Dental Tribune

The World's Dental Newspaper · South Asia Edition

Published in India www.dental-tribune.com 02/22

T cells & Omicron

Your T cells are recognizing Omicron

" Page 3

Deep learning

Deep learning will revolutionize healthcare - Dr. Sachin Gavali

" Page 4

Dental fear

How animal assisted therapy could help reduce dental fear among children

" Page 5

Product review

Esthetic dentistry review: Esthetrix Blaster

" Page 6

Laser and light devices as an integral tool in contemporary clinical dentistry

A guest editorial about the advancements in lasers and light devices in clinical dentistry

Dr. Praveen Arany, an expert in clinical translation of biological mechanisms for wound healing and tissue regeneration. (Photo: blog.thorlaser.com)

By Dr. Praveen Arany, Dr. Philip Sales, Dr. Yousef Alhorebi, Dr. Bhavneet K. Chawla

The first guest editorial of the new year 2022 comes from Dr. Praveen Arany, an assistant professor at the University of Buffalo's Deptartment of Oral Biology. Dr. Arany has done phenomenal research work with respect to the molecular mechanisms and clinical translation of photobiomodulation therapy. The editorial details how light and laser technologies offer significant utility in improving clinical care in current dentistry.

The year 2015 was celebrated as the International Year of Light and Light-based Technologies or International Year of Light by the United Nations to raise awareness of the tremendous accomplishments of light science.[1]

A glance at the impact of light and its applications showcases its tremendous impact on every facet of our modern lives, from high-speed optical communications, rapid manufacturing, and cosmological explorations. There are a few other examples of technological innovations that have profoundly impacted modern civilization and the progress of humankind.

Light technologies have revolutionized biology and medicine using high-resolution sub-cellular imaging with optical microscopes, and ophthalmological vision correction is considered routine daily practices.

Unsurprisingly, clinical dentistry has benefitted significantly from these innovations in optics and photonics technologies.[2]

These innovations can be broadly categorized into improved illumination, emerging optical diagnostic techniques, theranostics, manufacturing, surgical procedures, and non-surgical treatments.

This commentary provides a brief description and fundamental premise of these advances, and the audience is encouraged to explore more detailed resources on the vast fields these represent.

Working in a restricted anatomical space with active water spray and saliva compounded by sharp, high-speed rotary instruments presents dentists with unique operative challenges.

Fig. 1a *Fig. 1b*

Fig. 1a & b: Demonstration of the utility of self-illuminating instruments, such as a self-iluminating mirror (a) and a suction retractor with light (b), to improve visualization of the intra-oral operative field. (Images: Treedental and Isolite)

Illumination of the workspace has been an omnipresent challenge. Innovations in optical technologies have enabled superior chair lighting, magnifying loops with focused LED illumination, and self-illuminating instruments, among others (Fig. 1).

These innovations have improved accurate evaluations and operative procedures and serve as an essential trainee and patient education-motivation tool when combined with digital imaging. The advent of digital dentistry has made optical scanners a routine clinical tool. The reducing costs, compact footprint, ease of use, and accessibility to a post-imaging laboratory digital workflow have heralded modern digital dentistry.

Besides digital scanning, the use of fluorescence-based diagnostics for caries, periodontal disease, and pre-malignancies has made excellent recent progress[3].

Newer techniques like optical coherence tomography (OCT), photoacoustic imaging (PAI), surface-enhanced Raman spectroscopy (SERS), and terahertz imaging are already in use in medicine. These modalities are in advanced stages of development for clinical deployment in dentistry within the next decade. These tomographic and spectroscopic techniques only offer non-invasive, real-time, and repeated assessments along with compositional changes that provide diagnostic and prognostic value[4].

A recent example is using SERS to detect microleakage and marginal deterioration of restorations to determine clinical replacements[5].

These unprecedented insights into pathophysiological changes in oral-dental tissues prompt newer disease classifications and clinical interventional strategies, often with molecular precision.

However, another significant impact of these innovations is addressing the critical question of how extensively to treat clinically. The field of theranostics, a portmanteau (blend) of the words therapy and diagnostics, has several classic examples in modern medicine, especially in oncology. The presence of a specific malignant mutation offers a molecular target for specific interventions.

New approaches in dentistry are exploring these concepts where the optical diagnostic technique that detects caries in Enamel or Dentin using a light-based spectroscopic technique is coupled to a treatment laser that can then precisely ablate this lesion (Fig. 2)[6].

Another area using this concept is oncology, where laser

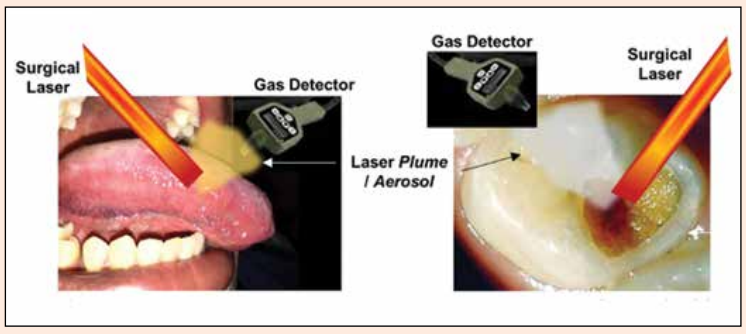


Fig. 2: The laser plume or aerosol generated by ablation can be instantly charaterized by chromography or spectroscopy for assessment of safe tumor margins (a) or carious tooth structure (b). Image credit Dr. Praveen Arany

ablation of tumors can instantly analyze the plume (aerosol) to determine if further ablation is necessary at the margins[7].

Light-based composites have predominated restorative dental procedures, providing ease of material manipulation and long working times. Improved curing light power and newer wavelengths, especially with higher power LEDs and lasers, are increasing the degree and depth of curing, contributing to improved long-term material performance[8].

3D printing laser technologies with both additive (lasersintering) and subtractive (milling) approaches are enabling rapid, cost-effective manufacturing (Fig. 3). A significant advantage of the additive manufacturing approach is the reduced material wastage, increased complexity, and higher resolution attainable.

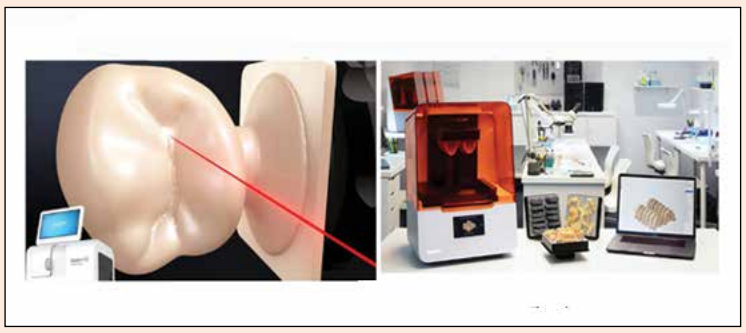


Fig. 3a *Fig. 3b*

Fig. 3a & b: Digital workflow for fabrication of dental prosthesis and restorations; subtractive 3D laser milling (a) and additive 3D printing with laser sintering (b). (Images: Dental Wings & FormLabs)

These biomaterial applications for prosthetic and restorative work have expanded to include polymers, ceramics, and metals with increasing emphasis on individual patient customization[10].

