therefore does not indicate that the wisdom teeth should be extracted. The best way to reduce any anterior crowding would be through orthodontic treatment, with the additional possibility of interproximal reduction or extraction of teeth to create space.

Misconception 2:

The harder you brush your teeth, the cleaner they get

Using a hard toothbrush or brushing your teeth with a lot of pressure does not lead to you removing plaque or food more effectively – instead, the abrasive action of the toothbrush can cause tooth surface loss, with healthy enamel and cementum worn away. Subsequently, this may trigger tooth sensitivity as a result of the dental tubules being exposed and becoming directly in contact with various stimuli.

Seeking oral health education from a dentist or dental hygienist can help prevent abrasive toothbrushing. It is recommended to use a soft-bristled toothbrush to brush your teeth and to replace your toothbrush when the bristles begin to wear out. Some modern electric toothbrushes also come with a pressure sensor which lights up when the head is pressed too firmly.

Misconception 3:

A healthy mouth has white teeth

In an era where tooth whitening adverts come up every time you log onto any social media platform, it is easy to misconstrue what a healthy mouth actually is. There are cases where teeth are discoloured due to the pathological presence of a disease but on the other hand, it is possible to have shiny, white teeth but also have gum disease or caries.

A paper in the British Dental Journal by Watts and Addy (2001) explains the aetiology of tooth staining and how important it is for dentists to correctly diagnose the dentition and identify the nature of the condition.

Teeth can discolour for a number of reasons – if teeth are stained because of the prolonged use of chlorhexidine mouthwashes

or from drinking tannin-rich tea and coffee, or by eating foods with a deep colour such as beetroot then this does not indicate that there is a presence of disease – the mouth may be perfectly healthy.

However, discoloured teeth as a result of poor oral hygiene, tobacco and plaque or calculus accumulation do indicate poor oral health. For extrinsic staining, it is important to identify and stop the cause. Oral health education and toothbrushing advice may be required, and if there is an accumulation of calculus then a scale and polish will be indicated.

A way of managing intrinsic tooth discolouration is tooth bleaching or whitening which can be carried out by the patient using mouth rinses, toothpastes or over-the-counter strips. Another technique is vital bleaching using a night guard prescribed by a dentist – this is safe and has a high success rate. For anterior teeth that have discoloured due to trauma, internal whitening can be carried out by a dentist after root canal therapy.

Misconception 4:
Rinse your mouth after brushing

This is a frequent finding in patients from all walks of life – many people opt to rinse their mouths with water or mouthwash after brushing their teeth either because they do not like the taste of the toothpaste in their mouths or they think of the mouthwash as an adjunct in helping to protect their teeth and gums. This is not the case.

Delivering Better Oral Health by Public Health England (2017) highlights the need to spit out after brushing, and to avoid rinsing, in order to maintain ade-

quate fluoride concentration levels in the mouth. Fluoride is antimicrobial as it acts as an enzyme inhibitor and interferes with bacterial metabolism. It is precisely this microbial activity that is chiefly responsible for the acidification of plaque which leads to demineralisation. Therefore, it is important not to wash away the fluoride that is protecting and strengthening the enamel on our teeth.

Misconception 5:
You should not brush or floss bleeding gums

Bleeding gums are a sign of inflammation of the gingiva – this is known as gingivitis. Many people are tempted to leave their gums alone as they may think brushing will bring more harm but this does not happen. In order to debunk this misconception, it is important to understand the aetiology of bleeding gums.

When oral hygiene is poor, plaque (containing bacteria) builds up around the teeth. If this is not removed from the teeth or gingival margin, then the bacteria can irritate the gums by releasing toxins. As a result, the gums bleed due to the body's own inflammatory response.



