



## SHIMON FRIEDMAN ENDODONTIC SYMPOSIUM & ALUMNI WEEKEND

Hosted by U of T Endodontic Alumni & Friends



**JUNE 7 - 9, 2018**

Celebrating the Silver Anniversary of the MSc  
Endodontics Program

# PROGRAMME

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## SCIENTIFIC PROGRAM

Time	Friday June 8, 2018
08:00 - 16:00	<b>Registration Open / Exhibits Open</b>
08:00 - 09:00	<b>Breakfast:</b> Cafeteria
09:00 - 09:10	<b>Welcome:</b> Dr. Bettina Basrani
09:10 - 09:30	<b>Graduate Student Presentation:</b> Dr. Myrto Piperidou – <i>Effects of final Irrigation with Smear OFF™ on the surface and in the Tubules of Dentin using surface analytical methods</i>
09:30 - 10:30	<b>Speaker:</b> Dr. Christine Sedgley - <i>Has bioinformatics changed how we treat root canal infections? - I</i>
10:30 - 10:50	<b>Coffee Break</b>
10:50 - 11:50	<b>Speaker:</b> Dr. Christine Sedgley - <i>Has bioinformatics changed how we treat root canal infections? - II</i>
11:50 - 13:00	<b>Lunch Break:</b> Room 172
13:00 - 13:20	<b>Graduate Student Presentation:</b> Dr. Aaron Fox – <i>The Performance of a Zirconium-based Root-Filling Material with Reduced Beam Hardening Artifact in the Detection of Artificial Vertical Root Fractures Using Cone Beam CT Imaging</i>
13:20 - 14:20	<b>Speaker:</b> Dr. Josette Camilleri - <i>Choosing the right material for specific applications in clinical endodontics</i>
14:20 - 14:40	<b>Coffee Break</b>
14:40 - 15:40	<b>Speaker:</b> Dr. Josette Camilleri - <i>Is a paradigm shift necessary in root canal obturation?</i>
15:40 - 16:00	<b>Graduate Student Presentation:</b> Dr. Jacqueline Lopez Gross – <i>Astroglial Plasticity within the Rat Orofacial Primary Motor Cortex induced by Endodontic Treatment versus Tooth Extraction</i>

Time	Saturday June 8, 2018
08:00 - 08:30	<b>Breakfast / Exhibits</b>
08:30 - 09:20	<b>Speaker:</b> Dr. Anibal Diogenes – <i>Regenerative Endodontics</i>
09:20 - 09:35	Coffee Break
09:35 - 10:25	<b>Speaker:</b> Dr. Anibal Diogenes - <i>Pain Management: Local Anesthetics and Analgesics</i>
10:25 - 10:40	<b>Coffee Break</b>
10:40 - 11:30	<b>Speaker:</b> Dr. Anil Kishen - <i>Nanoparticle Guided Endodontics: A major paradigm shift – I</i>
11:30 - 11:45	<b>Coffee Break</b>
11:45 - 12:30	<b>Speaker:</b> Dr. Anil Kishen - <i>Nanoparticle Guided Endodontics: A major paradigm shift – II</i>
12:30 - 13:30	<b>Lunch/U of T Endodontic Alumni &amp; Friends Business Meeting</b>
	<b>FREE AFTERNOON</b>

## SPEAKERS

Dr. Christine Sedgley  
BDS, MDS, MDSc, PhD, FRACDS, MRACDS(ENDO)



### Biography

Dr. Sedgley is Professor and Chair of Endodontology at the Oregon Health and Science University in Portland, Oregon. She received her BDS, MDS, MDSc (Endodontics), FRACDS and MRACDS(ENDO) qualifications in Australia. She earned her PhD in oral microbiology from the University of Hong Kong, and received her advanced specialty education certificate in endodontics from the University of Michigan. She is a Diplomate of the American Board of Endodontics. She has more than 60 research and chapter publications and has participated in over 150 continuing education and research presentations worldwide. Dr. Sedgley is an associate editor of the Journal of Endodontics.

### Topic

***Has bioinformatics changed how we treat root canal infections?***

### Abstract

This 2 hour presentation will review the major developments in endodontic microbiology with focus on how the utilization of bioinformatics has impacted our understanding of endodontic infections and their treatment.

**Course objectives:** At the end of this lecture, participants should be able to:

1. Identify major developments in endodontic microbiology and how they have influenced the practice of endodontics
2. Recognize the significance of biofilm communities in endodontic infections
3. Discuss the impact of bioinformatics on understanding root canal infections

Dr. Josette Camilleri  
BChD, MPhil, PhD, FICD, FIMMM, FADM, FHEA



### Biography

Dr. Josette Camilleri is a dental surgeon specialized in dental and construction cements and is currently a Senior Lecturer at the School of Dentistry, College of Medical and Dental Sciences, University of Birmingham, UK. She was formerly employed at the faculty of Architecture and Civil Engineering and the Faculty of Dental Surgery, University of Malta, Malta. She completed her doctoral degree, supervised by the late Professor Tom Pitt Ford, at Guy's Hospital, King's College London. Dr. Camilleri has published over 100 papers in peer-reviewed international journals and her work is cited over 4300 times.