The most common image of laser use in dentistry is its surgical application for soft tissue surgeries. Tremendous improvement in laser diode technologies has created a clinical renaissance with dental lasers' accessible and affordable availability.

These advances in laser technologies have also extended to both gas (e.g., carbon dioxide) and solid-state (e.g., Er: YAG, Er, Cr: YSGG) that have brought more compact and better-controlled lasers for all tissue, hard and soft tissue use.

The growth of the dental laser market has been noted to be over 5% in the coming years, making it one of the most sought-after dental technologies.

The improvements in our understanding of laser-biological tissue interactions have enabled a more rationalized approach for its clinical use. The use of high-power lasers ensures rapid tissue vaporization (above 100^0 C) that is effectively employed for surgical incisions, excisions, and curettage.

The area around these high-power surgical laser sites is exposed to lower energy, resulting in protein denaturation and coagulation. This is a significant advantage of using lasers in surgical procedures to attain a bloodless operative field. Post-laser procedures, these tissues heal remarkably well despite their rather non-pristine (brownish-yellow) appearance.

An extension of this surgical photothermal approach targets biofilms or pigmented bacteria[11]. This approach has been termed photodisinfection, photo-assisted disinfection, or simply laser hygiene. While this approach is effective clinically, it inadvertently results in adjacent tissue thermal damage.

An exogenous dye or photosensitizer is often employed to improve the safety and specificity of these responses. This process is called photo-activated disinfection or, most appropriately, antimicrobial photodynamic therapy (aPDT). This light-mediated technique requires lower power than surgical procedures and is a non-thermal, redox-mediated process that selectively destroys microbes.

Another use of this specific PDT technology is directed against tumors via cancer antigen-tagged photosensitizers (nanoparticles or liposomes)[12].

Finally, another non-surgical, non-thermal approach is termed photobiomodulation (PBM)[13]. This treatment uses low-dose light treatments in the visible and near-infrared wavelengths to alleviate pain and inflammation or promote tissue healing and regeneration. This therapy is often confused with PDT, where the primary goal is the destruction of the target, while PBM responses are primarily inhibitory or stimulatory.

Recent progress in understanding the precise molecular mechanisms and biomarkers enables optimal PBM clinical protocol recommendations leading to safe and effective clinical outcomes.

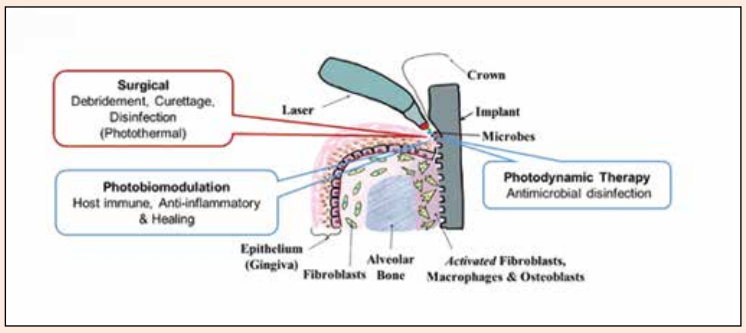


Fig. 4: Lasers in peri-implantitis and periodontal disease can be utilized for three discrete, but synergistic techniques. Both the surgical (photothermal) and non-surgical (antimicrobial photodynamic therapy and photobiomodulation) treatments should pay attention to the target and therapeutic biological response desired. (Image: Dr. Praveen Arany)

A major recent milestone in this field relevant to clinical dentistry was the recommendation of the Multinational Association of Supportive Care in Cancer and the International Society of Oral Oncology recommending the use of PBM treatment for the management of oncotherapy (radiation, chemotherapy, and transplants) associated oral mucositis[14]. The broad applications of PBM span several dental specialties, from temporomandibular joint disorders to peri-implantitis[15].

Recent work from our group demonstrated the ability of PBM to induce human β-Defensin 2 inducing an antimicrobial host response[16]. This PBM-host response can act synergistically with routine or laser surgical curettage and disinfection procedures (Fig. 4).

In summary, light and laser technologies offer significant utility in improving clinical care in current dentistry. A laser is a tool, and it is prudent to emphasize we must give attention to the nuances of device parameters and their biological interactions to ensure optimal patient safety and clinical effectiveness.

It would not be surprising to expect future dental chairs to include integrated laser or light devices capable of multitasking such as diagnosis, treatment, and theranostics to usher in the ear of patient-centered precision individual care.

Editorial note: To get the references, scan the QR code to go to the web version of the article.

Authors:

Dr. Philip Sales

Dr. Philip Sales was born was born and raised in Chicago, Illinois. He received his Master's degree in Biology at the University at Buffalo in the Arany Lab and completed his Bachelor's degree in Pre-Health at Benedictine University. His interests are in oral biology, 3D printing and digital dentistry. His hobbies over the years include sculpting, painting, and graphic design. These creative outlets have helped him develop his knowledge of CAD/CAM and apply it to the dental field. His goal is to utilize his knowledge of digital design and new technologies, to showcase its power and impact when it comes to treating medically complex cases in dentistry.

Dr. Yousef Alhorebi

Dr. Yousef Alhorebi is from San'aa, Yemen and has recently graduated with a bachelor's degree from University at Buffalo. I am currently a research assistant at the Arany lab and work on the use of photobiomodulation therapy for peri-implant disease management. He aspires to be a clinical dentist and use this technology in his daily practice. The publication of laser technology in the dentistry field has inspired him to continue this study even after his dental schooling. He has always strived and worked hard to learn and educate through research.

Dr. Bhavneet K. Chawla

Dr. Bhavneet K. Chawla was raised in Punjab, India where she did her schooling and finished her Bachelor in Dental Surgery. She moved to the US to pursue a Master's degree in Oral Sciences at the University at Buffalo. My research during my master's revolved around proton pump inhibitors in periodontal disease. Currently, she is volunteering as a research assistant in Arany's lab where she is working on a project that involves lasers and photobiomodulation. She is looking forward to beginning her journey in the International Dentist Program at the* University at Buffalo in May 2022.

