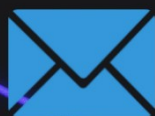




# DENTAL LASER VIRTUAL SCIENTIFIC CONFERENCE

ABSTRACT BOOK

16-17TH JULY 2021



[wfldapd@gmail.com](mailto:wfldapd@gmail.com)



[www.wfldlaser.com](http://www.wfldlaser.com)

# Table of Content

<b>Content</b>	<b>Pages</b>
Brief history of WFLD (ISLD) and congresses	3
2022 WFLD Congress –Poland	4
Asia Pacific Division in dental laser education –perspective	5
APD Executive Board 2020-2022	6
Honorary Members of Asia Pacific Division	7
Message from President, WFLD	8
Conference Chairman Remarks	9
Scientific Chairman Message	10
Conference Organizing Committee	11
APD-CSLD Broadcasted Forum – CSLD Team	12
APD Scientific Chairpersons Team	13
Supporting and endorsing organizations	14
The Persian Speaker Team	15
Conference Scientific Program	16-18
The Invited Speakers lectures	19-47
Abstract Presentation Competition and Candidates	48-71
Highlights	71-74
APD Webinar Series	75
Hybrid Dental Laser Course- Khon Kaen University	76
Authors Index	77



**The World Federation for Laser Dentistry (WFLD)**, formerly known as **International Society for Laser Dentistry (ISLD)** is the most reputable and established laser in dentistry icon for excellence in the world, since its inauguration in 1988.

WFLD serves as a not-for-profit medium for the exchange, advancement and dissemination of scientific knowledge related to LASER and its application in detecting, curing and preventing dental diseases. With members all over the globe to share knowledge and innovative ideas in the field of Laser in Dentistry through educational training and scientific conferences.

The first inaugural congress of the International Society for Laser Dentistry (ISLD) as it was known then, took place in 1988 in Tokyo, Japan. Since then, biennial congresses were held every two years with the objective to bring together the world experts in Laser Dentistry:

1988 – Tokyo, Japan,	1990 – Paris, France,
1992 – Salt Lake City, USA	1994 – Singapore
1996 – Jerusalem, Israel,	1998 – Maui, Hawaii,
2000 – Brussels, Belgium	2002 – Yokohama, Japan,
2004 – Sao Paulo, Brazil,	2006 – Berlin, Germany,
2008 – Hong Kong, China	2010 – Dubai, UAE,
2012 – Barcelona, Spain-	2014 – Paris, France,
2016 – Nagoya, Japan,	2020 – Dubai, UAE



# WFLD-17th Congress-2023



THE 17<sup>TH</sup> CONGRESS FOR  
THE WORLD FEDERATION  
FOR LASER DENTISTRY  
14-16 April 2023  
Wroclaw, Poland

**We look forward to  
welcoming you in Wroclaw!**

Additional information & registration  
will be available at [www.wfld2023.com](http://www.wfld2023.com)





The **Asia Pacific Division (APD)** was began in May 2006, at the Berlin Congress, former **ISLD** was renamed the **World Federation for Laser Dentistry (WFLD)** and was expanded to create 5 international divisions. APD, one of the 5 WFLD's divisions, has a team of educators who were educated in Higher Degree Research (Master and PhD) in Laser dentistry and share a common mission to advance evidence-based laser dentistry for an optimal patient's care.

Over the decades, APD became a forerunner in dental Laser education in the Asia Pacific Region, in providing **over 30** evidence-based dental laser training courses, symposia and conferences to culturally diverse populations from countries, like Thailand, Singapore, Vietnam, India, Hong Kong, China, Australia, Indonesia etc. to build a strong co-operating network among dental associations, universities and organizations e.g. WALT, IMLA, IDA, APALMS, ADA, APDF, ICD, CSLD etc., to pursuit a common goal of optimal oral health by building a scholarly dialog, teamwork, friendships and platform for future collaborations and growth.

APD recognizes the potential of photonic (Laser and light-based) technology, hybrid education and the emerging generations underpin the success of our future dental profession. This 2021 APD conference is another example which illustrates our ongoing commitment in investing in technologies, education and the future generations with evidence-based and higher degree research teaching.

Together, building the brightest future for Dentistry!

# Asia Pacific Division Executive Board 2020-2022



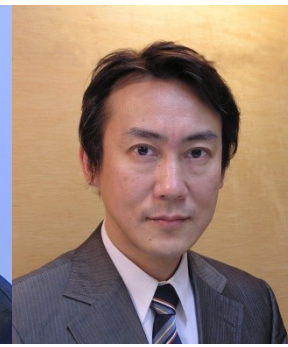
Dr. Ambrose Chan  
(Australia)  
Director



Prof Sajee Sattayut  
(Thailand)  
Vice-Director



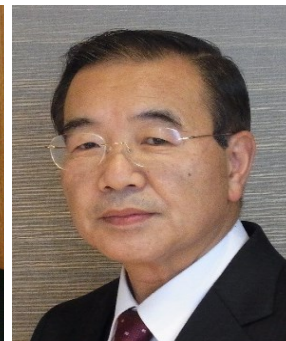
Dr. Kenneth Luk  
(Hong Kong- China)  
Secretary



Dr Shigeyuki Nagai  
(Japan)  
Treasurer



Prof. Akira Aoki  
(Japan)  
Committee Member



A/P Hisashi Watanabe  
(Japan)  
Committee Member



Prof Li Qian  
(China)  
Committee Member



Prof Reza Fekrazad  
(Iran)  
Committee Member



Dr. How Kim Chuan  
(Malaysia)  
Committee Member



Dr Igor Cernavin  
(Australia)  
Scientific Advisor



Dr Phillip Fu Fung Tsui  
(Hong Kong- China)  
Facebook Page



Dr. Katayoun Kalhori  
(Iran)  
Website Advisor

## Honorary Members of Asia Pacific Division



**Emeritus Professor Isao Ishikawa DDS PhD, Periodontist (Japan)**  
**WFLD Honorary Member**  
**Former WFLD President (2004-2006)**



**Emeritus Professor Loh Hong Sai BDS, MDS, FDSRCS, FDSRCPS, FAMS (Singapore)**  
**WFLD Honorary Member**  
**Former WFLD President (2002-2004)**  
**Former APD Director (2006-2012)**  
**Former Dean, Faculty of Dentistry, National University of Singapore**  
**Oral and Maxillo-facial Surgeon**



**Late Professor Kenji Yoshida DDS, PhD, Oral and Maxillo-facial Surgeon (Japan)**  
**WFLD Honorary Member**  
**Former President of the WFLD (2016-2018)**



## President Message

Dear Colleagues, dear Friends

It gives me great honour and pleasure to affirm that the APD is considered to be an iconic meeting for the continuing Dental Education.

Over The past years, APD has emerged from a local specialized meeting to a global forum where Dentists from all over the worlds, converse to share their professional experiences and researchers, innovate and grasp and pulse of the dental industry.

In vitro studies, clinical studies and scientific case reports have been presented on various conferences, seminars and congresses on all of the five continents. And still there are insufficiency reflected against this technology. I admit that one might a good dentist, and another have not a background information. It must be equally difficult. May be the background information on physics and biophysics to understand how lasers are operated on the tissues in the oral cavity.

Advanced education will usually demand some of your spare time, but with our APD activity, you will have fun and easily-applicable knowledge in exchange, ensuring both success of your dental office and content patients

APD is recognized to be one of the region most reliable congresses informative and popular in nature offering not only quality Dental programs but initiating a learning process among the Dental fraternity. The quality of the Educational program have gained regional as well as international recognition make an effective impact year after year.

Being an integral part of this meeting. I take this opportunity to extend a cordial welcome to all Dental surgeon, manufactures, dental academia, private clinics and students and our distinguished guests, to be a part of APD 2021 and contribute to its ongoing success .

Wishing you a fruitful meeting

Prof Toni Zeinoun

WFLD president

Dean of the Faculty of Dental Medicine

Lebanese University





## Conference Remarks

Dear Colleagues and Friends

On behalf of the Local Organizing Committee of the 2021 Asia Pacific Division of the World Federation for Laser Dentistry (APD-WFLD), Virtual Scientific Conference, I would like to express our profound gratitude to:

6 supportive organizations and 8 universities in endorsing this conference to their colleagues, post-graduate and under graduate students.

**28 international invited speakers over 18 countries (Asia, Europe, USA), and 23 scientific researchers** in delivering high-level lectures and scientific papers to over **200 online registrants and over 2,000 broadcasted audiences** at the hybrid forum that was co-hosted with the Chinese Stomatological Association-Chinese Society for Laser Dentistry.

6 researchers received the Scientific Presenters and Young Researcher Awards in the oral presentation competitions

With your unreserved support, contributions and participations, this conference has rewritten the history, being regarded as one of the best scientific programs that APD-WFLD has ever seen before!

Without doubt, this conference would leave a very special memory in everyone who was involved and attended, including us, for a long, long time.

Advances in photonic (laser/light) technology has changing the face of Dentistry whereby its enhancement in clinical diagnosis and oral disease management, with minimally invasiveness and maximally regenerative power and patient's comfort. However, the realization of such technology hasn't yet been fulfilled.

Let's remember, if everybody shared the same passion, in advancing technology and education like you and me, sooner the potential of Photonic Dentistry can be realized and can lead to the brightest future for our emerging generations and our patients!

Sincerely yours

**Ambrose Chan** PhD (Med), MSD, BDS (Hon), ClinDipDent, FRACDS, FICD

Chairman, 2021 APD-WFLD Virtual Scientific Conference

Director, APD-WFLD



## Scientific Chairman Message

Dear Colleagues and Delegates,

The tragic and critical situation of COVID-19 pandemic has stopped the cursory world and has given a very important message and has emphasized on new technologies and sciences to serve human existence one more time.

One of these technologies is LASER science that can help practitioners from diagnosis of diseases to treatment and rehabilitation of its side effects. In this area laser dentistry plays a desirable role and every laser in dentistry organizations should pay close attention and consider its position in the new world.

Asia Pacific Division of World Federation for Laser Dentistry (WFLD) as a first group of WFLD has decided to take the first step in this situation and would like to organize a scientific gathering in virtual form for scientists and researchers from all around the world.

We are honoured to invite you to attend the 3th World Federation for Laser Dentistry-Asia Pacific Division (WFLD-APD) virtual scientific conference and hybrid forum, with the motto " New Development in Dental Laser Applications and Education" will be held on Friday 16th and Saturday 17th July 2021.

With the support of WFLD-APD, in co-operation with the Iranian Medical Laser Association (IMLA), Chinese Society for laser dentistry (CSLD), Japanese Society for Laser Dentistry (JSLD), Indian Dental Association (IDA), International college of Dentistry (ICD), it is a new opportunity to promote laser science to improve the standard of oral laser clinical application and research, to carry out laser standardized training and to expand the international communication.

The conference provides a forum at which a multidisciplinary array of dentists, scientists and students can learn, share, investigate and create ideas; the outcomes of which are clinical applications that can and have changed the world of patient care.

Numerous numbers of international renowned speakers from more than 18 countries have been invited to present the latest results in the field of laser application.

Hence, you are cordially invited to attend the conference and we are looking forward to welcoming you on 16th July 2021.

Faithfully Yours,

Reza.Fekrazad

Chairman of Scientific Committee



## Conference Organising Committee

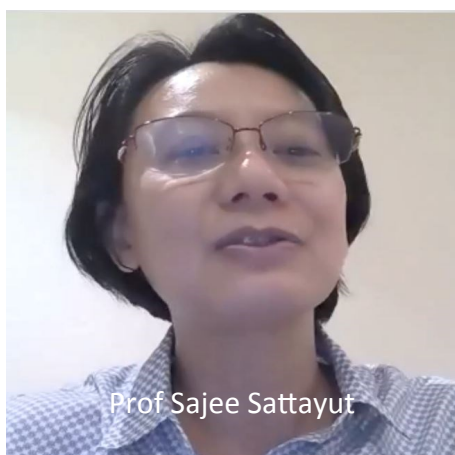
<b>Conference Chairman:</b>	Dr Ambrose Chan (Australia)
<b>Coordinator in-Chief :</b>	Dr Shigeyuki Nagai (Japan)
<b>Scientific Chairman:</b>	Prof Reza Fekrazad (Iran)
<b>Scientific Awards Committee:</b>	Prof Zhao JuZhi (China)
	Assoc Prof Kazushi Yoshikawa (Japan)
	Dr Philip Tsui (Hong Kong)
	Dr Katayoun Kalhori (Iran)
	Dr Kenneth Luk (Hong Kong)
<b>Scientific Chairpersons:</b>	Prof Sajee Sattayut (Thailand);
	Dr Katayoun Kalhori (Iran);
	Prof Reza Fekrazad (Iran)
	Dr How Kim Chuan (Malaysia)
	Dr Philip Tsui (Hong Kong)
	Dr Alex Chan (Australia)
	Dr Shigeyuki Nagai (Japan)
<b>Broadcasting Coordinator :</b>	Prof Li Qian (China)
<b>Homepage Designer :</b>	Mr Masami Ito (Japan)
<b>IT Consultant :</b>	Assoc Prof Hasan Kazan (Lebanon)
<b>Graphic Designer :</b>	Dr Alex Chan (Australia)
<b>Abstract Book Editor:</b>	Dr Katayoun Kalhori (Iran);
	Dr Alex Chan (Australia)
<b>Advisory Board:</b>	Prof Loh Hong Sai (Singapore);
	Prof Isao Ishikawa (Japan);
	Prof Akira Aoki (Japan);
	Prof Sajee Sattayut (Thailand);
	Dr Ashok Dhoble (India)
	Prof Chu Chun Hung (Hong Kong)