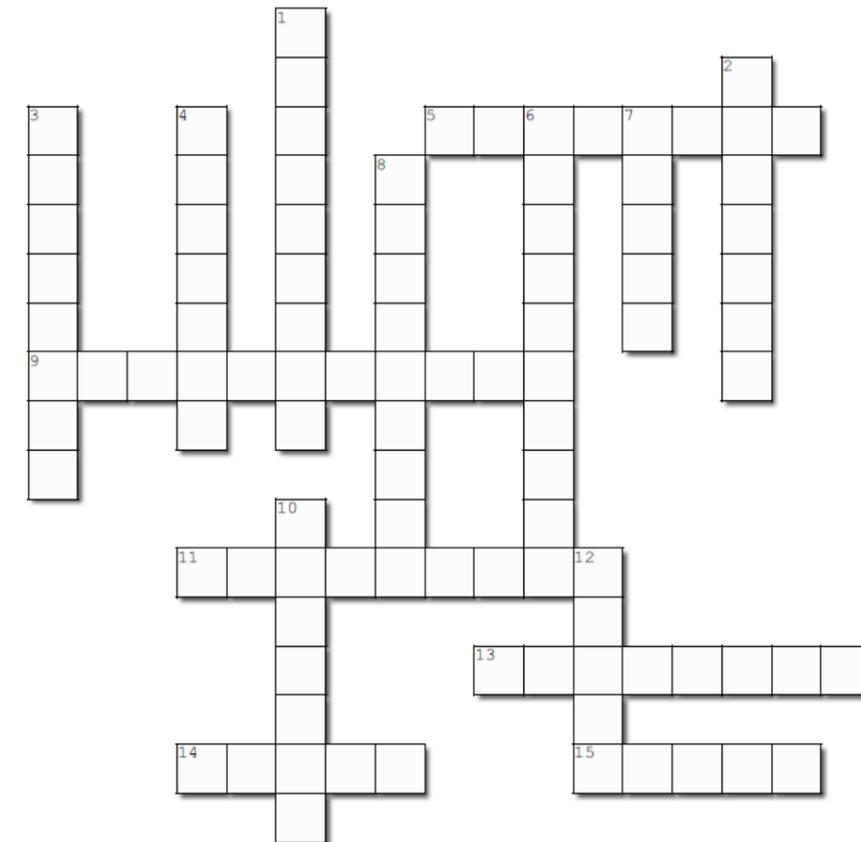
The best course of action would be to improve oral hygiene by brushing and flossing teeth regularly – but not extra-vigorously – in order to remove the plaque from teeth. In cases where the plaque has calcified to form calculus, a scale and polish by a dentist may be required.

Conclusion
Dental professionals often have to separate fact from fiction, and provide oral health education that is based on evidence. Due to the fast-paced nature of the dental profession, it is easy for GPs to overlook oral health education but this is when misconceptions catch on. Only some misconceptions have been debunked in this article so we need to develop a more effective way of communicating and promoting evidence-supported practice.

The National Institute for Health and Care Excellence (NICE, 2015) have stated that oral health promotion not only reduces the risk of tooth decay, gum disease and oral cancer, it also improves people's quality of life and reduces inequalities in both oral and general health. ■

EDSA Crossword

Test your knowledge of the articles within this issue with this crossword!



Across

- 5. A box full of these are necessary for all children (and some adults!) in every dental practice
- 9. Some have it to lactose, gluten, and noisy eaters
- 11. The father of modern dental implantology
- 13. A bit of a mouthful, otherwise described as pathologically excessive salivation
- 14. Surname of a famous TV dentist described as a 'dental role model to young black females'
- 15. Prolonged Chlorhexidine use can leave these on teeth

Down

- 1. To work without pay on a task that may not be your primary responsibility
- 2. 'Prevention is better than cure'; these days, a popular student scheme to study across Europe
- 3. A phenomenon of the anterior teeth falsely attributed to the eruption of wisdom teeth
- 4. Main component of all alcoholic beverages and some biofuels
- 6. Someone who earns money modelling clothes, trying products and reviewing businesses on social media
- 7. A popular synbiotic fermented dairy drink
- 8. indentation between teeth; you could be mistaken for giving out mixed signals if misheard saying this word in France
- 10. 'The pathologist's job is to find the bull among the cells.' (The High Mountains of Portugal, 2016)
- 12. How you could describe chilly weather in Greek

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