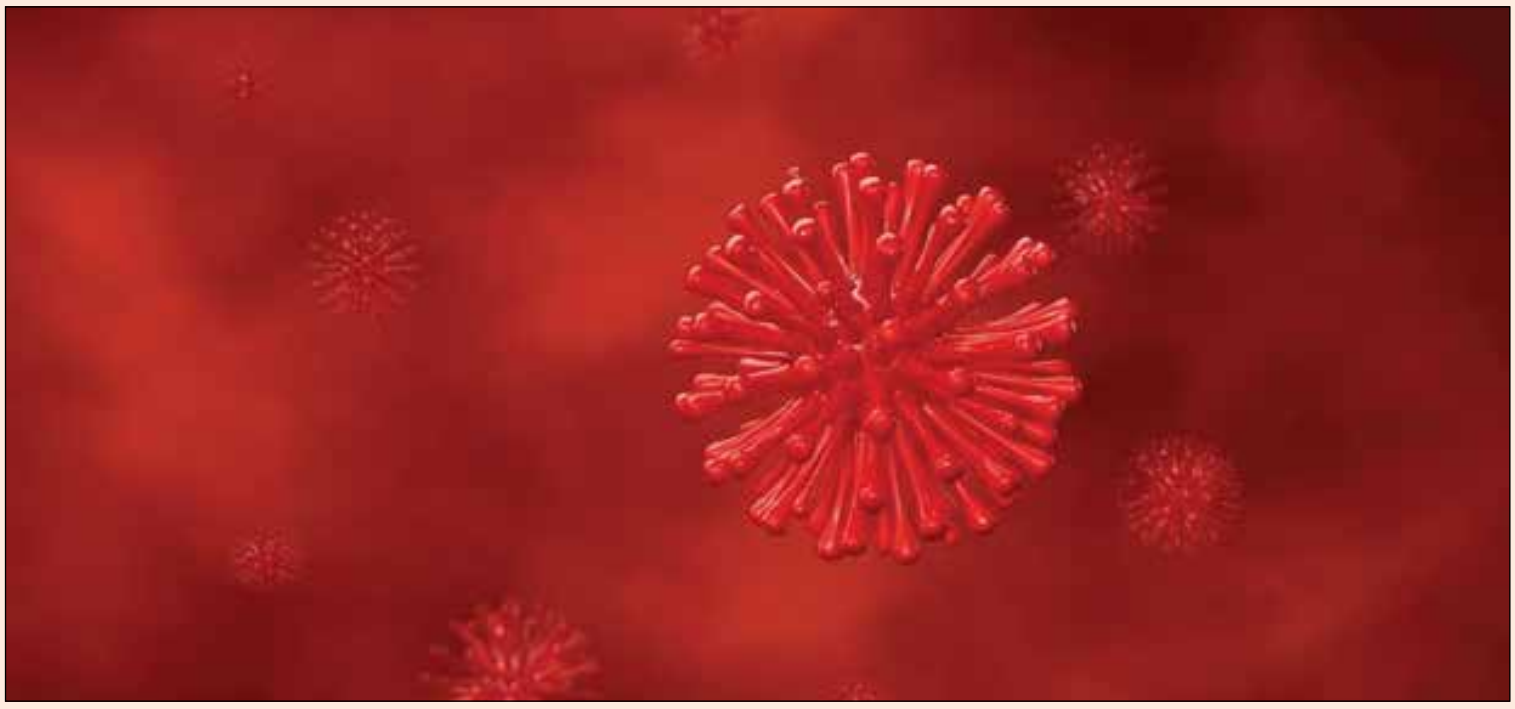
Dr. Praveen Arany

Dr. Praveen Arany received his dental degree at KIDS, Belgaum, and completed a joint PhD-residency program at Harvard University as a Harvard Presidential Scholar and two certificates in Clinical Translational Research from Harvard Medical School and the National Institute of Health. Following postdoctoral training at the Indian Institute of Sciences, National Cancer Institute, and Harvard School of Engineering & Applied Sciences, He served as an assistant clinical investigator at NIDCR, NIH, Bethesda, and is currently an assistant professor in the departments of Oral Biology, Surgery, and Biomedical Engineering, and biomedical engineering. He has served in various key leadership positions, has over 125 publications, served on editor and review boards. He has served as the past-president of the North-American and World Association for Photobiomodulation Therapy (WALT). His research primarily focuses on the molecular mechanisms and clinical translation of photobiomodulation therapy.

Your T cells are recognizing Omicron

By Rajeev Chitguppi
Dental Tribune South Asia

Although the newer variants of SARS-CoV-2 have weakened people's antibody defenses, the second arm of the immune system (T cell immunity) has retained its functionality.



Though there is a reduction in the antibody neutralization due to mutation-induced immune-evasion by Omicron, T-cell function is still intact. (Photo: Canva)

Most of the research has focused on antibody responses, esp. neutralizing antibodies - for two reasons.

1. A reduction in neutralizing-antibody levels correlates with a greater risk of symptomatic disease.

2. Antibodies are easier to study.

Antibody effectiveness appears to be fragile because a few mutations will cause a reduction in their neutralization capacity.

However, T cells appear to be more resilient. They retain their function as 'killer' cells and destroy virus-infected cells, thereby limiting the spread of infection and reducing the possibility of serious illness.

T cells are resilient because their levels do not drop as quickly as antibodies. Also, T cells can recognize many more sites on the spike protein than can antibodies - this allows T cells to cross-recognize even the highly mutated variants.

A few studies in this regard:

T cell immune response generated by SARS-CoV-2 vaccines is substantially preserved against the Omicron variant.

CD4+ T cells:

The proportion of CD4+ T cell epitopes potentially affected is 20%. However, the immunity loss mediated by CD4+ T cells could be slightly above 30% - the reason being that some of the affected epitopes are relatively more immunogenic.

CD8+ T cells:

The estimated loss for CD8+ T cells is approximately 20%.

The overall loss in protection:

The reduction observed in T cell immunity is significantly higher than that observed against other variants. Suppose we combine T cell immunity loss with the substantial antibody neutralization loss. In that case, the overall protection provided by SARS-CoV-2 vaccines could be significantly lower.

Conclusion:

Though there is a 20-30% loss in T-cell immunity, authors expect the remaining 70 - 80% of on-target T cells induced by SARS-CoV-2 vaccines to reduce morbidity and mortality from Omicron infection.

1) T cell responses induced by previous infection or vaccination remain robust against the Omicron variant.

Omicron's extensive mutations have resulted in reduced susceptibility to neutralizing antibodies. However, most T cell responses, induced by vaccination or natural infection, have been able to cross-recognize the new variant.

Well-preserved T-cell immunity to Omicron is likely to contribute to protection from severe COVID-19. The findings of this study supported the early clinical observations from South Africa.

2) Divergent SARS CoV-2 Omicron-specific immune (T-cell and B-cell) responses in SARS-CoV-2 vaccine recipients

The study showed that vaccinated people retain T-cell immunity to the SARS-CoV-2 Omicron variant, potentially balancing the reduction observed in antibody neutralization against Omicron. Booster vaccinations may further restore Omicron cross-neutralization by antibodies.

3) Highly Cross-Reactive Cellular Immunity to the SARS-CoV-2 Omicron Variant induced by COVID-19 vaccines

AstraZeneca/ Covishield or Pfizer vaccine recipients showed durable CD8+ and CD4+ T cell responses with demonstrable extensive cross-reactivity against both the Delta and Omicron variants. This study showed that current vaccines might provide considerable protection against severe disease due to the SARS-CoV-2 Omicron variant despite the substantial reduction observed in antibody-neutralization.

4) Effectiveness of BNT162b2 vaccine against Omicron variant in South Africa

Another study showed that the Pfizer vaccine effectiveness is (albeit at a reduced level) maintained against the hospital admissions presumed to have been induced by Omicron, compared to previous variants. An additional COVID-19 vaccine booster dose may balance the reduction in vaccine effectiveness.

T-cell responses seem to have remained quite intact, and the efficacy data emerging from South Africa could be due to T cells.

Deep learning will revolutionize healthcare

Sachin Gavali shares some insights about deep learning and its applications in healthcare

By Sachin Gavali

What is deep learning?

Ever since John von Neumann and Alan Turing conceived the idea of modern computers, scientists have dreamt about creating computer systems that can mimic human intelligence.

Initial efforts at developing intelligent programs were geared towards building increasingly sophisticated rules to handle the logic that was thought to govern intelligence. Eventually, researchers realized the complexity of building these rules was intractable, and a better approach was needed. Hence, instead of writing these rules manually, researchers created programs to generate these rules from existing data without any human intervention.