## APD-CSLD Broadcasted Forum

CSLD Team onsite conference in China



## APD Scientific Chairperson Team



Prof Sajee Sattayut



Dr Katayoun Kalhori



Dr Alex Chan



Dr Philip Tsui



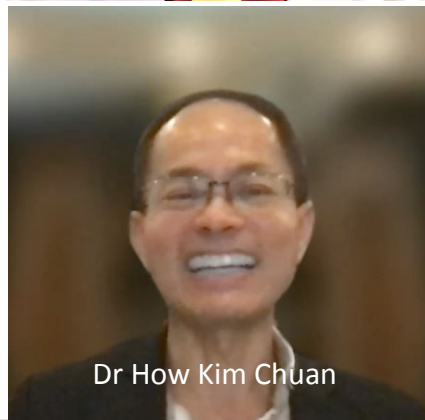
Dr Shigeyuki Nagai



Dr Ambrose Chan



Prof Reza Fekrazad



Dr How Kim Chuan



# WFID World Federation for Laser Dentistry

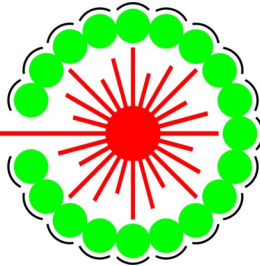
Asia Pacific Division

Formerly ISLD, founded in 1988



Supported by

انجمن علمی پزشکی لیزری ایران  
*Iranian Medical Laser Association*



Endorsed by

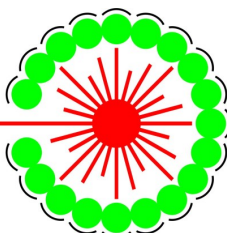


全民  
Q&M



# The Persian Speaker Team

انجمن علمی پزشکی لیزری ایران  
Iranian Medical Laser Association



Prof Reza.Fekrazad



Dr Katayoun Kalhori



A /Prof. Leila Gholami



A/Prof. Neda Moslemi



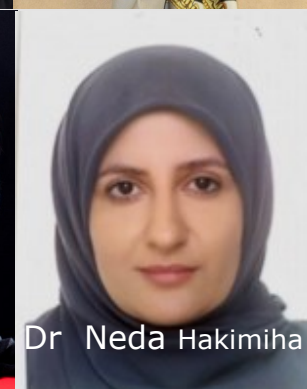
A/Prof Khatereh  
Khorsandi



A/Prof Farzaneh  
Ahrari



A/Prof. Zahra  
Ebrahimi



Dr Neda Hakimih



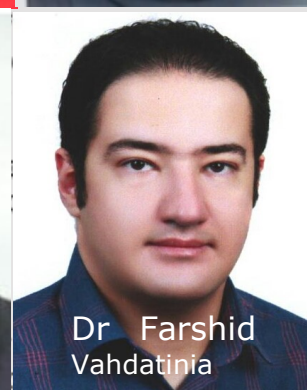
A/Prof Hamed  
Kaseb Ghane



A/Prof Simin Lesani



A/Prof Nasrin Zand



Dr Farshid  
Vahdatinia



Sepehr Fekrazad



A/Prof Ehsan  
Birangi



A/Prof Sohrab



Universal Scientific Education and Research Network



	<b>July 16<sup>th</sup> 2021, Friday JAPAN TIME: 11 am- 9 pm</b>	<b>Speakers</b>
	<b>Opening Speech</b>	
11:00-11:10	Welcoming Speech	Prof Toni Zeinoun
11:10-11:15	Acknowledgement	Dr Ambrose Chan
11:15-11:30	The Past, Present and Future of laser dentistry	Prof Akira Aoki
	Lecture Chairperson: Prof Sajee Sattayut	
11:30-12:00	Laser-nerve soldering in oral and maxillofacial surgery	Prof Reza Fekrazad
12:00-12:30	Laser assisted oral decontamination in COVID-19 Patients	Dr Katayoun Kalhori
12:30-13:00	New Perspectives in Treatment of Peri-implantitis: Is Laser a Ray of Hope?	Assoc Prof. Neda Moslemi
13:00-13:30	Current evidence of lasers application in periodontal surgeries	Assistant Prof. Leila Gholami
13:30-14:00	Effect of low-dose photodynamic therapy on normal and diabetic fibroblast cells wound healing	Assistant Prof Khatereh Khorsandi
14:00-14:30	Low level laser therapy (LLL) for alleviating pain in orthodontic patients	Assoc Prof Farzaneh Ahrari
14:30-15:00	Trigeminal Neuralgia and management by Soft Laser therapy	Prof Arshad Malik
	Scientific Presenter and Young Researcher Award Competition Chairperson: Dr Katayoun Kalhori and Prof Reza Fekrazad	Day 1
	Topic	Speakers
15:00-15:15	Diode laser aided de-bonding of ceramic brackets; effects on enamel and pulpal temperature	Assistant Prof Zahra Ebrahimini
15:15-15:30	Evaluation the efficacy of photobiomodulation with two different diode lasers on neurosensory recovery of injured inferior alveolar nerve in rat.	Dr Neda Hakimiha
15:30-15:45	How Far Could Laser Prevent Peri-implantitis: Laser-Modified Crowns	Assistant Prof Hadi Kaseb Ghane
15:45-16:00	Effect of two Photobiomodulation protocols on macrophage ROS (Reactive Oxygen Species) production, with and without interferon gamma.	Assistant Prof Simin Lesan
16:00-16:15	The clinical and physical aspects of Non-Thermal CO2 Laser Therapy as a photobiomodulative pain relieving approach in some oral lesions: An update	Assistant Prof Nasrin Zand
16:15-16:30	Dentinal tubule blockage using nanobioglass in the presence of diode (980nm) and Nd:YAG lasers: in vitro study	Dr Farshid Vahdatinia
16:30-16:45	Angiogenetic and Anti-inflammatory Effects of Photobiomodulation Therapy in Bone Regeneration of Rat	Mr Sepehr Fekrazad
16:45-17:00	Antibacterial effect of laser irradiation VS chemical agent on peri implant disease	Assistant Prof Ehsan Birang
17:00-17:15	Comparison of the antibacterial efficacy of different disinfection methods against Enterococcus Faecalis biofilms	Assistant Prof Sohrab Asefi
17:15-17:30	Dual-Functional Implants Developed by Combining Oxygen Non-thermal Plasma and Organosilicon Quaternary Ammonium Immobilization	Dr Wen Zhou
17:30-17:45	Low-level Er:YAG laser irradiation induced alteration of gene expression in rat calvarial osteogenic cells.	Mr Tsuyoshi Shimohira
17:45-18:00	Effect of different pulse energy on hydrodynamics of Er:YAG laser-activated irrigation teeth	Dr Yizhou Li



	<b>Live- Broadcasting</b>	
	<b>Chinese Society for Laser Dentistry (CSLD) on-site Conference, Xiamen, China.</b>	
16th July 2021 Japan Time	Prof. Song Yingliang, Prof. Zhao Jizhi, Prof. Li Qian, Prof Zhaohui Zou, Prof Yi Liu; Assoc Prof Wang Yuguang	CSLD Panel
	Dr Ambrose Chan, Prof Loh Hong Sai, Prof Sajee Sattayut, Prof Paolo Vescovi, Dr Shigeyuki Nagai, Dr Kenneth Luk , Prof Akira Aoki, Prof Reza Fekrazad , Dr Katayoun Kalhori	WFLD-APD Panel
18:00- 18:02	WFLD-APD Director Opening Message	Dr Ambrose Chan
18:03- 18:05	CSLD President Opening Message	Prof. Song Yingli- ang
18:05- 18:15	World Federation for Laser Dentistry (WFLD) - A historical perspective	Prof Loh Hong Sai
18:15 18:20	WFLD 2022 Congress Poland- Invitation	Assoc Prof Kinga Grzech-Leśniak
18:20- 18:30	APD in Laser Dentistry Education: Perspective	Dr Ambrose Chan
18:30- 19:00	Laser Dentistry from onsite to hybrid education in the pandemic era.	Prof Sajee Sattayut
19:00- 19:30	Laser Surgical and Non-surgical Management of MRONJ	Prof Paolo Vescovi
19:30- 20:00	Enhance periodontal tissues healing by laser	Prof Yi Liu
20:00- 20:30	Is green light combined with degradable opti- cal fiber the future of bone defect reparation?	Assoc Prof Wang Yuguang
20:30- 21:00	Clinical pearl to achieve success in Laser Dentistry	Forum Discussion WFLD-APD/CSLD

	<b>July 17th 2021, Saturday JAPAN TIME: 11 am- 10pm</b>	<b>Speakers</b>
	Lecture Chairperson: Dr Ambrose Chan and Dr Shigeyuki Nagai	
11:00-11:30	Amazing photobiomodulation on bone metabolism	Prof. Satoshi Yokose
11:30-12:00	Successful periodontal aesthetic treatment using an Er: YAG laser	Assoc Prof Koji Mizutani
12:00-12:30	Laser-assisted bone regenerative therapy for periodontitis, implant treatment and peri-implantitis.	Dr. Yoichi Taniguch
12:30-13:00	Latest developments in photonic application in Orthodontics	Dr How Kim Chuan
13:00-13:30	Principles of Optical Transmission	Prof Judith Dawes
13:30-14:00	Use of 445nm blue diode laser in clinical dentistry	Dr Kenneth Luk
14:00-14:30	Laser application in oral lichen planus	Dr Do Thi Thao
14:30-15:00	Tinnitus, TMD and PBMT	Prof Jan Tuner
	Scientific Presenter and Young Researcher Award Competition Chairperson: Dr Philip Tsui	Day 2
	Topic	Speakers
15:00-15:15	Does low level laser photobiomodulation effect play a prominent role in the management of peri-radicular bone lesion in endodontic treatment?	Dr Yuhao Bai
15:15-15:30	Measurement of photonic transmission of 450nm, 650nm and 980nm lasers through dental hard tissue	Dr Alex Chan
15:30-15:45	The efficiency of 810nm diode laser on Endodontic treatment	Dr Loc Ba Phan
15:45-16:00	Clinical characteristics and the efficiency of diode laser for gingival depigmentation	Dr Quynh Diem Le Nguyen
16:00-16:15	Photobiomodulation therapy for oral health care: A retrospective study at a primary care unit, Thailand.	Dr Suwat Tanya
16:15-16:30	An effect of CO2 laser power output on ablative depth and width in porcine tongue; An in vitro study	Dr Amontep Mungmee
16:30-16:45	Can diode lasers promote remineralising effect of fluoride on enamel caries? A systematic review and meta-analysis	Dr Vicky Wenqing Xue
16:45-17:00	Bubble dynamic analysis of Er:YAG laser SWEEPS irrigation technique	Dr Xinyu He
17:00-17:15	Ultrastructural analysis of Er:YAG lased bovine dentin contaminated by cariogenic bacteria	Dr Qing Du
17:15-17:30	Preventing enamel caries using a novel 9.3- $\mu$ m carbon dioxide laser	Dr Shuping Zhao
17:30-17:45	In vitro antibacterial effects of photodynamic therapy against Enterococcus faecalis in root canals of deciduous teeth	Miss Meimei Li
	Lecture Chairperson: Dr Alex Chan and Dr How Kim Chuan	
18:00-18:30	Laser De-bonding Zirconia and Emax crown on implants and natural teeth	Assoc Prof Kinga Grzech-Leśniak
18:30-19:00	Photobiomodulation in oncology: Preventive and curative management of cancer therapy-induced toxicities	Prof Rene- Jean Bensadoun
19:00-19:30	Frontiers of fluorescence controlled laser endodontic debridement	Emeritus Prof Laurence Walsh
19:30-20:00	Lasers in Dentistry: Current Applications and Future Directions	Assoc Prof Praveen Arany
20:00-20:30	The power of the bubble: Single versus double bubble	Prof Roeland De Moor
20:30-21:00	Lasers assist in management of Implant complications and failure	Dr Shigeyuki Nagai
21:00-21:30	Management of non-healing apical pathosis: Laser enhanced intentional replantation	Dr Ambrose Chan
<b>21:30-22:00</b>	<b>Award Winner Announcement and Closing Remarks</b>	Dr Ambrose Chan



# 2021 Dental Laser Virtual Scientific Conference







16July11:15

## **Prof. Akira Aoki | PhD, DDS**

Prof. Akira Aoki (Japan) from the Specialty of Photo-periodontics, Department of Periodontology, Tokyo Medical and Dental University (TMDU) that was named the first Photo-periodontics section in the world which specializes in photonic research and clinical applications in the field of Periodontics. Prof. Aoki has been engaged in Er:YAG laser research since 1991. He received the "Best Presentation Award" at the 3rd International Society for Lasers in Dentistry (ISLD) in 1992 and the 7th ISLD in 1998, and T. H. Maiman Award from Academy of Laser Dentistry (ALD), USA in 2001, for excellence in Er:YAG laser research in Dentistry. From 2003 to 2004, he was Visiting Assistant Professor at the Department of Preventive and Restorative Dental Sciences, UCSF, USA. He is the President-elect and the Executive Board Member of the World Federation of Laser Dentistry (WFLD).

### **Title: The Past, Present and Future of laser dentistry**

**Synopsis :** Since 1991, I have been engaged in laser research and its clinical applications in dentistry. During these past 30 years, laser dentistry has developed greatly and no one would have imagined such progress. Currently, lasers are used for various purposes in the treatment of oral diseases. If you use lasers properly, with precise knowledge and sufficient experience, laser treatment can provide you with a great deal of satisfaction, while at the same time being comfortable for the patient and yielding excellent, sometimes unexpectedly dramatic, treatment outcomes. Laser Dentistry will build on its legacy of accomplishments with unrelenting progress, paving a bright way for the future of Dentistry.

### **Take home messages:**

- A laser is a useful tool that can improve your dental practice, while at the same time being an expensive toy that can make your practice more enjoyable.
- A laser is not a magical "all purpose" device. You will still need to master conventional mechanical procedures before performing laser treatment, especially for periodontal therapy.



16July11:30

**Prof. REZA FEKRAZAD | DDS, MSc, FLD, FICD**

President of IMLA (Iranian Medical Laser Association), Chief editor of Publications and Guidelines of WALT (2021-2024), Secretary General of World Association for Laser Therapy (WALT) 2016-2020 , Current academic Position: Head of Laser Research Center in Medical Sciences and Deputy Director of Dean in Research Affairs in Dental Faculty of AJA University of Medical Sciences.

Professor Reza Fekrazad graduated from the Dental School of Tehran University of Medical Sciences in 1997. In 2003, he specialized in periodontology from Isfahan University of Medical Sciences. He is a fellowship graduate in Laser in Dentistry from Tehran-Aachen University in 2011. He was deputy of director of laser research center of dentistry in Dental Faculty (2010-2014) and also founder and head of first fellowship course of laser in dentistry, Tehran University of medical sciences in Iran.

**Title: Laser-nerve soldering in oral and maxillofacial surgery**

**Synopsis:** Tissue welding (fusion) or soldering are challenging topic in soft tissue surgery. Several studies have been done to improve the efficacy and outcomes of conventional suturing techniques or find alternative suture less approaches to overcome the limitation of suturing especially in laparoscopic, endoscopic, and microsurgical methods. Sutures, no matter how small, cause mechanical damage to the tissue during their insertion and presence of permanent sutures leads to a foreign body reaction with further inflammation and scarring at the repair site. In addition suturing especially in visceral surgery does not create a watertight connection, resulting to an entry for pathogens and subsequent infections.

Multiple different laser systems including the argon, carbon dioxide, YAG and diode laser were introduced in tissue adhesion in blood vessels, gut, nerves, skin. This technique offers advantages over conventional micro suturing including: less suture or needle trauma and decreased foreign body reactions and faster healing. The disadvantages have been low strength (due at least in part to low light penetration depths) and probable thermal damage to surrounding tissue.

**Take home message**

In conventional nerve suturing sutures cause mechanical damage to the tissue and presence of sutures materials lead to a foreign body reaction with further inflammation and scarring at the repair site.



16July12:00

### **Dr Katayoun AM Kalhori | DDS, MS, MSc**

Dr Katayoun AM Kalhori (Iran) DDS, MS, MSc (RWTH Aachen University and EMDOLA) graduated from Dental School of Azad University of Medical Sciences in 1998. In 2003, she specialized in Oral and Maxillafacial Pathology from Shahid Beheshti University of Medical Sciences Tehran Iran. She has numerous publications: 28 articles in international scientific journals; 9 articles in domestic scientific journals; 4 chapters in international books and 2 books in Farsi. She has presented more than 60 presentations in international congress and more than 150 lectures in National congresses. An active member of national committee of laser in dentistry of Ministry of health and medical Education Islamic Republic of Iran 2008-2012; Supervisor-role for 6 undergraduate and post graduate dentistry students' thesis; Country representative of Iran in WFLD since 2010; Scientific advisory Committee member of WALT 2016-2020. Current Position: Head of international affairs-Iranian Medical Laser Association; Lecturer and Gold member of the British Institute of Laser in Dentistry; Google scholar H-index of 15; Scopus H-index of 13; Research Gate score of 26; Reviewer in 5 international & National scientific journals

### **Title: Laser assisted oral decontamination in COVID-19 Patients**

**Synopsis:** Covid -19 came to this world and changed the whole world unbelievably. How all aspects of human life have been affected by this pandemic situation is beyond expectations. This is the reason of its importance.

In human body there are few zones of corona virus proliferation and distribution of corona virus. At the early stage, the virus is considered to be reproduced in the mucosal epithelium of upper respiratory tract (nasal cavity and Pharynx) followed by further reproduction in the lower respiratory tract and gastrointestinal mucosa. Therefore, restraining its proliferation in the initial sites is of great importance. On the other hand, since dental treatments are done in this danger zone, Dentistry is a field of high involvement risk. Laser technology can be a helpful via its Antiviral Photodynamic Therapy ability. Antiviral Photodynamic Therapy is a valuable, minimally invasive, and irresistible treatment modality for support and treatment of viral diseases. We believe corona virus is not an exception and can be controlled by Antiviral photodynamic therapy. And will try our best to explain you how it will help

**Take home message:** 1-Corona virus and its reproduction and distribution zone is our main field of activity. 2-Dentistry is highly affected by covid-19. 3-Antiviral Photodynamic Therapy can help oral cavity decontamination.





16July12:30

### **Assoc Prof. Neda Moslemi |**

Dr. Neda Moslemi studied dentistry at Shahid Beheshti University of Medical Sciences in Tehran from 1995-2001. She earned specialty in Periodontology from Tehran University of Medical Sciences, from 2003-2006. She is the associate professor at the department of Periodontology, Tehran University of Medical Sciences.

### **Title: New Perspectives in Treatment of Peri-implantitis: Is Laser a Ray of Hope?**

**Synopsis:** With the growing use of implants in daily practice, the prevalence of complications has been increasing. Peri-implant disease is the most common complication after osseointegration of dental implants. Peri-implantitis refers to the inflammation of soft and hard tissues around the osseointegrated implants and corresponds with the clinical manifestations of bleeding on probing, suppuration, increased probing depth, and marginal bone loss. At present, there is no documented protocol for management of sites with peri-implantitis and this is regarded as one of the most challenging issues in the field of periodontology. Due to the lack of access to the deep surfaces of the implant fixtures, adequate decontamination is not possible by mechanical instruments. The maximum level of decontamination of dental implant surface without surface alteration and increase of temperature is the main goal in treatment of peri-implantitis. Recently, there is an interest to see if lasers could be effective and safe in treatment of peri-implantitis or not. The current literature shows encouraging results in terms of effectiveness of lasers for surface decontamination. In this lecture, I will present the latest evidences associated with this topic and will discuss about the advantages and limitations of lasers for treatment of peri-implantitis.