She is the Editor of "Mineral Trioxide Aggregate. From Preparation to Application" published by Springer in 2014. She is a contributing author to the 7th edition of Harty's Endodontics in Clinical Practice (Editor: BS Chong) and Glass ionomer cements in Dentistry (Editor: SK Sidhu). She is an international lecturer, a reviewer, and a member of the scientific panels.

### Topic

***Choosing the right material for specific applications in clinical endodontics***

### Abstract

Management of tooth tissue loss may involve procedures involving the pulp. This necessitates the use of materials that will not adversely affect the pulp. If the pulp has to be removed, endodontic treatment will ensue. Failure of endodontic treatment will lead to root –end surgery. For each procedure performed a number of materials are available. The materials vary in composition, delivery and presentation. The clinician needs to be able to choose the right material depending on the clinical situation. The aim of this lecture is to discuss materials available for pulp therapy and root end filling.

## Topic

### *Is a paradigm shift necessary in root canal obturation?*

## Abstract

The purpose of root canal obturation is to prevent infection or re-infection of the root canal space; thus allowing the root treated tooth to remain as a functional unit in the dentition. Microleakage assessment has been the best indication for many years to assess the quality of root canal obturation. A 'hermetic' seal was considered to be necessary for a success root canal treatment outcome. There have been several developments with regard to root canal obturation techniques and materials, introduced with the aim of achieving improved quality root fillings and a better clinical outcome. Hydraulic tricalcium silicate-based sealers have been introduced and these materials have different properties to the classical root canal sealers. The presentation will review the material properties and the obturation techniques suggested for hydraulic sealers attempting to address whether a paradigm shift is necessary for root canal obturation.

Dr. Anibal Diogenes  
DDS, PhD



### Biography

Dr. Anibal Diogenes received his D.D.S. from the Federal University of Pernambuco in Brazil, his M.S. in Molecular Biology from the University of Nebraska, and his Ph.D. in Pharmacology and Certificate in Endodontics from the University of Texas Health Science Center at San Antonio. Dr. Diogenes is an associate professor and the director of the endodontic residency program at the University of Texas Health Science Center at San Antonio. His areas of research include pain, neuroscience and regenerative endodontics. He has published more than 57 peer review articles and 6 textbook chapters. He is also an Associate Editor for the Journal of Endodontics and a Diplomate of the American Board of Endodontics.

### Topic

***Regenerative Endodontics***

### Abstract

The endodontic management of permanent immature teeth is fraught with challenges. Although treatment modalities for vital pulp therapy in these teeth provide long-term favorable outcome, expectations for treatment of pulp necrosis and apical periodontitis are significantly less enthusiastic. Classically, immature teeth diagnosed with pulp necrosis have been treated with apexification or apexogenesis approaches. Unfortunately, these treatments provide little, to no benefit in promoting continued dental development. Regenerative endodontic procedures are currently considered an important alternative in treating teeth with otherwise questionable long-term prognosis due to thin, fragile dentinal walls and lack of immune-competency. Translational research has been crucial in providing evidence for treatment modifications that aim to increase favorable outcome. Despite acceptable published clinical outcomes, the predictability and



control over the formed tissues is lacking. There are still many clinical challenges to be overcome by translational research that could further the development of novel therapeutic approaches. In this lecture, the current status and the challenges to be overcome in regenerative endodontics will be reviewed and discussed.

#### **Learning Objectives:**

- 1- Identify the biologic basis for regenerative procedures
- 2- Identify the strength and weakness of a regenerative approach
- 3- Recognize the major current challenges to be overcome with regenerative procedures

#### **Topic**

##### ***Pain Management: Local Anesthetics and Analgesics***

#### **Abstract**

The dental pulp is one of the most densely innervated tissues in the body. The pulpal innervation is not only unique in quantity but there are several qualitative patterns that make dental pain particularly challenging to treat. An astute clinician must understand the peripheral and central neuronal changes that often follow inflammation. These plastic changes in the neuronal system pose several challenges for intra- and post-operative pain management. Local anesthesia is a prerequisite for adequate treatment. However, inflammation modulates both the bioavailability and the efficacy of currently used local anesthetics. Likewise, analgesics must be carefully selected to maximize therapeutic efficacy while minimizing side effects. In this lecture the trigeminal nociceptive system and its modulation will be reviewed. In addition, the pharmacology and therapeutics of local anesthetics and most commonly used analgesics will be discussed.