The study of building programs that can learn and extract information from data is known as machine learning.

A subfield of machine learning and a stepping stone to the coveted dream of artificial intelligence is the study of deep neural networks (DNN). The fundamental unit of a DNN is the perceptron, a coarse computational representation of a biological neuron and thus aims to mimic the human brain.

Though the study of deep neural networks has its roots in the 1950s, their true potential was demonstrated by Alex Krizhevsky, who introduced the first deep learning model - AlexNet. The model showed that it was possible to use DNNs to recognize and understand the content of images with-out any human intervention. Since then, the field of DNN research has exploded tremendously and has been progressing in three distinct directions - speech, vision, and natural language, each roughly trying to address an individual aspect of human cognition.

Newer developments in deep learning and its applications are revolutionizing healthcare. (Image: Canva)

Applications of deep learning in healthcare

1. Drug discovery and Precision Medicine

Various well-known pharmaceutical companies such as Roche, Bayer, and Pfizer have invested significantly in deep learning systems to aid numerous drug discovery and development stages. One of the earliest applications of DNNs has been to develop novel drugs and therapeutics.

As an extension of this application, DNNs have also proven to be helpful in precision medicine. This is particularly evident by the recent introduction of an extremely powerful deep learning system named AlphaFold2 created by the researchers at DeepMind.

Now, researchers can use newer systems to simulate interactions of proteins without performing costly and time-consuming experiments.

AlphaFold2 can accurately predict three-dimensional structures of proteins with an error margin of ~1.6 Angstroms. This has effectively solved a 50-year-old problem in molecular biology and revolutionized the field of novel drug development.

2. Augmenting clinical decision making

Traditionally, healthcare practitioners have relied on their domain knowledge and intuition decision-making in diagnosis and treatment modalities.

In recent years, computer-assisted diagnosis software has seen an increased adoption to provide clinicians with a second opinion. However, these software systems have proven inadequate more often than not.

Also, in recent years, systems such as the IBM Watson, which make use of massive datasets ranging from biomedical literature, ontologies, genomic and pharmaceutical studies, have shown promising results.

In addition to integrated approaches that handle many aspects of clinical decision-making, simpler targeted systems have also proven valuable. For example, many hospitals maintain an electronic record of patients. These records contain everything regarding diagnosis, treatments, and follow-ups about a patient. Usually, these records are made by doctors while handling the patients and thus are not in a well-structured format. Deep learning systems based on the principles of natural language processing have proven to be immensely useful in extracting actionable information from these records.

3. Forecasting the population health dynamics

Predicting the trajectory of large-scale health disorders such as epidemics has always been a challenge for various government and non-government agencies. Traditionally researchers employed classical statistical methods such as ordinary least square regression to study and analyze the factors that govern the trajectory of epidemics.

However, contrary to the factors driving health conditions at the individual level, those at the population level are not constant. They are affected by various continuously changing factors across both time and geography. This presents a significant challenge in the way one can use data to build predictive models for epidemics.

Traditional statistical methods require data in a well-defined format collected according to predefined protocols.

However, a recent class of deep learning methods based on the principles of graph theory has shown different results. It has shown that one can use the data not collected according to any predefined protocols and yet build predictive models and understand the trajectory of large-scale epidemics.

Challenges

Despite significant advancements in deep learning methods, numerous challenges have prevented their widespread adoption in healthcare. The most prominent one is the apparent black-box nature of these models.

For clinicians to have confidence in deep learning systems, they also need to explain the predictions. However, providing explanations for predictions is a challenge. Creating explainable models leads to simpler models with lower predictive performance. Thus, explainability is inversely proportional to predictive performance.

However, in recent years a new class of model explainability techniques has been developed - the most promising of them being Shapley Additive Explanations (SHAP).

SHAP is inspired by the principles of game theory, where the task of model prediction is considered a game played by the factors that determine the outcome of the task. The explanations of the predictions are then derived by quantifying the relative contribution of these factors to the outcome.

In addition to explainability, the lack of adequate data has also been one of the significant challenges to creating deep learning models for healthcare applications. Most of the data available in the healthcare domain are sparse and locked behind proprietary data usage agreements.

Though some organizations have started adopting the FAIR (Findability, Accessibility, Interoperability, and Reuse) principles to share their data, there is still a need to change the culture surrounding data use and access for research in the healthcare domain.

Author:

Sachin Gavali

Sachin Gavali is pursuing his PhD in bioinformatics and data science at the University of Delaware (USA) under the mentorship of Dr. Cathy Wu.

Currently, his research is focused on developing novel deep learning algorithms for problems in the biomedical domain.

He also works on developing high-performance machine learning systems with a focus on large-scale knowledge discovery from existing biomedical literature.

Before joining the PhD program, Sachin completed his bachelor's degree in dentistry from Terna Dental College, Mumbai.

IMPRINT

PUBLISHER & CHIEF EXECUTIVE OFFICER
Torsten R. OEMUS

CHIEF CONTENT OFFICER
Claudia DUSCHEK

DENTAL TRIBUNE SOUTH ASIA EDITION

PUBLISHER
Ruumi J. DARUWALLA

CHIEF EDITOR
Dr. Meera VERMA

CLINICAL EDITOR
Dr. Dilip DESHPANDE

RESEARCH EDITOR
Dr. Shobha DESHPANDE

ASSOCIATE EDITOR
Dr. GN ANANDAKRISHNA

EXECUTIVE EDITOR
Dr. Rajeev CHITGUPPI

ASSISTANT EXECUTIVE EDITOR
Dr. Amisha PAREKH

DESIGNER
Anil LAHANE

PRINTER
Mehernosh & Burzin MISTRY
Ampersand, Mumbai, India

DENTAL TRIBUNE INTERNATIONAL GMBH
Holbeinstr. 29, 04229, Leipzig, Germany
Tel.: +49 341 48 474-302
Fax: +49 341 48 474-173
General requests:
info@dental-tribune.com
Sales requests:
mediasales@dental-tribune.com
www.dental-tribune.com

DENTAL TRIBUNE
The World's Dental Newspaper • South Asia Edition

How animal-assisted therapy could help reduce dental fear among children

By Dr. Isha Rao
Dental Tribune South Asia

Animal-assisted therapy can be an effective behavior management strategy for dental anxiety in children. (Photo: Canva)

Dental anxiety is a global issue, and children are often scared of visiting the dentist. A national survey[1] in the UK has found that around 14% of 12-year-olds and 10% of 15-year-olds have dental anxiety. Managing dental anxiety is critical to increasing the acceptance of dental treatment by children and removing the barrier to successful treatment outcomes.

A new research study suggests that animal-assisted therapy (AAT) can reduce dental anxiety in children.

Dental anxiety refers to the anxiety associated with visiting the dentist for treatment procedures or preventive care. According to a study published in the European Archives of Paediatric Dentistry[2], it is the fifth most common cause of anxiety. Many factors contribute to dental anxiety, including age, gender, number of siblings, previous dental experience.

Treating anxious dental patients is stressful for the clinician due to reduced cooperation, requiring more treatment time and resources, resulting in an unpleasant experience for both the patient and the dentist.

AAT is effective in reducing overall anxiety. A 5-15 minute session with a pet animal can significantly increase oxytocin, serotonin, and dopamine while decreasing cortisol levels. AAT has been used in many rehabilitation centers, nursing homes, and schools to reduce stress or alleviate specific conditions.