### **Take home message**

1. The predominant role of lasers in treatment of peri-implantitis are their bactericidal effects.
2. The CO<sub>2</sub> laser, the diode laser, and the Erbium family lasers may be suitable for the irradiation of implant surfaces, since the implant body temperature does not increase significantly during irradiation.
3. In non-surgical therapy of contaminated implant surfaces high level lasers have shown limited clinical efficacy.
4. Photodynamic therapy is a promising method in treatment of peri-implantitis.



16July13:00

**Assistant Prof Leila Gholami | DDS, MSc, Fellowship in Laser Dentistry**

Assistant Professor, Department of Periodontology, Hamadan University of Medical Sciences, School of Dentistry, Fahmideh Street, Hamadan, Iran. Graduated from as a Dentist from Hamadan University of Medical Sciences (Iran) in 2006 and completed her MSc in Periodontics in the same University in 2012 as the top-ranking resident. Ever since she has worked as a board-certified periodontist and assistant professor in periodontics. She completed a fellowship course in laser dentistry at Acchen University, Germany, in 2014 and helped in stablishing well-equipped division of dental Laser research labs at Zahedan University of Medical Sciences and Hamadan University of Medical Sciences' Dental Research Centers. She has been the Director of Laser Research Lab of Hamadan University of Medical Sciences and the Director the post graduate periodontics program of Hamadan School of Dentistry for two years. During her academic career she has published more that 45 peer reviewed articles and presented at many national and international congresses, including conduct continuing education courses.

**Title: Current Evidence of Laser Application in Periodontal Surgeries** Learning Objectives:-1. Understanding the Laser tissue interactions with periodontal soft and hard tissues; 2. Review of the potential applications of Lasers in periodontal soft tissue surgeries; 3. Review of different applications of Lasers on Periodontal hard tissues and in periodontal flap surgeries. **Introduction** Lasers can be useful devices for adjunctive and also monotherapies in periodontology. The aim of the current review is to discuss the potential application of different lasers in periodontal surgical treatments as monotherapy. **Material and Methods** Online data bases were searched for original articles and case reports on applications of lasers in Periodontal surgical procedures. A Brief review of the mechanism of laser and periodontal tissue interactions will be discussed with presentation of some clinical cases of application of laser in periodontal surgical procedures. **Results** The potential applications of lasers in periodontal surgeries are categorized and presented in two main categories of soft tissues and hard tissues applications and discussion of the use of laser as monotherapy in Periodontal surgery. **Conclusion** There are many applications for lasers in periodontal surgeries reporting their safety and comparable results with conventional therapies. The correct choice of laser and its irradiation parameters and patient selection are of great importance in obtaining favorable results. **Take home message** Developments in laser devices has now made it possible to perform almost all periodontal surgical procedures safely and completely using lasers. Case selection and correct adjustment of irradiation parameters is of great importance in reaching desired results which needs to be evaluated in future well designed studies.



16July13:30

### **Assistant Prof Khatereh Khorsandi | PhD**

Dr Khatereh Khorsandi is faculty member and head of Department of Photodynamic, Medical Laser Research Center, YARA Institute, ACECR, Tehran University of medical sciences (TUMS) branch, Tehran, IRAN. She has Ph.D. in biochemistry. Her research interests include Photodynamic Therapy, Photobiomodulation, Photodynamic inactivation, cancer biology, stem cell and regeneration also Nanobiotechnology.

### **Title: Effect of low-dose photodynamic therapy on normal and diabetic fibroblast cells wound healing**

**Synopsis:** Photodynamic therapy (PDT) is a non-invasive method, which has been studied for several decades to treat cancer, infections, and other diseases. PDT involves the administration of a photosensitizer compound followed by irradiation to produce reactive oxygen species (ROS). It is possible that low dose photodynamic therapy (LDPDT) could improve wound healing. This study we explored the effects of LDPDT on wound healing in vitro using normal and diabetic cellular wound models. **Material and Methods** The effects of different concentrations of 5-ALA and different energy densities (dark or light) on the cell viability of HDF cells were studied using the MTT assay. Scratch wound assay was performed on both normal and diabetic cells and then cells treated with 1 and 5  $\mu\text{g}/\text{ml}$  of 5-ALA at 1  $\text{J}/\text{cm}^2$  energy density. ROS production and morphological alteration of the cells were studied. **Results** The mortality of normal fibroblast cells increased with increasing 5-ALA concentration and also increasing energy density (up to 3  $\text{J}/\text{cm}^2$ ). However, in diabetic, the mortality rate did not decrease. Diabetic cells showed increased migration and closure compared to normal cells under similar conditions. A low concentration of 5-ALA (5  $\mu\text{g}/\text{ml}$ ) and low energy density of 1  $\text{J}/\text{cm}^2$  in both normal and diabetic cells gave a small increase in ROS levels compared to controls. This may explain the positive effects of LDPDT on wound healing. **Conclusion** The findings of this study suggest that LDPDT may have a potential effect on the wound healing of diabetic wounds.

### **Take home message**

"This study suggests that low dose photodynamic therapy (LDPDT) may have a potential effect on the wound healing of diabetic wounds"



16July14:00

### **Assoc Prof Farzaneh Ahrari | DDS, MSc**

Associate Professor of Orthodontics, Dental Research Center, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Since 2007, Dr Ahrari Published more than 75 publication in ISI and Pubmed journals, and more than 20 publications in internal journals and presented about 30 lectures in international and internal congresses.

#### **Title: Low level laser therapy (LLLT) for alleviating pain in orthodontic patients**

Pain/discomfort is a common experience in subjects wearing fixed orthodontic appliances. Pain usually affects routine activities such as sleep, eating and chewing, and may even encourage some patients to undergo early termination of therapy. Traditionally, prescription of non-steroidal anti-inflammatory drugs (NSAIDs) has been considered as the most effective strategy for controlling pain, but the use of these drugs has raised health concerns due to the reported side effects like gastrointestinal problems, thrombocytopenia, and renal insufficiency. Low level laser therapy (LLLT) has been widely used in dentistry because of the analgesic and anti-inflammatory effects and its great benefits in accelerating the wound healing process. Some studies employed LLLT over the course of orthodontic treatment for controlling pain initiated after separator or arch wire placement or during canine retraction, but the results are controversial. In this lecture, some recent studies on the application of lasers for alleviating pain in orthodontic patients are reviewed, focusing on the optimal laser settings to achieve the best therapeutic result.

#### **Take home message**

Photonics technology is the future of Dentistry with wide clinical application from conventional surgical to minimally invasive surgery and nowadays Non invasive surgery. Diagnostic imaging in photonic technology also a major breakthrough



16July14:30

**Prof. Arshad Mahmood Malik | MDS, FPAOMFS, FPSOMP, FICD, FPFA**

Prof. Arshad Mahmood Malik graduated in 1979 from de' Montmorency College of dentistry, later done his MDS from PGMI Lahore. He served as Principal Dental Section / Head of Oral and Maxillofacial Surgery in Punjab Medical College Faisalabad and SAHARA medical college Narowal. Beside more than 26 years of teaching experience, he is an eminent Examiner for the post-graduate studies in the subjects of oral and maxillofacial surgery, oral medicine and Oral Pathology at College of Physicians and Surgeons of Pakistan, University of Health Sciences Lahore, Punjab University, Ghandhara University, PIMS Islamabad, SZAB University Islamabad, University of Bolan, ISRA University and University of Lahore. He is the Vice president Section XV ICD, fellow, Regent ICD region 24 Afghanistan, Pakistan and remained Chief Editor International College of Dentists from Section XV. He has been elected as President emeritus Central council Pakistan Society of Oral and Maxillofacial Pathology, President PDAC (2018) and PMAC. In addition he is also Fellow of Pakistan Association of Oral & Maxillofacial Surgery and Pakistan society of Oral and maxillofacial Pathology. Regular presenter in many international conferences with special reference to ICD as invited speaker. He has more than hundred original publications of his research work on oral wound healing by lasers, Ankylosis of TMJ, Dry socket and its etiology, oral radiology, oral surgical procedures like multiple grafts, implantology, periapical / dentoalveolar procedures and oro facial Pain management especially trigeminal neuralgia. He has won the best teacher award of the year thrice. Presently, he is the Dean/Principal HBS Dental College Islamabad.

**Title: Trigeminal Neuralgia and management by Soft Laser therapy**

**Synopsis:** Classical trigeminal neuralgia (TN) requires demonstration of morphologic changes in the trigeminal nerve root from vascular compression. Secondary TN is due to an identifiable underlying neurologic disease. TN of unknown etiology is labeled idiopathic. The diagnosis of trigeminal neuralgia (TN) critically depends on a patient's description of pathognomonic pain attacks. Unequivocal definition of the characteristic features of TN is therefore mandatory. Soft Laser management criteria must encompass variants of the clinical phenotype and incorporate the etiology of TN. Diagnostic certainty is graded possible when pain paroxysms occur in the distribution of the trigeminal nerve branches. Soft Laser therapy relief on triggered paroxysms permit the designation of clinically established TN. The neuropathic pain and its management by soft laser on the basis of understanding its pathophysiology will be briefed directing the GP to correct road map for the use of Soft Laser and its limitations. **Take home message** Laser has changed the approach to manage the pain control of oro-facial region. Thanks to laser photobioactivation properties which will change the TN management in the near future.





16July18:05

## **Professor Loh Hong Sai | BDS, MDS, FDSRCS, FDSRCPS, FAMS**

Oral and Maxillo-facial Surgeon; Former Dean, Faculty of Dentistry, National University of Singapore (1986-1995); Former Secretary and Council Member, Singapore Dental Association; Former World Federation for Laser Dentistry (WFLD) President (2002-2004); Former Asian Pacific Division (APD) Director (2006-2012); Honorary Member of APD; Life Member, WFLD 2006; Chairman, Medical Alumni Association; Advisor, Asian Pacific Dental Students Association (APDSA).

Awards/Honours (Post-PhD): British Commonwealth Senior Medical Fellowship (1986); Fellowship of the Association of South East Asia Institutes of Higher Learning (1990); Friend of Labour Award, National Trade Union Congress, Singapore (1992) and Roll of Honour, Singapore Dental Association 2004

Email:lohongsai@gmail.com

### **Title: World Federation for Laser Dentistry (WFLD) - a historical perspective**

It was first founded in 1988 as the International Society for Laser Dentistry (ISLD). It is a non-profit organization which aims to promote international laser dentistry to enhance clinical excellence through applications and research from collaborations with leading universities, associations and laser organizations. Presently, it has more than 60 countries participating in its activities, including an international conference once every two years since 1988, and in between hosting regional congresses organized by its five Divisions for the continuing education of all its members from North America and Canada, South America, Europe, Middle East and Africa and Asia Pacific regions.

It is affiliated with a reputable laser journal, and its divisions also organize post-graduate and certification courses regularly. WFLD is well regarded as the leading laser organization in the world.

### **Take home message**

Laser dentistry enhances clinical outcomes and management





16July18:30

**Professor Sajee Sattayut | PhD, DDS (First Class Honors)**

Oral and Maxillo-facial Surgeon, Faculty of Dentistry, Khon Kaen University

Head of Lasers in Dentistry Research Group, Khon Kaen University since 2011

Vice Director of Asia Pacific Division, World Federation for Laser Dentistry (WFLD), since 2015

Vice President of Thailand Association for Laser Medicine and Surgery, since 2018

Advisor, WFLD, Executive committee (2020-2022)

Thailand country representative, WFLD, since 2007

Member of Editorial Board of Laser Therapy Journal

Editor-in-chief, Gerontology and Geriatric Medicine Journal

Contact: Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Khon Kaen University. Mobile Phone: 66 93 546 6178; E-mail : sajee@kku.ac.th

Website : <https://sites.google.com/a/kku.ac.th/sajee-sattayut/home>

Publication : [https://www.researchgate.net/profile/Sajee\\_Sattayut/contributions](https://www.researchgate.net/profile/Sajee_Sattayut/contributions)

Current interest in laser dentistry: Laser therapy for oral potentially malignant disorders; Laser therapy for primary care; Laser dentistry education

**Title: Laser Dentistry from onsite to hybrid education in the pandemic era**

**Synopsis:** Owing to the COVID19 pandemic, the local and overseas travelling has been limited. Even though online education has been introduced for more than 10 years, the full online based study without onsite is challenging. We introduced the full online course in laser dentistry which was composed of theory and practice. The study model called the hybrid: online and onsite was conducted. This comprised online study with electronic module and discussion on e-classroom, hybrid stimulation laboratory practice and clinical demonstration. The paper examination and interview evaluation were conducted. There were 11 participants in this course. They were successfully passed the evaluation at the score in the range of 70 to 90 %. The laser dentistry education is able to arrange by the full online course using the hybrid model. **Take home message:** The laser dentistry education can be delivered via full online in the pandemic era by using efficient study model, sufficient knowledge and active networks.



16July19:00

## **Prof Paolo Vescovi | DDS, MSc, PhD, Spec Oral Surg.**

Degree in Dentistry in the University of Parma (Italy) in 1987, three years Speciality. Diploma in Oral Surgery and one year Post Graduate Diploma in Oral Medicine Oral Oncology in the University of Turin (Italy). European Master Degree in Oral Laser Applications (EMDOLA) in the University of Nice (France). PhD in the University of Liège (Belgium) with the subject "Laser applications in the MRONJ: Medication Related Osteonecrosis of the Jaws".

Professor of Oral Medicine and Clinical Stomatology since 1999 and director of Master EMDOLA since 2008 and Director of Master in Oral Surgery since 2013 in the University of Parma (Italy). Director Oral Medicine Oral Surgery and Laser Therapy Unit of University Center of Dentistry and Academic Hospital of Parma (Italy). Past President of SILO (Italian Society of Laser in Dentistry).

Member of National Board of Italian Society of Oral Medicine and Oral Pathology (SIPMO), Member of National Board of Italian Society of Non Transfusional Components (ANTHEC), Active Member of Italian Society of Oral Surgery (SIIdCO), Country Rep for Italy of WFLD (World Federation for Laser in Dentistry), Vice Director of the WFLD-ED, Member of WFLD ExCo (Treasurer).

Author of more than 400 scientific papers in the field of Oral Medicine, Oral Oncology, Oral Surgery and Laser Applications in Dentistry.

### **Title: Laser Surgical and Non-surgical Management of MRONJ**

#### **Take home message**

The combination of laser photo bio modulation with medical or surgical treatment, appears to improve vascularization of the coating mucous membrane, regeneration of the bone, reduction of pain and inflammation with a bactericidal effect. Surgical elimination of necrotic bone with erbium laser represent a minimally invasive technique inducing micro-perforations at the base for renewed vascularization. The intra operative examination of bone autofluorescence (AF) with a wavelength of 400-460 nm, seems to be a suitable guide during surgical debridement/resection of necrotic bone. Combined treatment with antibiotics, minimally invasive surgery (including erbium laser) eventually AF guided and laser photomodulation in the early stages of the disease, should be the gold standard of MRONJ management



16July19:30

**Prof. Yi Liu | DDS, PhD**

Dr. Yi Liu is a professor and department chair of the Department of Periodontics in Capital Medical University School of Stomatology, China. Dr. Liu earned a DDS degree from West China College of Stomatology, Sichuan University as well as PhD from Capital Medical University School of Stomatology. She is the Standing Committee Member of Chinese Stomatological Association of Periodontal Disease and the Committee Member of the Chinese Stomatological Association of Biomedical. Over the years, Dr. Liu is most noted for her research on mesenchymal stem cell-mediated oral and maxillofacial tissue regeneration and transformation medicine. More recently, she focused on the mechanism of host immune system controlling tissue regeneration, and investigate the effective immune regulation methods to improve tissue regeneration. Dr. Liu has published more than 50 scientific articles in a variety of scientific journals.

**Title: Enhance periodontal tissues healing by laser**

**Synopsis:** Periodontal tissue healing is a complex procedure. Inflammation, tissue reparation and remodeling were sequence appeared and overlapped in this process. Er:YAG and diode laser are common used lasers to improve periodontal tissue healing. In this presentation, we compared the clinical outcomes after using traditional scaling and root planning and Er:YAG laser. In vitro study, we observed morphology of the root surface by SEM after Er:YAG laser treatment, and the ability of periodontal cell attaching to the root surface. To accelerate wound healing, a soft tissue defect was created on mouse palate. The wound healing effect and speed were observed after Low-level laser (LLL) treatment. These results provided the evidence for clinical laser application.

**Take home message** Combination of Er:YAG and LLL can improve periodontal tissues healing process.



16July20:00

**A/Professor Wang Yuguang | Deputy chief physician, Doctoral supervisor.**

Wang Yuguang is a member of the Laser Specialty Committee of the Chinese Stomatological Association, the Laser Specialty Committee of the Beijing Stomatological Association, the Computer Specialty Committee of the Chinese Stomatological Association, and the initiator of the non-invasive diagnosis and treatment platform of the National Engineering Laboratory of Dental Digital Medical Technology and Materials. Wang Yuguang is also an associate editor of Photobiomodulation (PBM), Photomedicine, and Laser Surgery, and a reviewer of SCI journals such as The Journal of Biomedical Optics (JBO), Photochemistry and Photobiology, Lasers in Surgery & Medicine, PLoS One. From 2014 to 2015, Wang Yuguang studied in the Wellman Center for Photomedicine Laboratory, Massachusetts General Hospital, Harvard University. He proposed for the first time that 532nm green light can precisely control calcium ion channels, regulate stem cell differentiation and nerve conduction, and apply this technology to the treatment of oral and maxillofacial bone regeneration and dentin hypersensitivity. After returning home, he conducted translational medicine research. The articles were published in Small Methods and Drug Resistance Updates.

**Title: Is green light combined with degradable optical fiber the future of bone defect reparation?** Abstract: PBM especially short-wave (blue-green) light, significantly promotes bone regeneration by accelerating cell proliferation, migration and differentiation, but the depth of green light penetration limits the application of this technology in vivo. We constructed a flexible biodegradable optical waveguide (BOG) to provide a solution for applying green light in deep bone defect tissue and explored the effect and molecular mechanism of green light promoting the osteogenic differentiation of bone marrow stem cells (BMSCs). The BOG was constructed with poly (L-lactic acid) & poly (L-lactic-co-glycolic acid) (PLLA&PLGA)-based optical fibers and the diameter of the waveguide constructed by 3D printing is only about 200 microns. The BOG possesses superior flexibility and biocompatibility and degrades with bone regeneration reaches enough penetration depth in the tissue to achieve adequate green light coverage and reduces the thermal effect of laser irradiation. The green light conducted by the fiber activated the transient receptor potential vanilloid acid subtype 1 (TRPV1) channel through the photosensitive protein melanopsin (OPN4) and caused a transient increase in intracellular calcium ion concentration. Calcium ions transmit the signal to protein kinase C (PKC) and cross-react with the MAPK-ERK signaling pathway. The phosphorylation of C-RAF, MEK1/2, and ERK expands the signal cascade, and the osteogenic transcription factor RUNX2 is upregulated by p-ERK, which ultimately promotes the osteogenic differentiation of human bone marrow stem cells. In vivo, we introduced green light into SD rat bone defects through the degradable optical fiber and performed micro-CT and tissue staining, which proved its superior ability to accelerate bone regeneration.





17July11:00

### **Prof. Satoshi Yokose | PhD, DDS**

Prof. Yokose is Professor of Division of Endodontics and Operative Dentistry, Department of Restorative and Biomaterials Sciences, Meikai University, School of Dentistry (2013-present). Previously, Professor of Division of Operative Dentistry, Department of Conservative Dentistry, Ohu University, School of Dentistry (2005-2013) and Associate professor of Department of Operative Dentistry, Meikai University School of Dentistry (2000-2005).

He is also an Endodontics Instructor of Japan Endodontics Association and Instructor of Laser Dentistry of Japan Society for Laser Dentistry.

Research fields are dental pulp cell biology, bone metabolism, and laser dentistry for the regenerative therapy. He Participated in the NASA space experiments for examining the mechanism of osteoporosis of the astronaut (1992).

#### **Title: Amazing photobiomodulation on bone metabolism**

The osteocytes receiving mechanical loads release signal molecules, which orchestrate differentiation and activity of osteoblasts or osteoclasts to adapt the shape and structure to the mechanical environment. Therefore, osteocytes can act as a mechanosensory cell and play a role in regulating bone metabolism. Given that stimulation of laser irradiation to bone tissue is the same as mechanical stimulation, it has been postulated that laser irradiation can control bone metabolism and apply for bone regenerative therapies. Then we have reported that photobiomodulation (PBM) of carbon dioxide laser induced Dentin matrix protein 1 (Dmp-1) expression but inhibited Sclerostin expression in cultured osteocytes from rat calvariae. In general, it is reported that Sclerostin and Dmp-1 as soluble factors are expressed and/or suppressed by osteocytes responding to mechanical stress in bone tissue, and the soluble factors influence on proliferation and differentiation of osteoblasts. Our in vivo experiments using rat tibiae received bone defects analyzed using 3D micro CT also demonstrated that bone formation in the healing process can be accelerated by PBM of diode and Nd:YAG lasers. Our results indicate that PBM on bone tissue is capable of controlling the functions of osteocytes, resulting in the application of laser irradiation to bone regenerative therapies. However, recently we investigated that PBM of diode laser affected not only osteoblast differentiation but also osteoclast differentiation, bone immune system (Osteoimmunology), osteoblastogenesis and osteoclastogenesis. In this presentation, I am going to explain the bone metabolism influenced by opposing mechanisms in response to PBM, based on our basic experiments, and I would like to consider the possibility of laser in bone regenerative therapy. **Take home message** PBM can be a double-edged sword in bone regenerative therapies.



17July11:30

**Assoc Prof Koji Mizutani | DDS, PhD.**

Assistant Professor of Periodontology, Graduate school of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Tokyo, Japan.

He graduated from the Dental School, Tokyo Medical and Dental University in 2002. He received PhD program parallel to his clinical training in Department of Periodontology, TMDU in 2002-2006, then became a clinical instructor in TMDU Dental Hospital in 2007. He became a research fellow in Joslin Diabetes Center, Harvard Medical School, Boston, USA in 2010-2012. After his return to Japan, he became Assistant Professor of Periodontology, Graduate school of Medical and Dental Sciences, TMDU. His research includes laser therapy for periodontitis and peri-implantitis, and the association between periodontitis and diabetes. He was one of the authors of the position papers in the periodontal laser therapy in 2010 and the periodontal regenerative therapy in 2012 by Japanese Society of Periodontology and Guideline for the diabetes treatment by the Japan Diabetes Society in both 2016 and 2019.

**Title: Successful periodontal aesthetic treatment using an Er: YAG laser**

**Take home message**

Laser ablation has been recognized as one of the most effective and reliable minimally invasive treatment modalities for gingival pigmentation. Er:YAG laser micro-keyhole laser surgery (EL-MIKS), a novel depigmentation technique, was able to successfully remove an extended area of metal tattoos in the gingiva with simpler, easier and less invasive procedure than conventional periodontal plastic surgery.



17July12:00

### **Dr. Yoichi Taniguchi | PhD, DDS**

Dr Yoichi Taniguchi, DDS, PhD. is Adjunctive Lecture of Periodontology, Graduate school of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Tokyo, Japan and the director of Taniguchi Dental Clinic, Sapporo Japan. He graduated from the Dental School, Nippon Dental University in 2007.

He received PhD program parallel to his clinical training in Department of Periodontology, TMDU in 2008-2012, then became a clinical instructor in TMDU Dental Hospital in 2013-2015. He became a director in Taniguchi Dental Clinic, Hokkaido, Sapporo in 2015. His research includes bone regenerative therapy using Er:YAG laser for periodontitis and peri-implantitis.

#### **Title: Laser-assisted bone regenerative therapy for periodontitis, implant treatment and peri-implantitis.**

**Synopsis:** Bone regenerative therapy are applied to periodontal and implant treatment. Especially, membrane technique such as guided tissue/bone regenerative therapy was commonly performed to regenerate for major bone defect in periodontal therapy and to improve for insufficient bone quantity in implant treatment. However, membranes increase the risk of impaired healing in the interdental region and alveolar ridge area as well as postoperative exposure of the membrane and infect to grafted bone. To date, a highly effective and low-morbidity surgical procedure has not been generally established for bone regeneration in severe bone defects. Recently, we developed a novel bone regenerative procedure, Er:YAG laser-assisted bone regenerative therapy (Er-LBRT), which induces blood clot coagulation in the superficial areas of grafted bone. We have applied this technique in periodontal regenerative therapy. Er-LBRT achieved successful clinical outcomes that are more than equivalent to those seen with conventional periodontal regenerative therapy at a lower risk such as infection to bone graft material. Furthermore, Er-LBRT was applied to regenerative therapy in ridge preservation and ridge augmentation and peri-implantitis treatment. In this lecture, the Er-LBRT procedure is introduced and its effectiveness is discussed based on clinical evidence.

**Take home message** 1. Laser-assisted bone regenerative therapy (LBRT) is a simple procedure using blood clot to stabilize the grafted bone without a membrane. 2. LBRT enables sufficient bone regeneration in periodontitis, ridge preservation/augmentation and peri-implantitis cases. 3. The clinical outcome of LBRT shows equal or better results comparison to a membrane technique. 4. A new concept of bone regenerative treatment using the ability of laser blood clot formation.



17July12:30

## **Dato' Dr How Kim Chuan | Managing Director**

**BDS, MSC Orthodontics, FDS RCS Oral Surgery, FDS RCSEd Restorative, MORTH RCS; MORTH RCSEd, Cert Implantology, Cert Implantology, FWCLD, FWFLD Laser (USA), FICOI & Diplomate ICOI Implantology (USA), FICCDE, FICD, FAID, FAMM Academy of Medicine (Malaya), Consultant Orthodontist, Implantologist & Aesthetic Laser Dentistry**

Dato' Dr How Kim Chuan is a practicing orthodontist and implantologist. He received numerous academic degrees and honorary fellowships and positions. He is currently the President of Section XV for International College of Dentists (ICD) and the President of Osseointegration Society of Malaysia. He has been serving as FDI Councilor for 6 years from 2011-2017. He was also the Chief editor for the Asia Pacific Dental Federation for 6 Years from 2008-2014.

Dr How has conducted a number of Clinical Orthodontic Courses in Asia Pacific countries. He is a speaker for Invisalign and lecture invisalign extensively throughout Asia. He firmly believes that clear aligner technology is the future of orthodontics.

### **Title: Latest developments in Photonic application in orthodontics**

**Synopsis:** The application of photonics application in orthodontics in the past 20 years have been advancing by leaps and bounds

1. Laser surgery in soft tissue swelling, apicectomy, frenectomy, lingual frenectomy
2. Low level laser therapy in speeding up orthodontic treatment
3. intra oral scanning technology in digital orthodontic development
4. 3D diagnostic imaging in orthodontic diagnosis and treatment planning as well as post treatment evaluation

### **Take home message**

Photonics technology is the future of Dentistry with wide clinical application from conventional surgical to minimally invasive surgery and nowadays Non invasive surgery. Diagnostic imaging in photonic technology also a major breakthrough





17July12:30

### **Prof. Judith Dawes | PhD**

Judith Dawes is Professor of Physics at Macquarie University and Director of MQ Photonics Research Centre. She is Treasurer for Science and Technology Australia and she is a former President of the Australian Optical Society. She is active in promoting Women in STEM and is a Fellow of SPIE and OSA, major international Optics societies.

With experience in laser applications in medicine and dentistry, she applies nanotechnology for medical diagnostics and sensing. Her achievements include the invention of a new laser crystal, and the invention of a laser-cured protein solder for microsurgery.

### **Title: Principles of Light Propagation**

**Synopsis:** The talk will review light propagation in different media, including the phenomena of scattering, absorption, and transmission and reflection at surfaces, and how these are measured in practice. The Beer-Lambert Law for light propagation in various media will be explained. Light absorption by chromophores in tissues leads to photothermal, photomechanical, photochemical and photo-biomodulation effects. Light propagation in optical fibres and waveguides will also be discussed.

### **Take home message:**

An understanding of the principles of light propagation in tissues is important to enable practitioners to optimise their use of lasers for clinical treatment.



17July13:30

**Dr Kenneth Luk | BDS (Liverpool); DGD (UK); MGD (CDSHK); MSc (RWTH Aachen)**

Dr. Kenneth Luk obtained his BDS at the University of Liverpool. He obtained the MSc in Lasers in Dentistry at Aachen University, Germany. Dr Luk is in private practice and currently pursuing his PhD research at University of Hong Kong.

Dr Luk is currently the secretary of the Asia Pacific Division of WFLD (World Federation for Laser Dentistry).

**Title: Use of 445nm blue diode laser in clinical dentistry**

**Synopsis:** Question: Do you have laser in your office?" Answer: I have a diode laser. An opening conversation about soft tissue laser treatment.

Although diode lasers are soft tissue lasers, they emit wavelengths from 445nm to 980nm.

There are similarities of 445nm compared to other diode wavelengths, yet different. This presentation will share the clinical applications of 445nm blue laser.

**Take home message**

There are many wavelengths produced by diode lasers. To understand the optical properties of 445nm that is different from other diode wavelengths.



17July14:00

### **Dr DO Thi Thao | DDS, MSC, PhD**

Vice Dean, Faculty of Odonto-Stomatology and Head of Oral Pathology and Periodontology, Can Tho University of Medicine and Pharmacy, Vietnam. She has numerous national and international presentations and publications. Textbooks: Do Thi Thao (2020), Oral and Maxillofacial Diseases, Medical Publishing House, (Vietnamese).

Honors and Awards: Tailor Made Programme Problem – Based Learning, Can Tho University, Vietnam and Radboud University, The Netherlands 2008-2009; The 5th International Workshop on Clinical Research Methods in Oral Health, Hoi An, Quang Nam, Vietnam 2014; Summer Institute in Clinical Dental Research Methods, School of Dentistry, University of Washington, Seattle, USA 2014.

### **Title: Laser application in oral lichen planus**

**Synopsis:** Oral lichen planus is a chronic inflammatory immune-mediated disease of oral mucosa. Immunopathogenesis of Oral lichen planus is thought to be associated with cell-mediated immune dysregulation. There are six different types of oral lichen planus: reticular, atrophy, erosive, plaque, popular and bullous. Oral lichen planus usually cause burning sensation, taste disturbances, irritation and discomfort with speech, chewing, swallowing. Despite this disease targeting the oral mucosa, its great impact on quality of life is underrated.

Oral lichen planus has been considered a potentially malignant disorder. Therefore, these lesions should be treated and monitored in the long term. Various treatments have been designed to improve clinical signs and symptoms of oral lichen planus. Laser surgery is an effective method for elimination of signs and symptoms of oral lichen planus.

This review provides different laser therapies in the treatment of oral lichen planus and how to evaluate the efficacy of laser therapies for the treatment of these lesions.

### **Take home message**

Laser therapy holds promise as a novel therapeutic option in oral lichen planus and may deliver new insights for a better understanding of oral lichen planus pathogenesis in general.



17July14:30

## **Prof Jan Tunér | DDS**

He graduated in 1968. Since 1986 he has been focusing on PhotoBioModulation. He has been lecturing worldwide and is the author of eight books and several book chapters about medical lasers. Dr. Tunér was a board member of the World Association for Laser Therapy during many years and has been a reviewer of several scientific journals and is presently a senior editor of *Photobiomodulation, Photomedicine, and Laser Surgery*. Among his published research papers, five were performed in cooperation with his Alma Mater, the Karolinska Institutet in Stockholm, Sweden.

### **Title : Tinnitus, TMD and PBMT**

**Synopsis:** Somatosensory tinnitus is a diagnostic subgroup that is often overlooked by otolaryngologists. This phantom sound can be evoked by muscular tension in the limbs, spine, neck or in the TMJ. Dentist could therefore play an important role in the treatment of TMD-related tinnitus, but the patient rarely believes that a dentist could be part of the solution and does not tell. So, dentists should include this question in the anamnesis. PBMT is already known to be useful in TMD therapy and can consequently be a valuable tool in somatosensory TMD-related tinnitus. This presentation will highlight some experiences by Swedish dentists in this field and will suggest reasonable PBM parameters.