The study:

The researchers chose 102 and two children between the ages of 5-10 at random and divided them into two groups. Dental treatment was performed in group A in the presence of a therapy dog. In group B, they provided dental treatment in a standard dental setting.

The researchers assessed the anxiety levels by measuring the pulse rate and using an anxiety rating scale. Parents were asked to rate their child's interaction with therapy dogs before leaving the clinic.

According to the findings, the anxiety reduction was highly significant in the presence of a therapy animal. The researchers concluded that animal-assisted therapy is an effective behavior management strategy in dental practice.

References

1) Agras S, Sylvester D, Oliveau D. The epidemiology of common fears and phobia. Compr Psychiatry. 1969;10(2):151-156. doi:10.1016/0010-440x(69)90022-4

2) Thakkar, T.K., Naik, S.N. & Dixit, U.B. Assessment of dental anxiety in children between 5 and 10 years of age in the presence of a therapy dog: a randomized controlled clinical study. Eur Arch Paediatr Dent 22, 459–467 (2021). https://doi.org/10.1007/s40368-020-00583-1

Author:

Dr. Isha Rao

Dr. Isha Rao graduated from MGM Dental College, Navi Mumbai in 2020. She currently works as an assistant editor (Public Health) at Dental Tribune South Asia and covers various areas in public health. She is interested in pursuing research in the domain of public health policy and financing.

Esthetic dentistry review: Esthetrix Blaster

By Dr. Nisha Deshpande

The Blaster, although it needs some modifications, can be a great addition to your armamentarium for restorative and adhesive dentistry.

As any restorative dentist worth their salt or, in this case, bond would tell you, the best adhesion you can achieve, thereby increasing the life of your restoration, is through enamel.

It is critical to have a clean enamel surface with, if possible, some micro-abrasion if you want to achieve optimal adhesion.

I have been on the lookout for a product for my restorative needs that was also pocket-friendly when a senior colleague suggested the Esthetrix Blaster. It turns out this was my best investment of 2021.

The Blaster consists of a handpiece, which is sleek and made of medical-grade titanium and steel as claimed by the manufacturer, and a round powder reservoir. You can unscrew it to add the powder as required. This part can easily fit into the dental chair's coupling, attaching air rotor handpieces.

This easy attachment and the fact that it has no bulky structures that need a tabletop for housing are very user-friendly features of the Blaster. The box also contains some cleaning equipment to clean the unit after every use.

Powders:

- One of them is aluminium trihydrate used for biofilm removal and stain removal.
- The second one is a coarse aluminium oxide powder, an admixed powder of aluminium oxide, and aluminium trihydrate of 30 to 80 µm coarseness in combination. This powder can help clean and achieve microabrasion of the enamel surface before bonding procedures for direct or indirect restorations.

Strengths:

- Easy to use
- Small and compact design so easy to store
- Not very expensive (here I am comparing it to Aqua-Care, which is a bit expensive so not feasible for everyone to buy)
- Powders are economical
- You can visually appreciate a clean enamel surface, especially after removing temporary cement and cleaning the tooth before cementation.
- Easy to follow installation and maintenance videos
- Handpiece is detachable and autoclavable

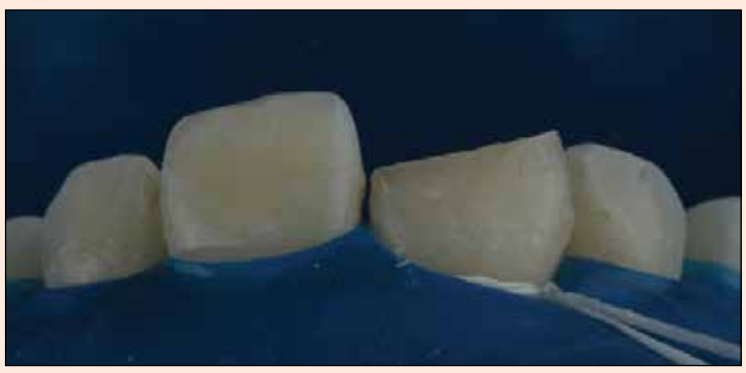
Weaknesses:

I found the daily maintenance to be a bit laborious and cumbersome. Of course, you can train your dental assistant to do it. Still, if not done correctly, the handpiece could get clogged with the powder particles, so I prefer doing it myself.

I would have loved to use just one product for both - cleaning and micro etching. However, for micro etching, especially for orthodontic brackets or indirect restorations that need sandblasting, one needs to purchase another micro-etcher product.

There is no option to use just air or water.

Word of caution:

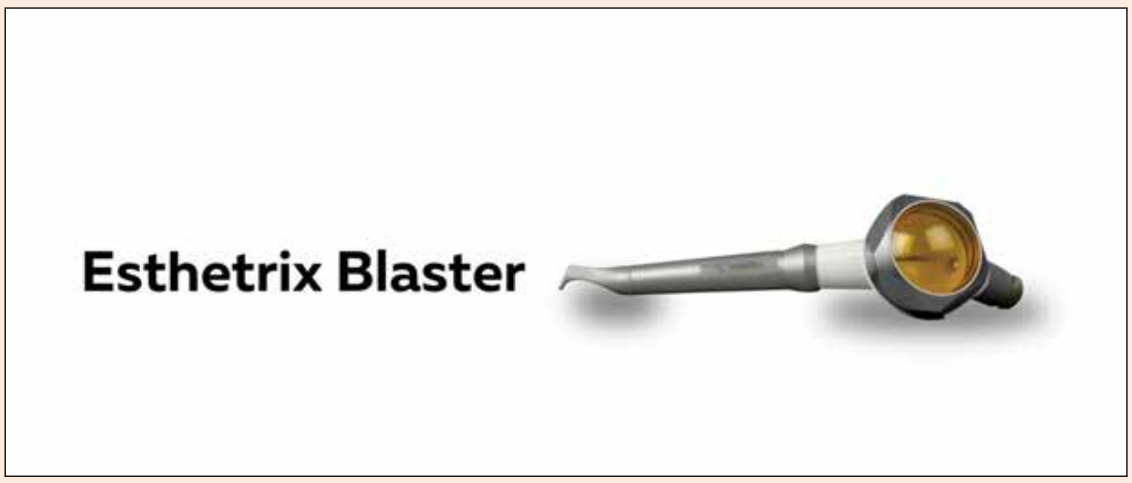


Case 1: Before cleaning.

Case 1: After bevel placement and cleaning with Esthetrix Blaster.

Case 2: Used prior to bonding indirect restorations..

Case 3: Used before ICON infiltration procedure.



Esthetrix Blaster can be an affordable addition to your esthetic dentistry armamentarium. (Photo: Esthettrix)

When used intraorally, any air polisher or sandblasting device should be used with great caution because, especially in areas with minimal or no attached gingiva left, there are chances of causing emphysema. This can happen even while polishing composites with an air rotor. Hence, one just needs to be aware and take adequate precautions.

How to prevent this complication? A discussion on the Facebook group Ripe Global: Restorative Implant Practice Excellence' provides great insight into this.

Warranty:

One-year warranty

Bottom Line:

The Blaster could use some modifications to make it more user-friendly in terms of functionality. However, I found it a great addition to my armamentarium for restorative and adhesive dentistry without being very expensive.