**Take home message** f Tinnitus can be related to TMD and PBMT is a valuable adjunct method.





17July18:00

### **Assoc Prof Kinga Grzech-Leśniak | PhD, DMD, MSc**

Advanced specialist in periodontology and oral pathology, Associate Professor at the Wrocław Medical University in Poland; Director of the Laser Laboratory at the Department of Oral Surgery at Wrocław Medical University, Poland; President of the Polish Society of Laser Dentistry, country representative for Poland at the World Federation for Laser Dentistry, WFLD; Member Committee of the FDI Dental Practice Committee. Affiliated Assistant Professor at Department of Periodontics, School of Dentistry Virginia Commonwealth University in United States. Advisor at the Executive Board WFLD. Practitioner since 2000, she established a specialist clinic in 2006, which has become one of the leading periodontal treatment centres in Poland. Lecturer with 19 years of experience as an educator, school counsellor and tutor. Versed in classroom management, behaviour strategies and individualized instruction.

#### **Title: Exploring the use of Laser for safe retrieval all-ceramic dental prosthetic restoration**

**Synopsis:** Fixed dental prostheses require lifelong maintenance and restoration, though removal of prosthetic components will often be necessary. Nowadays, with the increase of patients' aesthetic expectations, all-ceramic restoration has been gaining popularity - being the most desirable in particular, because of its aesthetic value. Materials most commonly used are high-strength ceramic materials.

Removal of zirconia veneers, crowns or bridges, thanks to their great bonding capabilities and physical strength, can be a challenge. It often requires sectioning using rotary instruments. In many cases, except for wasted time and effort, it can lead to irreversible damage to the tooth surface or abutment. In the end, the patient will be forced into getting new prosthetic restoration, which is time-consuming and frustrating for both clinicians and the patient.

Recent literature shows that lasers from the erbium family can be used for different ceramic restoration's safe retrieval. This lecture will describe possibilities, advantages and limitations of the ceramic orthodontics brackets de-bonding, veneers, crown and bridges retrieval from natural teeth and implant abutments which bases on current knowledge and literature.

**Take Home message:** Today's lecture provides practical information on the safe and effective use of lasers for prosthetic EMAX and Zirconia crown de-bonding procedures.



17July18:30

### **Prof Rene-Jean Bensadoun | Radiation Oncology, MD, MSc, HDR,**

Chairman at the « Centre de Haute Energie », NICE (France). Former Full Professor and Chairman at the Department of Radiation Oncology, University Hospital of Poitiers (France).

His fields of interest are Radiation Oncology, Head & Neck Cancer, Supportive Care in Cancer, Photobiomodulation, New techniques in Radiation Oncology, Cancer-treatment toxicity. President of WALT (2021-2024) (WALT Vice-President (2018), Scientific Secretary (2015-2017) membership secretary (2010-2014)).

He's the author of more than 195 peer reviewed papers, 89 as first or corresponding author, 2 Books, 4 book chapters. Comprehensive impact factor: 999,8.

### **Title: Photobiomodulation in oncology: Preventive and curative management of cancer therapy-induced toxicities.**

**Purpose:** There is a large body of evidence supporting the efficacy of low level laser therapy (LLLT) also known as photobiomodulation (PBM) when used for the prevention and/or treatment of oral mucositis (OM) in patients undergoing radiotherapy for head and neck cancer (HNC).

**Results:** In vitro studies assessing the effect of LLLT/PBM on tumor cells have reported conflicting results. This diversity of effects is likely to be specific to LLLT power and dose. However, no clinical studies reported tumor protection or enhanced tumor growth as a result of LLLT exposure. For OM management, optimal LLLT/PBM parameters were: Wavelength: typically between 633-685 nanometer (nm), or 780-830 nm; Energy density: laser or light-emitting diode (LED) output between 10-150 mw; Dose: 2-3 Joules (J/cm<sup>2</sup>), and no more than 6 J/cm<sup>2</sup> on the tissue surface treated; Schedule: 2-3 times a week up to daily; Emission type: continuous or pulsed (<100 Hertz) as low frequency pulsed light may be superior to continuous wave light for wound healing; Route of delivery: intra-orally or transcutaneously. Although evidence suggests that LLLT/PBM is safe in HNC patients, vigilance remains warranted to detect any potential adverse effects of LLLT/PBM on cancer treatment outcomes and survival.

**Take Home message:** Most of the side effects of cancer-therapy induced side effects in the mouth and in the Head & Neck region can be safely et efficiently reduced with preventive and curative use of LLLT/PBM !



17July19:00

**Emeritus Professor Laurence J. Walsh AO | BSc (Hons) (Qld), DSc (Qld), PhD (Qld), GCEd, FFOP (RCPA), FICD, FADI, FPFA, FIADFE**

Emeritus Professor Laurence J. Walsh AO is from the University of Queensland, Brisbane, Australia where he leads the research group in lasers and other advanced technologies.

He has been using multiple laser wavelengths clinically in specialist practice for over 30 years, and has published over 100 studies on laser applications in dentistry, including seminal work on laser based detection and fluid activation.

He holds multiple patents on dental laser technologies. Prof Walsh also trains specialist trainees and medical staff in laser surgery and in practical laser safety.

**Title: Frontiers of fluorescence controlled laser endodontic debridement**

**Synopsis:** This presentation will discuss the development of laser-induced fluorescence diagnostic methods and their validation and performance enhancement, and then how they can be coupled with laser-activated irrigation to achieve canals with excellent microbial elimination and minimal removal of root dentine.

This gives a more conservative, faster approach to laser-augmented endodontics. The separate components (irrigation fluids, fibers, detection, and laser modes) can all be readily modified. Extreme examples of how such methods perform in high complexity canals will be shown.

**Take home message:** Lasers can augment endodontic treatment by diagnosis of the bacterial load of the root canal at the same time as agitating irrigation fluids, to give improved canal debridement.



17July19:30

### **Assoc Prof Praveen R Arany | BDS, MDS., MMSc, PhD**

Dr. Arany is trained as a dentist and an oral pathologist. Following a joint PhD-Residency program as a Harvard Presidential Scholar, he received two certificates in clinical translational research from Harvard Medical School and the National Institute of Health. He pursued postdoctoral fellowships at the Indian Institute of Sciences, Bangalore, National Cancer Institute, Bethesda, and Harvard School of Engineering and Applied Sciences & Wyss Institute, Cambridge. Following his training, he served as an Assistant Clinical Investigator, NIDCR, NIH, Bethesda, from 2012 to 2015. Since 2015, he is a tenure-track Assistant Professor, Oral Biology, School of Dental Medicine, University at Buffalo, New York. He also has several adjunct positions in various institutes, including the National Institute of Aging, Baltimore; Biomedical Engineering, University at Buffalo; Nursing, Shepherd's University; and Physical Therapy, Manipal University. He is a recipient of numerous awards, such as the NCI Director's Young Investigator Award, Wound Healing Society's Young Investigator Award, Eugene Seidner scholar, and Horrace Furomoto Young Investigator award. He has held several leadership positions and continued to serve in various positions in the Wound Healing Society (WHS), American Association for Dental Research (AADR), Academy of Laser Dentistry (ALD), American Society of Lasers in Medicine (ASLMS), American Dental Education Association (ADEA).

### **Title: Lasers in Dentistry: Current Applications and Future Directions**

**Synopsis:** Dentistry has historically led clinical fields in adoption of new technologies. Light has been a central part of clinical dentistry from evolutions of operating lights and fiber optic illuminations to light cured restorations and more recently, optical imaging. While the use of lasers in medicine was commercially available since 1960's, the first dental laser for hard tissue applications was approved by the US FDA in 1997. Adoption for high power soft tissue applications has always been popular in many medical fields such as surgery, oncology, dermatology and ophthalmology. Surgical dental laser technology has evolved significantly past few decades significantly improving their clinical utilization. There are several myths about the use of surgical lasers and these will be addressed in this talk. Further, there have been evolutions of several non-surgical light applications such as antimicrobial photodynamic therapy and photobiomodulation therapy. This talk will focus on a mechanistic rationale and clinical applications of each approach, emphasizing the differences among them. **Take home message** "Following this talk, the audience would appreciate there are several therapeutic applications of dental lasers encompassing both surgical and non-surgical uses that can benefit clinical dentistry"





17July20:00

### **Prof. Dr. Roeland De Moor | PhD, BD, MSc, MSc**

He is ordinary full professor at the Ghent University (UGent- Belgium), Section of Endodontics / Department of Oral Health Sciences. His research group is focused on root canal cleaning and disinfection with laser activated irrigation (LAI) and light activated nanoparticles, the use of lasers and light in endodontics such as Laser Doppler Flowmetry and dental laser bleaching. His referral based clinical practice is supported by his research focus. He gives lectures worldwide on the use of light and lasers in endodontics, root canal irrigation and disinfection, on dental laser bleaching, and on the application of nanotechnology for endodontic purposes. He is (co)author of more than 150 international peer reviewed articles, published 20 book chapters and (co)-edited three books. Member of the editorial board of the International Endodontic Journal, J of Endodontics, Journal of Adhesive Dentistry.

#### **Title : The power of the bubble: Single versus double bubble**

LAI was marketed in 2009 and it is a powerful approach to clean and disinfect root canals. From activation with the fiber in the root canal, we evolved to the use of the laser tip positioned in the pulp chamber. Together with the development of super short pulses (SSP: 50  $\mu$ sec) a new approach was launched in 2013. There is scientific proof that the Photon-induced photoacoustic streaming approach (single pulse) can outperform ultrasonically activated irrigation for debris removal, physical artificial biofilm removal and disinfection. The efficacy is attributed to extremely rapid opto-dynamic phenomena during SSP-assisted activation. A double pulse modality was introduced in 2018 with the goal to enhance the disinfecting and activating efficacy of SSP laser-assisted activation. Shock Wave Enhanced Emission Photoacoustic Streaming approach consists of delivering a subsequent laser pulse into the liquid at an optimal time when the initial bubble is in the final phase of its collapse. The growth of the second bubble exerts pressure on the collapsing initial bubble accelerating its collapse. The collapse of secondary bubbles resulting in the emission of primary and secondary shock waves. **Take home message:** Erbium laser-activated irrigation is an evidence based approach with value added root canal cleaning and disinfection. New insights in laser cavitation induced fluid streaming led to the creation of a double pulse modality, with increased effectiveness.



17July21:00

## **Dr. Shigeyuki Nagai | PhD, DDS**

Dr. Shigeyuki Nagai (Japan) received his DDS from the Osaka Dental University, Japan in 1987 and studied at the Harvard School of Dental Medicine as a Clinical Fellow from 1989-1992. He practiced at the Massachusetts Veterans Administration Medical Center and General Hospital in 1991. He received his PhD from Tokyo Medical and Dental University. Dr. Nagai serves as a Board member of the Japanese Society for Laser Dentistry, Asia and Pacific Division of the WFLD (International Society for Lasers in Dentistry), the Japan Society for Dental Anti-Aging and Vice President of the Japanese Academy of Color for Dentistry. He is a committee member of the Japan Academy of Esthetic Dentistry, Japan Society for Laser Surgery and Medicine and Japan Association of Microscopic Dentistry; President and Chief Instructor for the Japanese Chapter of the Academy of Laser Dentistry. He was awarded the Leon Goldman Award for Clinical Excellence in Laser Dentistry from the Academy of Laser Dentistry in 2010 and the Excellent Presentation Prize of the Japanese Academy of Color for Dentistry in 2008. Dr. Nagai maintains a full-time private dental practice in Tokyo, Japan and visiting lecturer at Tokyo Medical and Dental University Photoperiodontics, Department of Periodontology.

### **Title: Lasers assist in management of Implant complications and failure**

**Synopsis:** Implant treatment has become popular in dentistry. The success rate is also relatively high according to the recent study. Many patients have been treated with dental implants. It is not uncommon to find dental implants in the mouth of the new patient. Implant treatment has the risk of having the peri-implant disease. It is important to understand the risk factors for peri-implant disease. Peri-implant disease has been classified as peri-implant mucositis and peri-implantitis. The diagnosis by probing, BOP and X-ray has been made, but the common use of bone-level implant placement has made probing difficult which has the strong S-shape curve under the gingival margin. More careful observation and diagnosis have become important. The characteristics of laser treatment: include a bactericidal effect, a tissue activating effect, a healing promoting effect, the specific wavelength and laser-photosensitizers detoxification effect, and the removal of the debris from the titanium implant body. It is important to understand the effects of lasers on the implant body when the lasers are used. In this lecture, lasers assist in managing implant complications and failure will be discussed and illustrated with clinical cases. **Take home message:** Laser dentistry is dentistry. Lasers should be used if the benefits outweigh the risks compared to conventional methods. Deep understanding of dentistry leads to success of the laser treatment.



17July21:00

**Dr Ambrose Chan | PhD, BDS.Hons, MSDent, ClinDipDent, FRACDS, FICD**

A general dental practitioner who has incorporated photonic and laser technologies in Dentistry for over 35 years. His clinical competency has been recognized by his conferral as a Fellow of the Royal Australasian College of Dental Surgeons. Not only have his expertise benefited his own patients, but he has made solid contributions towards the development of Dentistry itself, taking on an integral role as a Representative on Laser for the Australian Dental Association and Committee member of the "Standards Australia on Laser applications and regulations". In scientific front, he was conferred the highest university degree of PhD in Medicine (U Syd), expanding the boundaries of knowledge in PhotoBiomodulation therapy. He reputedly won the prestige prize of "The Best Scientific Research Award"-2010 at the WFLD Congress. Currently, he serves as an Honorary Research Fellow at the Brain Mind Centre, U Syd. Eminently, he also serves as the member of the Editorial Board for the Journal of Photochemistry and Photobiology B: Biology; Journal of Lasers in Medical Science and LaserTherapy. As the Director for the Asian Pacific Division, he has been essential in organizing laser conferences and developing and teaching curriculum for university-based dental laser training in the Asian Pacific region. Through these involvements and in recognition of his significant contributions, he was conferred as a Fellow by the International College of Dentists and was appointed as the Honorary Assistant Professor, at the faculty of Dentistry, University of Hong Kong.

**Title: Management of non-healing apical pathosis: Laser enhanced Intentional Replantation (LEIR).**

Non-healing apical pathosis associated with endodontically- treated teeth can compromise the supporting bone for the involved tooth, adjacent teeth, the prosthetic replacement, as well as the patient's overall well beings. When endodontic retreatment or apical surgery are not feasible due to anatomic factors and size of pathosis. Intentional Replantation (IR) should be considered as a viable, "last resort" treatment modality to extend the survival of the natural dentition and restore the patient's oral and general health. This 20mins presentation will cover: -Definition, indications, contra-indications and advantages of IR. -Survival rate of IR in comparison to endodontic retreatment, apical surgery, single-implant supporting prosthesis and its possible complications. The adjunctive use of lasers during IR procedure optimizes the potential for reattachment and periapical healing. **Take home message:** LEIR promotes healing, reattachment and restores the supporting bone for future implant prosthetic replacement; preserves patient's natural dentition, oral and the overall health. A potential viable treatment modality and deserve further scientific investigations and realization.



**2021 Dental Laser Virtual Scientific Conference  
Abstract Presentation Competition and Candidates**

### **Young Researcher Award**

**First Prize: Mr Tsuyoshi Shimohira (169)**

**Second Prize: Dr Alex Chan (168)**

**Third Prize: Mr Sepehr Fekrazad (166)**

### **Presenter Award**

**First Prize: Dr Neda Hakimiha (168)**

**Second Prize: A/Prof Sohrab Asefi (154)**

**Third Prize: A/Prof Shuping Zhao (154)**





**16 July 15:00**

**Assistant Prof Zahra Ebrahimi 1, Prof Soghra Yassaei 2**

1-Orthodontics Dept, Aja U Medical Sciences, Tehran, Iran

2-Orthodontics Dept, Shahid Sadoughi U Medical Sciences, Yazd, Iran

**Title:** Diode laser aided debonding of ceramic brackets; effects on enamel and pulpal temperature

### **Abstract**

**Aim:** Debonding of ceramic brackets due to their high bond strength and low fracture toughness is one of the most challenging complications of orthodontic clinicians. Application of lasers might be effective in the debonding of ceramic brackets as they reduce bond strength of resins and, therefore, can eliminate the risk of enamel damage. However, the thermal effects of laser radiation on dental tissue can cause undesirable results. The aim of this study is to evaluate the enamel surface characteristics and pulpal temperature changes of teeth after debonding of ceramic brackets with or without laser light.