Disclaimer:

The opinions expressed above are solely the author's perspective and are completely unbiased. The author does not have any financial interest in the company whose materials/ products are included in this article..

Author:

Dr. Nisha Deshpande

Dr. Nisha Deshpande has been practicing restorative and esthetic dentistry in Thane for over ten years. She works as an assistant editor for the topic of esthetic dentistry at Dental Tribune South Asia.

Dr. Nisha Deshpande graduated from Government Dental College and Hospital, Mumbai in 2007. She was the recipient of the Vice-Chancellor's Gold Medal for scoring the highest marks in her final BDS examination, having topped the Maharashtra University of Health Sciences (MUHS) in 2006. She has received the Post Graduate Certificate in Aesthetic Dentistry from the State University of New York at Buffalo, USA in 2011. She is a member of the European Society of Cosmetic Dentistry (ESCD) and the Indian Academy of Aesthetic and Cosmetic Dentistry (IAACD). She is currently pursuing the International Certification In Aesthetic and Restorative Dentistry from Egas Moniz University, Caparica, Portugal.

Editorial note: We thank Dr. Anand Narvekar for his suggestion to add a word of caution to the RipeGlobal group discussion. Dr. Anand Narvekar is a senior dentist from Mumbai known for his expertise in photography. Dr. Narvekar has been an avid photographer since 1996 and is a mentor in the leading photography forum – Photography Club Of India. Former chief photographer at Motor World India. He is a guest faculty at various dental institutes and academies.

Study identifies oral bacteria that lower antiviral immunity in oral cavity

Lead author Dr Juhi Bagaitkar. (Image: Juhi Bagaitkar)

By Iveta Ramonaite
Dental Tribune International

LOUISVILLE, Ky., US: Researchers from the US have recently examined oral microbes' role in regulating antiviral responses in the oral cavity. They discovered that proteins produced by oral epithelial cells protect humans against viruses entering the body through the mouth, including SARS-CoV-2. But oral bacteria can also suppress the activity of these cells, thus increasing vulnerability to infection.

The study was led by two researchers from the University of Louisville School of Dentistry, Dr. Richard J. Lamont, Delta Dental endowed professor and chair of the Department of Oral Immunology and Infectious Diseases, and Dr. Juhi Bagaitkar, associate professor in the department.

Discussing her interest in the study, Dr. Bagaitkar told Dental Tribune International that understanding immune responses and how oral microbes manipulate them has been a shared interest of the Lamont and Bagaitkar laboratories. She added that this common interest had been the foundation of several collaborative research projects undertaken by the laboratories.

While working on their projects, the researchers noticed that very little was known about how antiviral immune responses are developed and regulated in the oral cavity compared to the respiratory or internal mucosal surfaces.

"A significant number of viral pathogens either directly infect oral epithelial cells or have a transient presence in the oral cavity owing to infection and release from other tissues. This piqued our interest, and we investigated how antiviral immunity is regulated and manipulated in the oral cavity," Dr. Bagaitkar commented.

Gingivalis and interferon production and activation

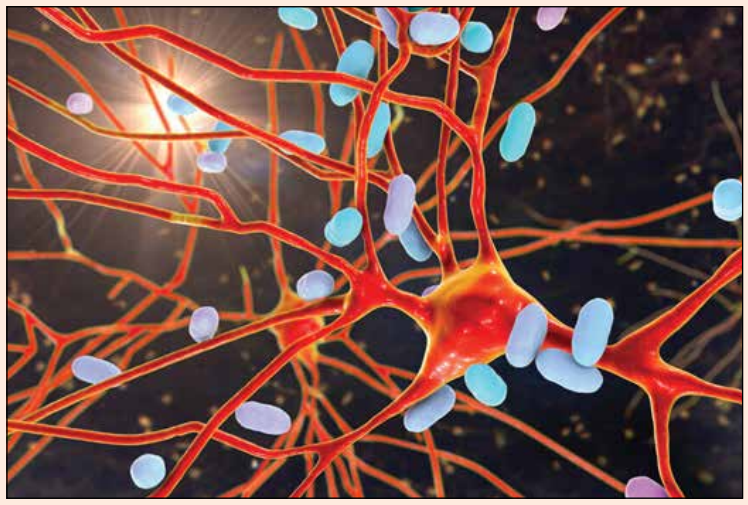
In the study, the researchers used human gingival tissues, mouse models, and *in vitro* approaches to show that the production of interferons, which are important antiviral cytokines that play a critical role in limiting viral infection, and antiviral immunity are severely compromised in the presence of the oral bacterial pathogen *Porphyromonas gingivalis*.

"The most interesting aspect of our study is that we found how bacterial residents of the oral biofilm can determine the efficacy of host interferon responses," Dr. Bagaitkar explained and added that the finding is rather innovative and has important implications for understanding what might predispose an individual to a viral infection.

She further commented: "Specifically, we identified *P. gingivalis*, a periodontal pathogen and a master manipulator of host immune responses, as able to entirely shut down interferon responses by attacking three separate arms of the interferon response pathway. We found that mice and human periodontitis patients who are chronically infected with *P. gingivalis* have an intrinsically lowered ability to produce interferons and activate interferon-stimulated genes in response to viral pathogenic stimuli. Furthermore, we found that *P. gingivalis*-derived proteases cleave interferon receptors, making cells refractory to exogenous sources of interferons, either produced by other cells or injected."

> **"We found how bacterial residents of the oral biofilm can determine the efficacy of host interferon responses."**
>
> **— Dr. Juhi Bagaitkar, University of Louisville**

P. gingivalis has previously been associated with numerous other chronic and degenerative diseases, including Alzheimer's and rheumatoid arthritis. Additionally, recent studies have reported that immune suppression in periodontitis patients can enhance their susceptibility to a viral infection. The present study has consolidated the previous findings.



According to a recent study, **Porphyromonas gingivalis**, *bacteria that cause periodontal disease, play an important role in regulating antiviral responses in the oral cavity by reducing oral defences and increasing viral growth. (Image: Kateryna Kon/Shutterstock)*

"Our studies now add to this body of literature by showing that periodontitis, a bacterial infection-driven chronic inflammatory and tissue destructive disease, might enhance the oral viral burden," Dr. Bagaitkar said and added that some of the viruses that affect the oral cavity include herpes, HIV, human papillomavirus and also SARS-CoV-2.

In light of the findings, the researchers commented that future studies would focus on investigating strategies to bolster oral antiviral immunity against viruses that infect oral tissues.

The study, titled "Microbiome-mediated incapacitation of interferon lambda production in the oral mucosa," was published online on 21 December 2021 in *Proceedings of the National Academy of Sciences of the United States of America*.

COVID-19 advances acceptance of teledentistry among patients

By Franziska Beier
Dental Tribune International

Dubai, UAE: A survey of UAE and Saudi Arabian residents has found that 88% of the respondents appreciate the advantages of teledentistry and online communication more now than they did before the SARS-CoV-2 pandemic. The survey results are part of a wider white paper presented at the second Digital Health MENA Forum last autumn in Dubai.

The survey was conducted among 1,000 participants, half of whom were based in the UAE and half in Saudi Arabia. They responded to questions concerning their sentiments about the future of telehealth and teledentistry and how the pandemic has influenced these. In an interview, Angelo Maura, general manager for the Middle East and Africa region at Align Technology, told *Dental Tribune Middle East*.

Reflecting on the key results, he said: "We found that patients had definitely undergone a mind shift by embracing the new normal of digital dentistry." Even though only 32% of the respondents used online digital communication tools to interact with their dentist during the COVID-19 lockdown, the majority of those who did (78%) said that they found them convenient and intended to continue to use these digital tools for non-emergency care in the future.

Moreover, the study results show a balance of opinions about the safety of visiting a dental office during the pandemic: 44% of the respondents visited a dentist between March and June 2020, whereas 42% did not make an appointment due to possible concerns risks. Nevertheless, consumer confidence in dentists remained high, 80% trusting their dentist to take the necessary precautions to protect patients.

A survey has found that 78% of those respondents who used online communication tools to interact with their dentist during the pandemic will continue to do so for non-emergency cases in the future. (Image: Elnur/Shutterstock)

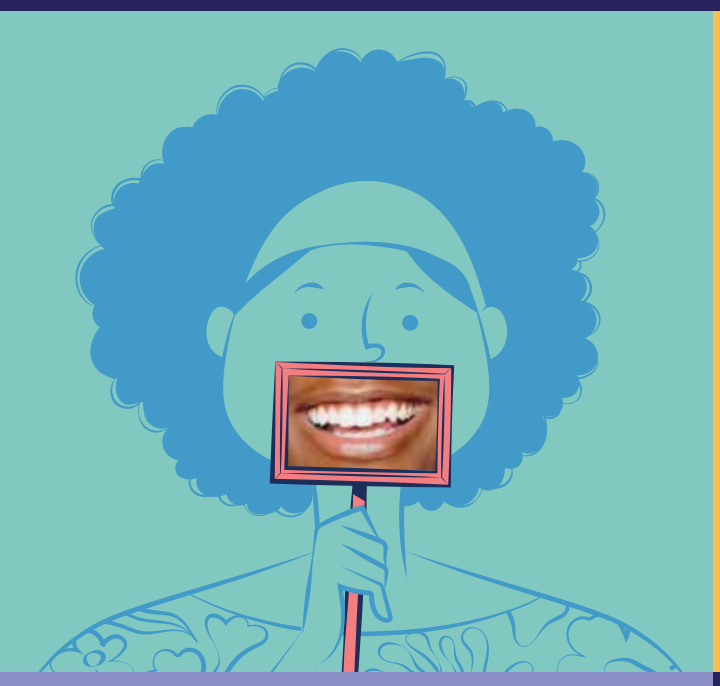
Based on these results, it is clear that practitioners who use digital platforms for communication with their patients are more likely to maintain their operations during the pandemic, especially lockdowns.

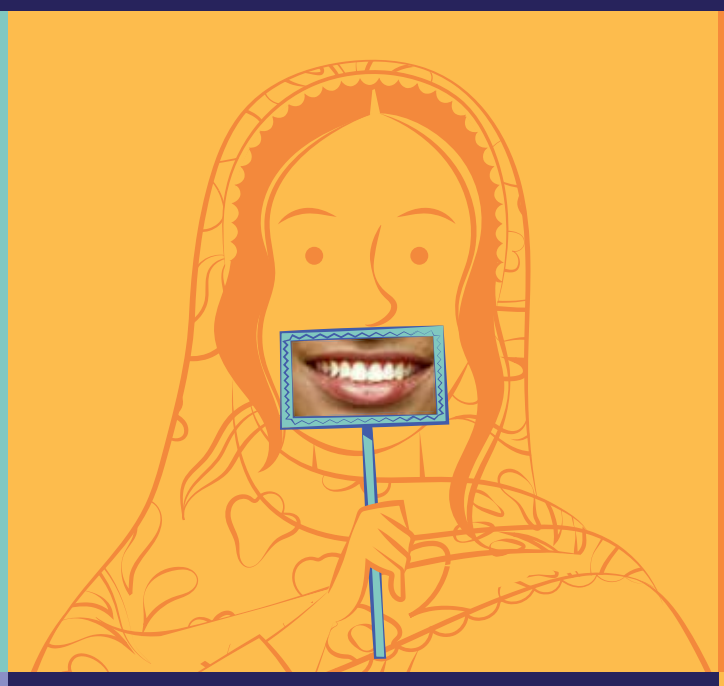
"We […] found that nothing can replace face-to-face interaction, as direct dentist care is still fundamental in the industry. And we do believe in that. However, it will be very important for dental professionals to find a balance between face-to-face care and teledentistry in order to give a better service and better cartots," emphasized Maura.

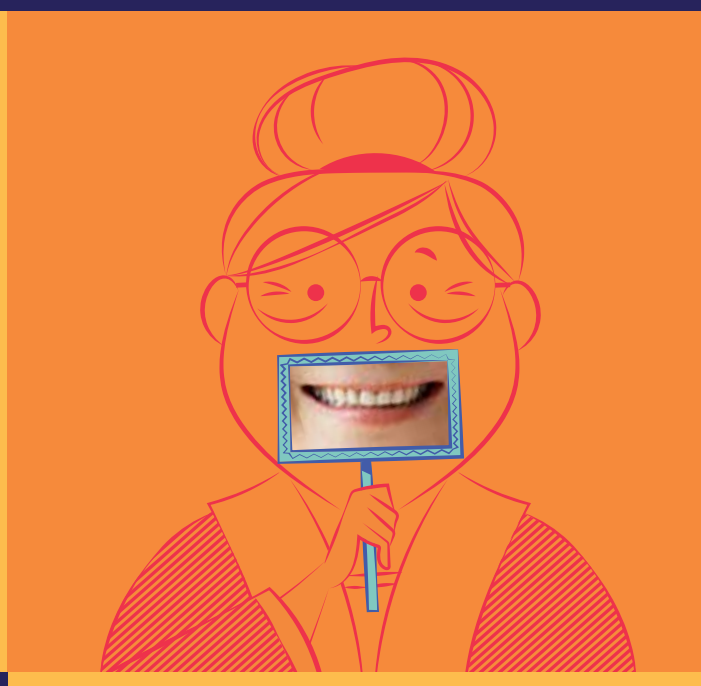
The white paper, titled "Digitisation and patient care: Mapping new opportunities in the dental sector," was released by Align Technology.