**Materials and methods:** Thirty polycrystalline brackets were bonded to 30 intact extracted premolars, and later debonded conventionally or through a diode laser (2.5 W, 980 nm). The laser was applied for 10 seconds with sweeping movement. After debonding, the adhesive remnant index (ARI), the lengths and frequency of enamel cracks were compared among the groups. The increase in intrapulpal temperature was also measured. The collected data were analyzed by Chi-squared test and paired t-test using Statistical Package for Social Sciences (SPSS) software.

**Results:** There was no case of enamel fracture in none of the groups. Laser debonding caused a significant decrease in the frequency and lengths of enamel cracks, compared to conventional debonding. In laser debonding group, the increase in intrapulpal temperature (1.46°C) was significantly below the benchmark of 5.5°C for all the specimens. No significant difference was observed in ARI scores among the groups.

**Conclusion:** Laser-assisted debonding of ceramic brackets could reduce the risk of enamel damage, without causing thermal damage to the pulp. However, some increases in the length and frequency of enamel cracks should be expected with all debonding methods.

**Keywords:** Ceramic bracket; Diode laser; Debonding; Enamel damage; Pulpal temperature; Laboratory research.



**16July15:15**

**Dr Neda Hakimiha 1, Dr Neda Moslemi 2, Prof Reza Fekrazad 3.**

1-Laser application in medical sciences research center, Shahid Beheshti university of medical sciences , Tehran, Iran.

2-Department of Periodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

3- AJA University of Medical Sciences, School of Dentistry, Laser research center in medical Sciences, Tehran, Iran

**Title:** Evaluation the efficacy of photobiomodulation with two different diode lasers on neurosensory recovery of injured inferior alveolar nerve in rat.

### **Abstract**

**Introduction:** This study aimed to evaluate the efficacy of photobiomodulation therapy (PBM) with 810 and 980 nm diode lasers on neurosensory recovery of injured inferior alveolar nerve (IAN) in rat.

**Material and Methods:** Seventy- two rats were assigned to one of the four groups of study: (1) 810 nm laser (Crushed IAN+ laser 810 nm), (2) 980 nm laser (Crushed IAN+ laser 980 nm), (3) Control (Crushed IAN without PBM), (4) Sham (No injury, No PBM). The neurosensory evaluation was done at baseline and during one month post operation. In addition, the expression of nerve growth factor (NGF), brain-derived neurotrophic factor (BDNF), were recorded on days 2 and 30 post injury.

**Results:** One day post injury, all rats with nerve injury exhibited significant increase in the withdrawal threshold in behavioral test compared to the baseline. This increased threshold returned to the baseline scores in 810 nm, 980 nm, and control groups on days 11, 17, and 29, respectively with a significant lower threshold in laser groups compared to the control group. NGF and BDNF were significantly higher in 810 nm laser group compared to the control group in both time points.

**Conclusion:** PBM with 810 and 980 nm diode lasers accelerated the neurosensory recovery of IAN. 810 nm laser showed better results in the expression of neurotrophic factors.

**Keywords:** low-level laser therapy; Nerve Regeneration; Inferior alveolar nerve; nerve crush; Photobiomodulation Therapy



**16July15:30**

**Assistant Prof Hadi Kaseb Ghane 1, Prof Reza Fekrazad 2, Assistant Prof Nazanin Samiei**

1-Department of Prosthodontics, Dental Branch, Islamic Azad University of Medical Sciences, Tehran, Iran

2- Radiation Science Research Center, Laser Research Center in Medical Sciences, AJA University of Medical Sciences, Tehran, Iran.

3- Periodontics Department, Dental School, Tehran University of Medical Sciences, Tehran, Iran

**Title:** How Far Could Laser Prevent Peri-implantitis: Laser-Modified Crowns

**Abstract**

Despite the reported high success of dental implants, problems related to biofilm formation and peri-implantitis due to the entrance and proliferation of bacteria on the peri-implant zone have increasing attention. In this sense, this work proposes a new zirconia surface (framework) with micro-grooves aiming to develop an effective tight seal between soft tissue and implant surface and thus, to protect from bacterial invasion. In this study, different laser and design parameters will test to produce successive micro-grooves with different and variate depth, width and wall. The micro-grooves produce by lasers and were morphologically characterize by SEM. By Optimizing laser modality, we are going to improve mechanical strength of fibroblast attachment to zirconia frameworks in vitro; By this mean, optimal fibroblast attachment to these frameworks will be obtained; which has significant importance in avoiding peri-implantitis and increasing implant success and survival rate.

Keywords: Laser, Zirconia, Soft Tissue Attachement, Peri-implantitis



**16July15:45**

**Assistant Prof Simin Lesan 1, Assistant Prof Taraneh Farrokhnia 2, Dr Milad Sadeghi 3, Assoc Prof Sadegh Hassannia 4**

1- Oral medicine Dept, Faculty of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran; 2- Oral medicine Dept, Faculty of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran ; 3- Oral medicine specialist, Private practice, Tehran, Iran; 4- Clinical Biochemist Department of Biochemistry, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran

**Title:** Effect of two Photobiomodulation protocols on macrophage ROS (Reactive Oxygen Species) production, with and without interferon gamma.

### **Abstract**

**Introduction:** ROS (Reactive Oxygen Species) play a role in tissue repair and inflammation, are produced as a result of cellular metabolism in macrophages. Interferon-gamma (  $INF\gamma$ ) stimulated ROS release. One of the molecular cellular mechanisms of photobiomodulation is the production of ROS. This study was designed to compare the effect of 810 and 940 nm diode laser with and without  $INF\gamma$  on ROS production.

**Material and Methods:** In this Invitro study , 90 samples of macrophage cell line of mouse was irradiated by the continuous wave mod of 810 and 940 nm diode laser in 15 and 30 seconds. After irradiation, 2  $\mu$ l of  $INF\gamma$  was added to the plates. Indirect Nitric oxide (NO) measurement was used to evaluate the level of ROS production.

**Results:** Data analysis showed no significant difference between the rate of ROS release in 810 and 940 nm ( $p=0.63$ ), the research findings indicate a higher amount of nitrite oxide of 30s compared to 15 s ( $P = 0.001$ ), and in the group with interferon gamma ( $p = 0.00$ ).

**Conclusion:** According to this research, it was shown ROS release, improved with increasing time and  $INF\gamma$ . More animal and clinical studies are needed in the future.





**16July16:00**

**Assistant Prof Nasrin Zand 1**

**Prof Parvin Mansouri, Prof Azam Iraji zad, Somayyeh Fardindoost , Assistant Prof Leila Ataie Fashtami, Assistant Prof Mohsen Fateh, Assistant Prof Afshan Shirkavand, Assistant Prof Safa Najafi, Prof Mohammad Farhadi , Associate Prof Alireza Nikoofar , Assistant Prof Hoda Mahdavi , Dr Amir Abbas Hedayati Asl**

1-Department of Medical Laser, Medical Laser Research Center, Yara institute, Academic Center for Education, Culture and Research (ACECR), Tehran, Iran

**Title:** The clinical and physical aspects of NTCLT (Non-Thermal CO2 Laser Therapy) as a photobiomodulative pain relieving approach in some oral lesions: An update

### **Abstract**

**Introduction:** NTCLT(Non-Thermal CO2 Laser Therapy) is a novel photobiomodulative approach, the immediate pain relieving effects of which, have been demonstrated on some oral lesions, such as; recurrent aphthous stomatitis (RCT), oral lesions of pemphigus vulgaris (before- after clinical trial), aphthous ulcers of Behcet's disease (case series), chemotherapy induced oral mucositis (patchy OM, before- after clinical trial), GVHD (case reports) and some other case reports.

**Material and Methods:** In order to use the CO2 laser as a non-thermal, photobiomodulative laser for NTCLT, the CO2 laser beam (power: 1 W) is irradiated through a thick layer of transparent, non-anesthetic gel with high water content, with a defocused hand piece, scanning the lesion with with rapid circular motion of the hand-piece.

**Results:** The pain severity of the oral lesions declined immediately and significantly after NTCLT( $P < 0.001$ ) without any visible thermal complications. The procedure was pain free, with no need to anesthesia. The thermal effects of NTCLT were evaluated due to different irradiation times by FLIR TG165 spot thermal camera.

**Conclusion:** The results of these trials propose that single session of NTCLT can relieve pain in some oral lesions immediately and significantly with no visible thermal complications. Thermographic studies confirmed the non-thermal nature of NTCLT.

**Keywords:** CO2 laser, Non-Thermal CO2 Laser Therapy, NTCLT, Pain relief, Powermetry, Thermography



**16July16:15**

**Dr Farshid Vahdatinia 1,2**

**Assistant Prof Mostafa Solati, Prof Reza Fekrazad, Dr Abbas Farmany,**

**Dr Maryam Farhadian, Dr Neda Hakimiha**

1-Dental Implants Research Center, Hamadan University of Medical Sciences, Hamadan, Iran; 2- Dental School, AJA University of Medical Sciences, Tehran, Iran.

**Title:** Dentinal tubule blockage using nanobioglass in the presence of diode (980nm) and Nd:YAG lasers: in vitro study

### **Abstract**

**Introduction:** the main objective of this study to enhance the blockage of dentinal tubules using nanobioglass in the presence of diode (980nm) and Nd:YAG lasers in order to reduce Permeability and dentin hypersensitivity in an in vitro study.

**Material and Methods:** 36 dentinal samples were randomly divided into 6 subgroups (n = 6): A. Control, B. Diode Laser (980 nm, 3W), C. Nd:YAG Laser (1064, 1.0 W), D. nanobioglass, E. nanobioglass + Diode Laser (980 nm), F. Nanobioglass + Nd:YAG Laser. The average number of open dentinal tubules was qualitatively and quantitatively evaluated by scanning electron microscopy. Data were evaluated by SPSS software version 22, Kruskal-Wallis test and Mann-Whitney tests with Bonferroni's correction ( $\alpha = 0.008$ ).

**Results:** Based on the results of Mann-Whitney test, there was a significant difference in the mean number of open dentinal tubules between the control group and the other groups ( $p < 0.008$ ). However, the difference among the other groups was not statistically significant ( $p > 0.008$ ).

**Conclusion:** Findings of this study showed that high-power laser radiation, such as Nd:YAG and diode (980nm) alone or with nanobioglass has a significant effect on the blockage of dentinal tubules.



**16July16:30**

**Mr Sepehr Fekrazad 1, Dr Sepanta Hosseinpour 2, Dr Mona Sohrabi 3, Prof Reza Fekrazad 4**

1-INPMPDT, U Scientific Education and Research Network, Tehran, Iran. 2- School of Dentistry, University of Queensland, Australia. 3- Department of Pediatrics, Dental School, Qazvin University of Medical Sciences . 4- Radiation Sciences' Research Center, AJA University of Medical Sciences.

**Title:** Angiogenetic and Anti-inflammatory Effects of Photobiomodulation Therapy in Bone Regeneration of Rat

### **Abstract**

**Introduction-**Bone regenerative medicine requires novel alternative approaches to overcome its drawbacks. In this regard, photobiomodulation (PBM) has been applied in order to enhance healing process, tissue regeneration, and reducing inflammation and pain. The present study sought to evaluate low-level laser therapy (LLLT) on inflammatory mediators and angiogenic factors for bone regeneration in rat critical-sized cranial defects.

**Material and Methods-**Thirty male Wistar rats were randomly allocated into two groups (n=15); 1) photobiomodulation therapy (PBMT) and 2) control groups. Each of these groups divided into three groups (n=5) based on their follow-up periods (1, 3, and 7 days). During the surgery, an 8-mm critical-sized calvarial defect were created in each rat. We used continuous diode laser (wave length 809 nm, power density 100 mW/cm<sup>2</sup>, energy density 4 J/cm<sup>2</sup>) immediately after surgery and then every other day. All samples were sacrificed and bone specimens were evaluated histologically and histomorphometrically after hematoxylin and eosin (H&E) staining, ALP, OCN, PTGIR, and IL-1 levels were assessed by RT-PCR, and VEGF expression were analyzed by immunohistochemistry analysis.

**Results-**The level of IL-1 expression was significantly reduced in PBMT group compared with controls after 7 days (p<0.05), whereas, PTGIR level were significantly enhanced in comparison to control group after 7 days. Moreover, OCN and ALP levels increased after PBM application; however, the differences were not statistically significant (p>0.05). IHC evaluation showed a significant increase in VEGF expression after 3 days in PBMT group compared with control (p>0.05)

**Conclusion-**In the conditions of this study, the results showed a significant alteration in osteogenic, angiogenic and inflammatory mediators in rats' calvarial defect following PBM. It seems PBM can accelerate angiogenesis in bone healing process. Although an evidence-based decision for definite therapeutic application of PBM is still unattainable, the findings of our study can help other researchers to ameliorate their study design and elect more. **Keywords:** Photobiomodulation, Bone Healing, Regeneration, Angiogenesis, Inflammation, Laser Therapy, Low-Level Laser.



**16July16:45**

**Assistant Prof Ehsan Birang 1, Prof Reza Birang 2, Prof Reza Fekrazad 3.**

1-Iran University of Medical Sciences, Tehran. Iran.

2-Isfahan Dental School, Iran

3-Periodontic department, school of dentistry, AJA University of medical sciences.

**Title:** Antibacterial effect of laser irradiation VS chemical agent on peri implant disease

### **Abstract**

A main challenge in treatment of peri-implant disease is the effective decontamination of the implant surface. This challenge has always been a problem, associated with the treatment of these diseases with regard to the difficulty in removing and eliminating bacterial biofilm from the surface of dental implants, especially rough surfaces. In the presentation, we discuss about Erbium: Yttrium Aluminum Garnet (Er-YAG) laser, plastic curette, 0.12% chlorhexidine, aPDT, and 810 nm diode laser. The results of the presentation show that all five methods could reduce oral biofilms from roughed surfaces of titanium discs. Er: YAG laser and plastic curette had the highest and the lowest effects respectively.





**16July17:00**

**Assistant Prof Sohrab Asefi 1, Dr Abdollah Ghorbanzadeh 2, Dr Abbas Bahador 3, Prof Reza Fekrazad 4, Dr Roya Ayar 5, Dr Siavash Tabatabai 5.**

1-Orthodontic department, school of dentistry, Tehran University of medical sciences  
 2- Endodontic department, school of dentistry, Tehran University of medical sciences  
 3- Microbiology department, school of medicine, Tehran University of medical sciences.  
 4- Periodontic department, school of dentistry, AJA University of medical sciences.  
 5- private practice

**Title:** Comparison of the antibacterial efficacy of different disinfection methods against *Enterococcus Faecalis* biofilms

### **Abstract**

**Introduction:** Ideal goal of root canal therapy is the elimination of bacteria and their by-products of root canal systems. However, it is so difficult to achieve. The purpose of this study was to compare the antibacterial efficacy of different disinfection protocols against *Enterococcus Faecalis* (*E. Faecalis*) biofilms.

**Material and Methods:** Sample included seventy-six extracted single-rooted human teeth. ProTaper rotary instruments were used for root canal preparation. The smear layer was removed by 17%EDTA, followed by 5.25% sodium hypochlorite. Root canals were sterilized by using gamma irradiation, they were inoculated with an *E. Faecalis* suspension, then they were incubated for 4 days and 4-weeks. Samples randomly divided into two experimental groups (4-days, 4-weeks old biofilms). SEM was used to confirm the biofilm formation. In each experimental group, there are five experimental subgroups according to the method of disinfection applied, included: Diode laser irradiation (Diode), Light activated disinfection (LAD), 0.2% Chlorhexidine gluconate (0.2%CHX), 0.2% CHX +LAD and 0.2% CHX+Diode groups.

**Results:** None of experimental group did not show complete biofilm bacterial elimination. The highest reduction value in biofilm was found in the 0.2% CHX+LAD method. Diode laser alone revealed the lowest efficacy in all the root canal portions. There was significantly lower antibacterial efficacy against 4-week old than the 4-day old matured biofilms ( $P<0.05$ ).