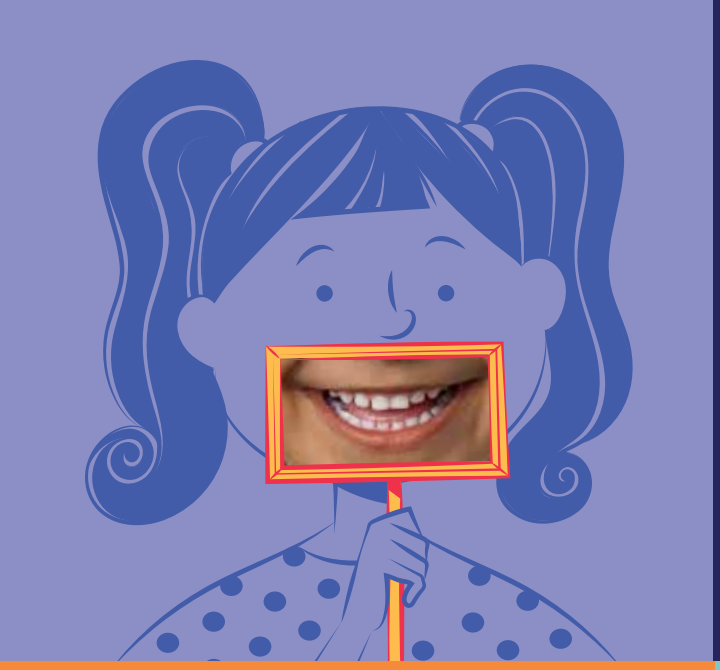
BE PROUD OF YOUR MOUTH

Oral health impacts happiness and well-being



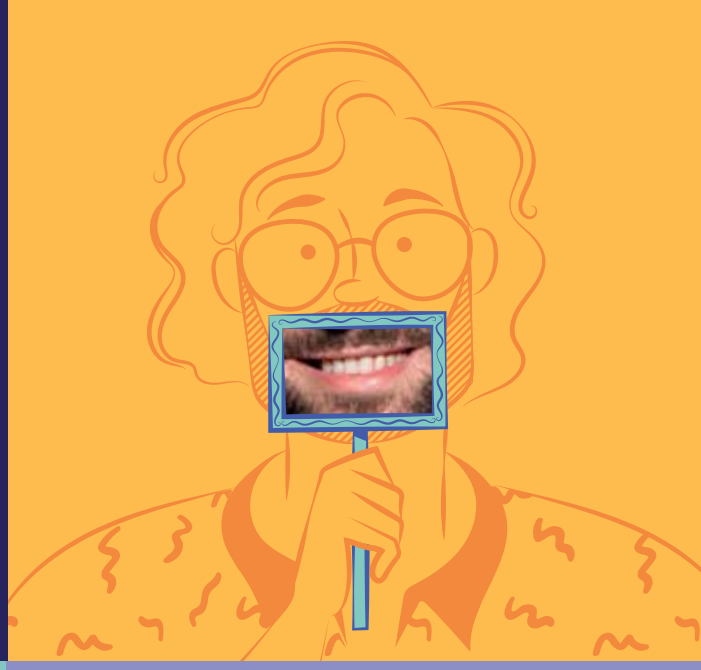


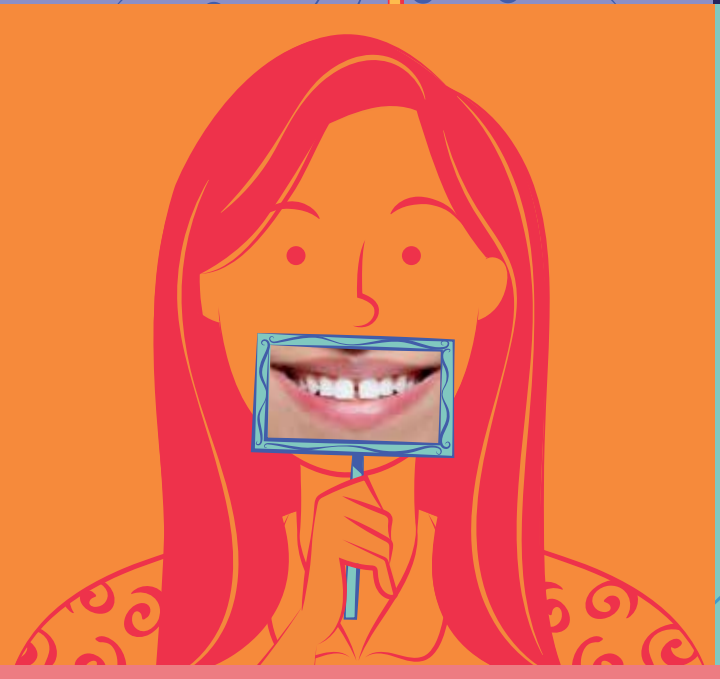


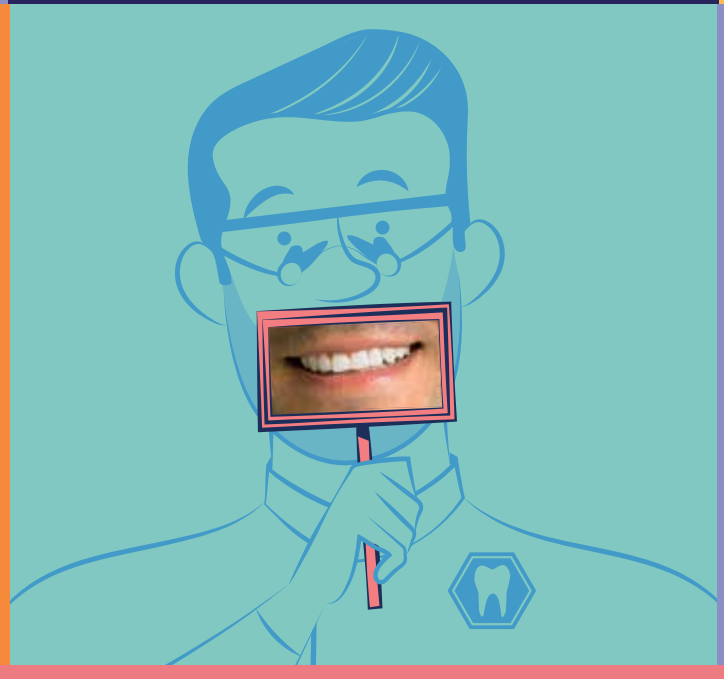


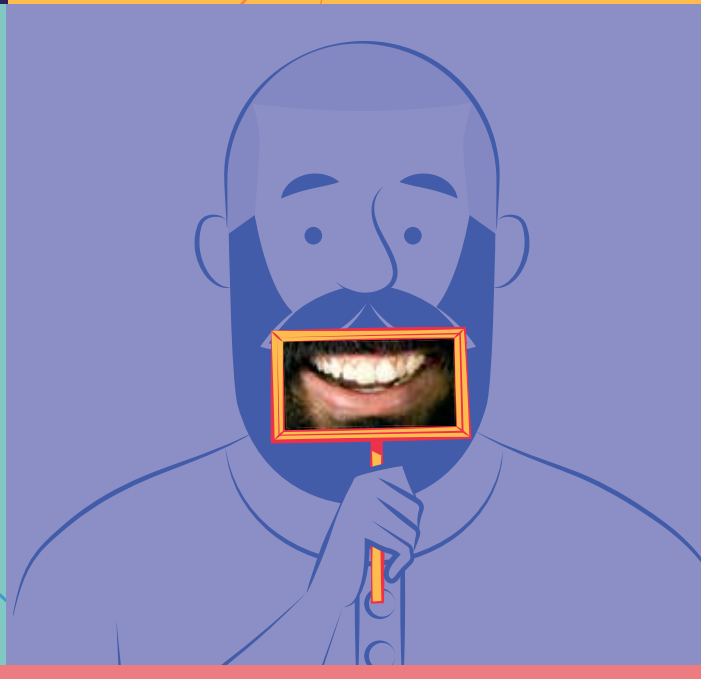
GET INVOLVED

worldoralhealthday.org









World Oral Health Day
20 March

fdi FDI World Dental Federation

@worldoralhealthday #MouthProud #WOHD22

Global Partners

Unilever

align invisalign | iTero | exocad

Dentsply Sirona

Global Supporters

WRIGLEY Oral Healthcare Program

LISTERINE