**Conclusion:** Except diode laser alone, all other disinfection methods were effective in the relative elimination of the *E. Faecalis* biofilms. 0.2%CHX+LAD showed signifi-



**16July17:15**

**Dr Wen Zhou 1,2,3, Zhen li 1, Hongyan Zhao 1, Jiang Chen 1, Michael Weir 2, Thomas W. Oates 2, Lei Cheng 3, Hockin H. K. Xu 2, Xiaojing Huang 1**

1-Fujian Key Laboratory of Oral Diseases & Fujian Provincial Engineering Research Center of Oral Biomaterial & Stomatological Key lab of Fujian College and University & Postdoctoral workstation, School and hospital of Stomatology, Fujian Medical University, Fuzhou, 350002; 2- Department of Advanced Oral Sciences and Therapeutics, University of Maryland School of Dentistry, Baltimore, MD, 21201; 3- State Key Laboratory of Oral Diseases, West China Hospital of Stomatology, National Clinical Research Center for Oral Diseases & Department of Operative Dentistry and Endodontics, West China School of Stomatology, Sichuan University, Chengdu, 610041

**Title:** Dual-Functional Implants Developed by Combining Oxygen Non-thermal Plasma and Organosilicon Quaternary Ammonium Immobilization

### **Abstract**

**Introduction:** Plasma is ionized gas. It consists of energetic particles like excited electrons and ions. Non-thermal plasma (NTP) is promising in surface modification of dental materials, disinfection, endodontic therapy and periodontitis treatment, etc. This study was to provide the titanium with dual-function by combining NTP treatment and antibacterial organosilicon immobilization.

**Methods:** Oxygen non-thermal plasma was used to treat the titanium surfaces first. Then Octadecyldimethyl-(3-trimethoxysilylpropyl)-ammonium chloride (ODDMAC) was covalently bond to the surfaces. Chemical components analysis was completed with X-ray photoelectron spectroscopy (XPS) and Micro-Raman spectroscopy. Surface morphology were examined using scanning electron microscope (SEM). Water contact angle was also tested. Metabolic activity of *Staphylococcus aureus* (*S. aureus*) biofilm on the surfaces was measured. CCK-8 and fluorescence staining were used to evaluate adherence and viability of rat bone marrow-derived stem cells (rBMSCs) on the surfaces.

**Results:** The present modification strategy can effectively improve the chemical components and hydrophilicity, while maintaining the topography of the titanium surface. The modified titanium reduced the metabolic level of *S. aureus* biofilms. And the adhesion, proliferation of rBMSCs on the modified surfaces were improved.

**Conclusions:** The novel dual-function implant have improved physicochemical properties. It can effectively inhibit *S. aureus*, while promoting adhesion and proliferation of rBMSCs. Therefore, the dual-function implant provides theoretic and practical basis for developing new implant materials



**16July17:30**

**Mr Tsuyoshi Shimohira 1,**

**Dr Hiromi Niimi 1, Dr Yujin Ohsugi 1, Dr Yosuke Tsuchiya 1, Dr Kazuki Morita 1, Dr Sumiko Yoshida 1, Dr Masahiro Hatasa 1, Dr Takahiko Shiba 1, Hiroshi Kadokura 1, Dr Takanori Iwata 1, Prof Akira Aoki 1; Prof Satoshi Yokose 2, Dr Sayaka Katagiri 2.**

1-Department of Periodontology, Tokyo Medical and Dental University.

2-Department of Restorative and Biomaterials Sciences, School of Dentistry, Meikai University

**Title:** Low-level Er:YAG laser irradiation induced alteration of gene expression in rat calvarial osteogenic cells.

### **Abstract**

**Introduction:** Previous studies showed beneficial effects of Er:YAG laser irradiation on bone healing. We aimed to examine the gene expression alteration by laser irradiation on osteogenic cells.

**Material and Methods:** Osteogenic cells were prepared by culturing rat calvarial osteoblast-like cells in osteoinductive medium for 21 days. The cells were irradiated with Er:YAG laser (wavelength: 2.94  $\mu\text{m}$ , energy density: 3.1 and 8.2 J/cm<sup>2</sup>). Lactate dehydrogenase assay of the irradiated cells was performed. After screening for genes related to bone formation, mechanotransduction, and thermal effect by qPCR, gene expression at 3 h after 3.1 J/cm<sup>2</sup> irradiation was comprehensively analyzed using microarray.

**Results:** No dramatical increase in surface temperature and LDH activities after laser irradiation were observed. Sost expression was significantly reduced at 3 h after 3.1 J/cm<sup>2</sup> irradiation. Bcar1 and Hspa1a expression were significantly increased following 8.2 J/cm<sup>2</sup> irradiation. Microarray analysis identified 116 differentially expressed genes. Gene set enrichment analysis showed enrichment of histone H3-K9 methylation and modification gene sets.

**Conclusion:** Er:YAG laser irradiation, especially at 3.1 J/cm<sup>2</sup>, showed positive effect on the gene expression related to bone formation in osteogenic cells, without inducing significant cell damage. These findings may represent critical mechanisms of early bone formation after Er:YAG laser irradiation.



**16July17:45**

**Dr Yizhou Li 1, Xinyu He 1, Yichao Tian 1, Prof Qian Li 1, Mingyuan Nie 2, Chong pan 2, Prof Jizhi Zhao 1.**

1-Department of Stomatology, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College Beijing , China

2-Key Laboratory of Fluid Mechanics of Ministry of Education, Beihang University

**Title:** Effect of different pulse energy on hydrodynamics of Er:YAG laser-activated irrigation teeth

### **Abstract**

**Introduction:** Due to anatomical complexity and irregularity of the root canal, thorough debridement of apical third remains a challenge for ideal therapy. Er:YAG laser-activated irrigation has been proposed as a promising approach to disinfecting efficiently. However, the effect of different pulse energy on hydrodynamics of Er:YAG laser-activated irrigation inside root canal is still unclear. The aim of this study is to use high-speed photography to assess the hydrodynamics of Er:YAG laser-activated irrigation under different pulse energy, and further deduce an efficient clinical proposal for Er:YAG laser energy setting.

**Material and Methods:** Er:YAG laser was activated at 5-50 mJ with super short pulse mode upon the orifice of transparent single root canal model. Hydrodynamics, including the shape transformation and position distribution of bubbles, was recorded with high-speed photography (200,000 fps) and analyzed with Matlab.

**Results:** In single straight root canal model, with the increasing of pulse energy, the maximum volume of steam bubble inside pulp cavity enlarged. But at the same time, the gray scale integral of cold boiling bubbles in the apical region of root canal increased first and then decreased, achieving maximum gray scale integral when pulse energy was 15-25mJ.

**Conclusion:** In single straight root canal model, results of maximum gray scale integral presumably proposed that pulse energy setting at 15-25mJ create more furious hydrodynamics in the apical region of root canal.

**Keywords:** Er:YAG laser ; endodontics ; root canal therapy ; hydrodynamics



**17July15:00**

**Dr Yuhao Bai 1, Ying Zhao 1**

1-Department of Stomatology, Capital Medical University Xuanwu Hospital, Beijing, China

**Title:** Does low level laser photobiomodulation effect play a prominent role in the management of peri-radicular bone lesion in endodontic treatment?

**Abstract**

**Introduction:** To assess the potential photobiomodulation effect of low-level laser (including diode laser and Nd:YAG laser) intra-canal irradiation in the management of bone lesions in endodontic treatment.

**Material and Methods:** Forty-one teeth diagnosed as chronic apical periodontitis were included, in which twenty-three was non-surgical re-treatment cases. After canal instrumentation to at least ISO 25, taper 0.06. Each canal was cleaned with 17% EDTA solution and dried with paper point, canals were disinfected with routine intra-canal laser irradiation. Then, canals were filled with 3% sodium hypochlorite solution, laser fiber was inserted into the root canal until the apical region was reached, and intra-canal irradiation procedure was accomplished with a fiber tip up-and-down movement within the apical region for 3 cycles (1minute/cycle, 3 cycles totally for each canal, with 1 minute interval after each irradiation cycle). After calcium hydroxide dressing for 2 weeks, canals were obturated with warm gutta-percha technique (iRootSP bioceramic sealer).

**Results:** The periapical and peri-radicular bone lesion of all the treatment and re-treatment cases were healed, with a favorable prognosis in at least 2-year follow-up.

**Conclusion:** Low level laser photobiomodulation effect may play a prominent role in the management of periapical and peri-radicular bone lesion in endodontic treatment. **Keywords:** Photobiomodulation effect, Endodontic treatment, Peri-radicular bone lesion





**17July15:15**

**Dr Alex Chan 1, Dr Ambrose Chan 2, Prof Judith Dawes 3, Prof Hien Ngo 4**

1- General Dental Practice

2- Brain Mind Centre, Faculty of Medicine and Health, U of Sydney, Australia

3- Department of Physics and Astronomy, Photonics Research Centre, U of Macquarie, Australia

4- Head of School, Dental School, U of Western Australia

**Title:** Measurement of photonic transmission of 450nm, 650nm and 980nm lasers through dental hard tissue.

### **Abstract**

**Introduction:** The amount of energy available after transmission through biological tissues is clinically important for determining photobiological effects. This ex vivo study aimed to quantify the photonic transmission of 450nm, 650nm and 980nm lasers through the dental crown to the pulp chamber.

**Material and Methods:** 30 extracted human teeth (anterior n=10; premolar n=10; molar n=10) were longitudinally sectioned (Human Ethics approval # HREC/93/8/4.2). Each sample was methodically exposed to three wavelengths ( $\lambda = 450, 650, \text{ and } 980 \text{ nm}$ ; 10 J/cm<sup>2</sup>, 0.5 W, 5 J, 10 s). Photons were delivered with an 8 mm fibre-bundle-probe directed perpendicularly to the buccal cervical-third of the crown. The amount of transmission was measured twice and averaged using a periodically pre-calibrated power meter. Examiners were blinded during irradiation and measuring. Data was analysed using a general linear model with logarithmic transformation.

**Results:** Tooth thickness and wavelength were both significant predictors of photonic transmission ( $P < 0.001$ ) while tooth type was not. Within the sample, whose thicknesses ranged 2-5mm, transmission ranged from 2-18%, <0.1-10%, and <0.1-5% in the 980nm, 650nm and 450nm groups respectively.

**Conclusion:** Recognising the influence of tooth thickness and potentially other tooth-related factors on photonic transmission quantitatively will facilitate optimal clinical applications and the design of future research.

**Keywords:** Laser, transmission, dental hard tissue, tooth thickness



**17July15:30**

**Dr Loc Ba Phan 1, Dr Thao Thi Do 1.**

1-Faculty of Odonto-Stomatology, Can Tho University of Medicine and Pharmacy  
Can Tho, Vietnam

**Title:** The efficiency of 810nm diode laser on Endodontic treatment

### **Abstract**

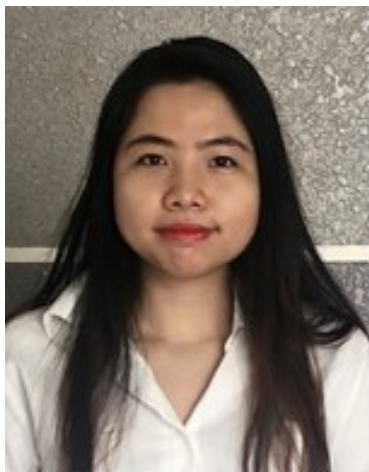
**Background:** Post-operative pain is a frequent occurrence causing discomfort after root canal treatment (RCT). Moreover, total eradication of bacteria is almost impossible, due to complex root canals system, which affects the result of RCT.

**Objective:** to access the effect of 810-nm diode laser on the severity of post-operative pain and the outcome of RCT.

**Materials and methods:** this study included 37 molars with pulp diseases. They all received RCT and were irradiated with 200 $\mu$ m fiber optic using diode laser (810-nm wavelength, output power of 1.5W, continuous mode, 5s irradiation followed by 10s pause, 4 times for each root canal). The pain level was recorded by using a visual analogue scale (VAS) right before RCT and 1 day, 3 days and 7 days after that. Patients were asked to come back after 3 and 6 months for evaluating the outcome of RCT.

**Results:** the VAS scores revealed significant decreases in pain levels after RCT compared with preoperative pain ( $P < 0.05$ ). After 3-month and 6-month follow-up, there were no periapical lesions appearance in 94,6% of cases.

**Conclusion:** 810 nm diode laser may be considered as an adjunctive treatment to conventional endodontic treatment in terms of reducing the post-operative pain and increasing successful rate.



**17July15:45**

**Dr Quynh Diem Le Nguyen 1, Dr Thao Thi Do 1, Dr Khue Nhut Truong 1.**

1-Faculty of Odonto-Stomatology, Can Tho University of Medicine and Pharmacy  
Can Tho, Vietnam

**Title:** Clinical characteristics and the efficiency of diode laser for gingival depigmentation

### **Abstract**

**Introduction:** Melanin pigmentation of the gingival is an esthetic concerns has been common, especially in patients having a very high smile line (gummy smile). The present study was undertaken to describe the clinical features of gingival hyperpigmentation and evaluate the treatment results of gingival hyperpigmentation by diode laser.

**Materials and methods:** A descriptive cross-sectional study and case series were carried out to study on 45 patients with moderate and heavy gingival hyperpigmentation from January 2019 to December 2020.

**Results:** The class of gingival hyperpigmentation at baseline had 80% severe hyperpigmentation with the mean DOPI score of  $2.44 \pm 0.25$ . After 6 months of treatment, there were no cases of severe pigmentation. The decrease in DOPI scores after 6 months was statistically significant different from before treatment. No cases of swelling and bleeding have been reported after treatment. All patients had no pain after 1 week of treatment. 97.8% of patients are satisfied with the results after 6 months and will recommend for similar cases.

**Conclusion:** Treatment gingival hyperpigmentation with diode laser was a safe and effective technique which produces the good results and patient satisfaction.



**17July16:00**

**Dr Suwat Tanya 1,2 ; Prof Sajee Sattayut 2, 3**

1- PhD student in Oral Sciences, Faculty of Dentistry, Khon Kaen University, Thailand.

2- Lasers in Dentistry Research Group (LDRG), Faculty of Dentistry, Khon Kaen University, Thailand.

3- Department of Maxillofacial Surgery, Faculty of Dentistry, Khon Kaen University, Thailand

**Title:** Photobiomodulation therapy for oral health care: A retrospective study at a primary care unit, Thailand.

### **Abstract**

**Introduction:** Although photobiomodulation therapy (PBMT) has been widely used in dentistry, there is rarely applied in primary health care unit (PCU). This study aimed to evaluate clinical efficacy of PBMT and patient's satisfaction with this therapy at a PCU in Thailand.

**Method:** A retrospective study was obtained from the treatment records of Bua Ngoen health promotion hospital, Khon Kaen, Thailand. The methods comprised 1) developing criteria of data collection, 2) verifying data collected from the records and 3) analysis of data using n-of-1 concept.

**Results:** There were 9 patients; 7 women and 2 men, treated by PMBT from March 2017 to October 2018. The average age was  $60.9 \pm 9.1$  years old. The regime was 980nm-diode laser at 500mW/continuous wave/ 8s per point of irradiation. The number of patients based on treatment as follows:- 3 patients for reduction of inflamed oral mucosa, 3 gingivitis patients received PBMT before scaling, 1 patient for treating gingivitis and relief of burning sensation, 1 patient for initiating hemostasis and 1 patient for gingivitis treatment and initiating hemostasis. The clinical efficacy was fulfilled in every patient besides the satisfaction of the non-invasive technique.

**Conclusion:** The PBMT for reducing inflammation and promoting hemostasis can be transferred to PCU.

**Keywords:** Photobiomodulation therapy, primary care unit, gingivitis, hemostasis



**17July16:15**

**Dr Amontep Mungmee 1, Prof Sajee Sattayut 2.**

1-Resident of residency training programme in Oral and Maxillofacial Surgery Department of Oral and Maxillofacial Surgery, Khon Kaen University, Thailand

2-Department of Oral and Maxillofacial Surgery, Khon Kaen University and Lasers in Dentistry Research Group (LDRG), Khon Kaen University, Thailand

**Title:** An effect of CO<sub>2</sub> laser power output on ablative depth and width in porcine tongue; An in vitro study

### **Abstract**

**Introduction:** The purposes of this study were to explore ablative depth and width affected by a 10,600-nm CO<sub>2</sub> laser continuous wave at 3 to 10W in soft tissue blocks of swine tongue.

**Material and method:** The in vitro study was conducted in 112 samples which were randomly allocated into 8 groups according to the power settings; 14 samples each group. The sample was ablated by the CO<sub>2</sub> laser at the speed of 2.5mm/sec. The depth and width of incision was measured in mm by using ImageJ (<https://imagej.nih.gov/ij/download.html>). The Kruskal Wallis Test was used for comparing the outcomes among the groups.

**Results:** The 3W group showed the minimum depth and width of ablation (Median=0.527 and 0.142, respectively). The maximum depth and width were in the 9W group (Median=3.75 and 0.68, respectively). The incisional width and depth of the 3W was significantly less than the groups irradiated with 6W (Median=2.507 and 0.417, respectively) to 10W (Median=3.388 and 0.648, respectively) at P value<0.05. There was no significant difference among the groups of 6 to 10W (P value>0.05).

**Conclusion:** The ablative effect of CO<sub>2</sub> laser based on the power output was categorized into 3 levels, namely, 3W, 4W to 5W and 6w to 10W.





**17July16:30**

**Dr Vicky Wenqing Xue 1, Assistant Prof Irene Shuping Zhao 2, Prof Chun Hung Chu 1.**

1-Faculty of Dentistry, The University of Hong Kong, Hong Kong 999077, China

2-School of Dentistry, Shenzhen University Health Science Center, Shenzhen 518000, China

**Title:** Can diode lasers promote remineralising effect of fluoride on enamel caries? A systematic review and meta-analysis

### **Abstract**

**Introduction:** The study aimed to compare remineralising effect of combined treatment of diode laser and fluoride (L&F) with fluoride (F) on the remineralisation of enamel caries.

**Method:** A systematic search of literature in English published by May 2021 was performed using PubMed, Scopus, and Web of Science. The keywords are ((diode lasers) OR (diode laser) OR (quantum cascade laser) OR (quantum cascade lasers) OR (Gallium Aluminum Arsenide lasers) OR (Gallium Aluminum Arsenide laser) OR (GaAlAs lasers) OR (GaAlAs Laser) OR (semiconductor laser) OR (semiconductor lasers)) AND ((dental caries) OR (caries) OR (remineralization) OR (remineralisation) OR (demineralization) OR (demineralisation)). Meta-analysis was performed to compare the microhardness of the demineralised enamel receiving F&L with F.

**Results:** The search identified 2,803 publications. No clinical study was identified. Three laboratory studies were included. A variety of fluorides including acidulated phosphate fluoride, casein phosphopeptide-amorphous calcium phosphate fluoride, and sodium fluoride were used. The studies used microhardness to assess remineralization. The standard mean difference of microhardness of demineralised enamel between F&L with F was 1.06 (CI:0.12, 2.00, p=0.03). The studies had substantial heterogeneity (I<sup>2</sup>=83%).

**Conclusion:** Diode lasers enhance remineralisation of fluoride on enamel caries.



**17July16:45**

**Dr Xinyu He 1, Dr Yizhou Li 1, Dr Mingyuan Nie 1, Dr Chong Pan 1, Prof Jizhi Zhao 1.**

1-Peking union medical college hospital, Beijing China

**Title:** Bubble dynamic analysis of Er:YAG laser SWEEPS irrigation technique

### **Abstract**

**Introduction:** Eliminating infection within a root canal is crucial to the success of endodontic treatment. Many studies reported that Er:YAG laser activated irrigation has an excellent antibacterial effect. In recent years, shock wave enhanced emission photoacoustic streaming (SWEEPS) was proved to be a promising program to enhance the cleanliness efficiency due to its dual pulses program. However, the mechanism of SWEEPS technique was still unknown. In this study, we used high-speed photography to investigate the bubble characteristics of SWEEPS program with different temporal separation, and the results show that as the temporal separation increases, different physical phenomenon occur between the bubbles generated by with the dual pulses. **Material and methods:** Er:YAG laser SWEEPS technique with different temporal separation setting was activated in transparent single-root tooth model. High-speed photography (200,000 fps) was used to capture the process characterization of bubbles. Matlab was used to analysis the bubble's oscillations and statement frame by frame. **Results** As the temporal separation increases, three common phenomenon will occur between the bubbles generated by the dual pulses, including bubbles combination, bubbles inhibition and bubbles collision in sequence. **Conclusion:** Different temporal separation may determine the effect of SWEEPS technique activated irrigation.



**17July17:00**

**Dr Qing Du 1, Dr Xiao Wang 1, Dr He Li 2, Dr Jing Ju 2.**

1-Stomatology Department, Peking University Third Hospital

2-College of Chemistry and Molecular Engineering, Peking University, Beijing National Laboratory for Molecular Sciences (BNLMS)

**Title:** Ultrastructural analysis of Er:YAG lased bovine dentin contaminated by cariogenic bacteria

### **Abstract**

**Introduction:** Although many of researches involved ultrastructure observation of lased dentin, the comprehensive analysis of Er:YAG laser lased, bacteria contaminated dentin should be referred to directly, to determine the impact of crystalline changes.

**Material and Methods:** Twenty-two dentin specimens from bovine incisors were co-cultured with *S. mutans* and divided into four groups with diverse Er:YAG laser irradiation energy (0W, 0.5W, 1W, 1.5W). The ultrastructure of dentin before and after laser irradiation were investigated with nanoanalytical electron microscopy. High-resolution transmission electron microscope images and selected-area electron diffraction patterns were obtained for characterizing crystal domain size, structure and microenvironment of dentin.

**Results:** The combination of these methods disclosed that there exist mineralized, demineralized and remineralized dentin in the bacteria-invaded dentin, and can be feasibly recognized via morphological features. Laser treatments influence HAp crystals in dentin tissue in different ways: laser irradiation improves the crystallinity of lamella HAp by domain growth, and rearranges its growth orientations. This change occurred mainly in demineralized area where the collagen fibrils were damaged by acid. Needle HAp in mineralized dentin tissue (where the collagen fibrils keep intact) barely changed with laser irradiation of no higher than 1.5 W.

**Conclusion:** We report an unprecedented presence of remineralization zone consisting of lamella HAp crystals with distinct high-index planes

**Keywords:** Nanoanalytical electron microscopy; remineralization; hydroxyapatite; laser irradiation, ultrastructure of dentin tissue.



**17July17:15**

**Assistant Prof Shuping Zhao 1**

1-School of Dentistry, Shenzhen University Health Science Center  
Shenzhen, Guangdong, China

**Title:** Preventing enamel caries using a novel 9.3- $\mu\text{m}$  carbon dioxide laser

**Abstract**

**Introduction:** To investigate the effects of a 9.3- $\mu\text{m}$  carbon dioxide (CO<sub>2</sub>) laser and silver diamine fluoride (SDF) on the prevention of enamel demineralisation and inhibition of cariogenic bacteria.

**Material and Methods:** Enamel blocks were applied with Laser (Group-1), SDF (Group-2), Laser + SDF (Group-3) and no treatment (Group-4), and then subjected to an 8-day pH-cycling for cariogenic challenge. Lesion depth and cross-sectional micro-hardness were assessed. Surface morphological and chemical changes were studied using scanning electron microscope (SEM) with energy dispersive spectroscopy (EDS). For the antibacterial activity, treated enamel blocks were incubated with *Streptococcus mutans*. The biofilm morphology, kinetics and viability were assessed.

**Results:** Lesion depths ( $\mu\text{m}$ ) for Group-1 to Group-4 were  $88 \pm 21$ ,  $26 \pm 11$ ,  $13 \pm 9$  and  $115 \pm 25$ , respectively ( $p < 0.001$ ; Group-2 and Group-3 < Group-1 < Group-4). Group-3 had a significantly higher cross-sectional micro-hardness than the other three groups. EDS determined that Group-4 had the lowest calcium-to-phosphorus molar ratio among the groups ( $p < 0.001$ ). SEM images showed apparent bacteria accumulation on enamel surfaces in Group-4, but not in other groups.

**Conclusion:** The irradiation with a 9.3- $\mu\text{m}$  CO<sub>2</sub> laser alone can prevent the demineralisation of enamel and reduce the adhesion of cariogenic bacteria. Moreover, adding SDF can significantly increase the preventive effect and antibacterial ability.

**Keywords:** Enamel caries, carbon dioxide laser, silver diamine fluoride



**17July17:30**

**Miss Meimei Li 1, WenChee Wong 1, Huacui Xiong 1, Ke Chen 1.**

1-Stomatological Hospital, Southern Medical University, Guangzhou China

**Title:** In vitro antibacterial effects of photodynamic therapy against *Enterococcus faecalis* in root canals of deciduous teeth

### **Abstract**

**Introduction:** This study aimed at evaluating the antibacterial efficacy of photodynamic therapy (PDT) in the root canal of infected deciduous teeth.

**Material and Methods:** Forty root canals of deciduous anterior teeth were enlarged up to #35 K-file and inoculated with *E. faecalis* for 21 days. The root canals were randomly assigned into four groups (n=10): The normal saline group, 1% NaClO group, PDT group, and the 1% NaClO+PDT group. Paper point samples were obtained at baseline (S1) and after treatment (S2). The colony-forming units (CFU) were counted. A scanning laser confocal microscope (CLSM) and scanning electron microscope (SEM) was used to observe 5 samples after treatment in each subgroup.

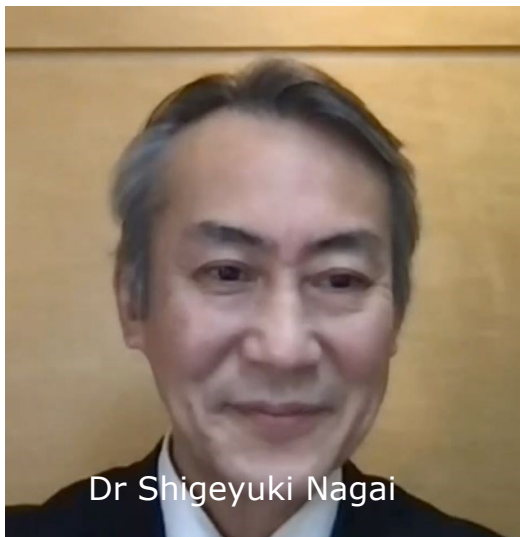
**Results:** Compared to the saline group, PDT reduced bacterial counts in the root canal ( $p < 0.05$ ). The CFU counts were lowest ( $p < 0.05$ ) in the 1% NaClO and in 1% NaClO+PDT groups. The rate of bacterial death on the surface of the biofilm in the PDT group was increased after treatment ( $P < 0.05$ ), and the rate of bacterial death was highest in 1%NaClO group and 1%NaClO+PDT group ( $P < 0.05$ )

**Conclusion:** Photodynamic therapy has an antibacterial activity against *E. faecalis* in the root canal of deciduous teeth.



# Highlights

## 2021 APD Dental Laser Virtual Scientific Conference



## Highlights

### 2021 APD Dental Laser Virtual Scientific Conference



Assoc Prof Praveen  
R Arany



Emeritus Prof Laurence  
J. Walsh



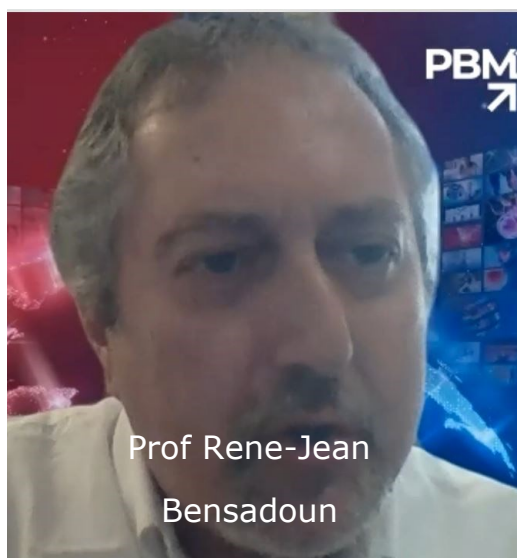
Prof. Arshad Malik



Assoc Prof Kinga  
Wozniak-Leśniak



Prof. Judith Dawes



Prof Rene-Jean  
Bensadoun



# WFID World Federation for Laser Dentistry

Asia Pacific Division

Formerly ISLD, founded in 1988



Prof Loh Hong Sai



Prof Paolo Vescovi



Dr Katayoun Kalthori



Dr DO Thi Thao



Prof Satoshi Yokose



Prof Akira Aoki



## Asia Pacific Division (APD) Webinar Series

The Asia Pacific Division Committee invite you to attend a complimentary Webinar Series via Zoom.

\*

Photonic (Light-based and Laser) Dentistry: Changing the face of Dentistry

+ Webinar #7 - 18th June 2021



+ Webinar #6 - 21st May 2021



+ Webinar #5 - 29th April 2021



+ Webinar #4 - 25th March 2021



+ Webinar #3 - 25th February 2021



+ Webinar #2 - 28th January 2021



+ Webinar #1 - 17th December 2020





# Laser dentistry from on site to hybrid education in the pandemic era



Please do not hesitate to contact us for more details:



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## “THE LASER DENTISTRY EDUCATIONAL NETWORK TO FUFILL LIFE-LONG LEARNING”

### BACKGROUND

#### of creating the hybrid design for learning laser dentistry

Besides demands of the learners to use lasers in dental practices, international travelling and conducting onsite classroom are limited due to the pandemic of COVID-19. The hybrid education connecting multi-onsite classrooms by designed online platforms revitalizes the classroom of lasers in dentistry. This encourages the learners to practice on their own through the online platform, interactive group discussion and virtual laboratory.

### INSTRUCTIONAL DESIGN

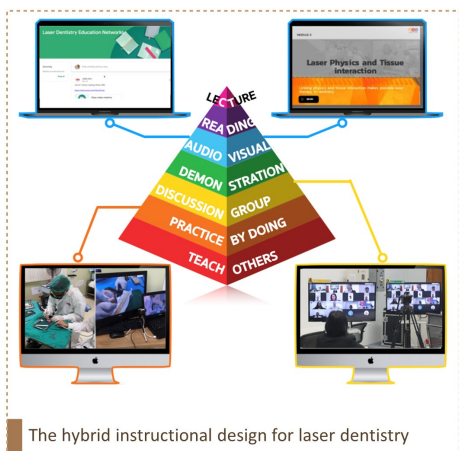
#### The hybrid laser dentistry course

This hybrid education of lasers in dentistry course is under the Project of Innovative Laser Dentistry towards Khon Kaen University Medical Hub. The aim is to transfer innovation of the Lasers in Dentistry Research Group Khon Kaen University (LDRG) to overseas enhanced international education networks in laser dentistry



The basic laser dentistry course comprises concept in laser dentistry, laser physics, laser-tissue interaction, laser safety and laser therapy in dentistry (16 hours) and hands on practicing frequently used laser techniques in non-vital animal materials (12 hours). These transfer via interactive modules on KKU e-learning platform, LIVE lectures, LIVE presentation on google meeting, e-classroom for virtual in-class communication and simultaneous simulation lab for virtual hand-on session.

All graduates from the basic laser dentistry course are invited to be the affiliates of educational networks of Lasers in Dentistry Research Group, Khon Kaen University. Then, more specific hand-on laser technique practices on requests or clinical practices of laser dentistry and research will be supported to the learners or the learners' organization as appropriate.



The hybrid instructional design for laser dentistry

"The definite purpose of using laser treatment leading to appropriate laser therapy and techniques producing sufficient clinical outcome." Prof. Sajee Sattayut, 2021



## Authors Index

A		P	
	Akira Aoki	19	Paolo Vescovi
	Alex Chan	61	Praveen Arany
	Ambrose Chan	46	Q
	Amontep Mungmee	65	Qing Du
	Arshad Malik	26	Quynh Diem Le Nguyen
D			R
	Do Thi Thao	38	Rene- Jean Bensadoun
E			Reza Fekrazad
	Ehsan Birang	55	Roeland De Moor
F			S
	Farshid Vahdatinia	53	Sajee Sattayut
	Farzaneh Ahrari	25	Satoshi Yokose
H			Sepehr Fekrazad
	Hadi Kaseb Ghane	50	Shigeyuki Nagai
	How Kim Chuan	35	Shuping Zhao
J			Simin Lesan
	Jan Tuner	39	Sohrab Asefi
	Judith Dawes	36	Suwat Tanya
K			T
	Katayoun Kalhori	21	Tsuyoshi Shimohira
	Kenneth Luk	37	V
	Khatereh Khorsandi	24	Vicky Wenqing Xue
	Kinga Grzech-Leśniak	40	W
	Koji Mizutani	33	Wang Yuguang
L			Wen Zhou
	Laurence Walsh	42	X
	Leila Gholami	23	Xinyu He
	Loc Ba Phan	62	Y
	Loh Hong Sai	27	Yi Liu
M			Yizhou Li
	Meimei Li	70	Yoichi Taniguch
N			Yuhao Bai
	Nasrin Zand	52	Z
	Neda Hakimiha	49	Zahra Ebrahiminik
	Neda Moslemi	22	