At the end of this lecture, the participant will be able to:

- 1) Describe the major components of the trigeminal nociceptive pathway
- 2) Understand the mechanism of action of local anesthetics and major reasons for anesthesia failure
- 3) Describe how NSAIDs work, their indication and contraindication
- 4) Evaluate the therapeutic value of opioid in treating Endodontic pain

Dr. Anil Kishen  
BDS, MDS, PhD



### Biography

Dr. Anil Kishen is Professor of Endodontics and Principal Investigator of the Nanoparticle Guided Functional Tissue Engineering Lab at the University of Toronto. He has published over 120 peer-reviewed articles with over 10 invention disclosures to his credit. Dr. Kishen has pioneered novel technologies for endodontic treatments and is a strong advocate for high-quality translational research benefiting patient care.

### Topic

***Nanoparticle Guided Endodontics: A major paradigm shift – I and II***

### Abstract

Endodontic technologies and biomaterials have witnessed significant advances in the last decade. In spite of these advances, some of the integral limitations in endodontic treatment still persist. Development of minimally invasive techniques that predictably disinfect the infected teeth, reverse disease mediated changes in dentin, improve mechanical characteristics of dentin and promote biologically based treatment will have the potential to shift the current paradigm in endodontic therapy. Bioactive nanoparticles have received significant interest in biomedicine and health care in the recent times. This lecture will cover the application of multifunctional nanoparticles for functional tissue engineering on teeth with apical periodontitis.

## GRADUATE STUDENT PRESENTATIONS

Dr. Myrto Piperidou



### Abstract

#### **EFFECTS OF FINAL IRRIGATION WITH SMEAR OFF™ ON THE SURFACE AND IN THE TUBULES OF DENTIN USING SURFACE ANALYTICAL METHODS**

PIPERIDOU, MYRTO<sup>1</sup>, SODHI, RANA N.S.<sup>2</sup>, KOLOSOWSKI, KAMIL P. <sup>1</sup> & BASRANI, BETTINA R.<sup>1</sup>

<sup>1</sup>Endodontics, Faculty of Dentistry, University of Toronto, Toronto, ON;

<sup>2</sup>Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering, University of Toronto, Toronto, ON

**Background:** Smear OFF™ 2-in-1 is a novel irrigant containing chlorhexidine (CHX) and Ethylenediaminetetraacetic acid (EDTA). The chemical interaction of Smear OFF™ with sodium hypochlorite (NaOCl), and its ability to form by-product on dentin surface and dentinal tubules have not been studied previously.

**Objective/Hypothesis:** The aim is to evaluate the chemical and ultra-structural effects of final irrigation with NaOCl and Smear OFF™ on root canal dentin and dentinal tubules. The hypothesis is that no precipitate and no effects will be noted after final rinse with Smear OFF™.

**Methods:** Dentin blocks from human maxillary molars were prepared, mounted in resin and dentinal tubules were exposed in a perpendicular orientation. The blocks were divided in Group A (control): Irrigation with 6% NaOCl 17% EDTA 6 % NaOCl and 2% CHX, Group B (experimental): Irrigation with 6% NaOCl and Smear OFF™. Time-of-Flight Secondary-Ion-Mass-Spectrometry (TOF – SIMS) analysis of the blocks followed. Cross sections of dentin blocks were also prepared, allowing the study of penetration depth. New samples were prepared with the dentinal tubules exposed in perpendicular orientation, irrigated with the same protocol and analyzed with X- Ray Photoelectron spectroscopy (XPS).

**Results:** Precipitation with PCA and occlusion of the dentinal tubules were noted on the surface of the dentin in the Group A but not in Group B.

**Conclusion:** Open dentinal tubules without precipitate were detected after irrigation with NaOCl followed by Smear OFF™.

**Significance/Impact:** Smear OFF™ can be a safe irrigant for final rinse protocol.



### Abstract

#### THE PERFORMANCE OF A ZIRCONIUM-BASED ROOT-FILLING MATERIAL WITH REDUCED BEAM HARDENING ARTIFACT IN THE DERECTION OF ARTIFICIAL VERTICAL ROOT FRACTURES USING CONE BEAM CT IMAGING

AARON FOX

Endodontics, Faculty of Dentistry, University of Toronto, Toronto, ON;

**Objective:** The objectives of this study are to 1) describe a novel technique for characterizing beam hardening artifacts on cone beam computed tomography (CBCT) images produced by three root canal filling materials; 2) to evaluate the effects of a zirconium-based (Zr) root canal filling material on the production of the beam hardening artifact; and 3) to evaluate the influence of a novel Zr root-filling material using CBCT in the *in vitro* detection of vertical root fracture (VRF).

**Material and Methods:** The palatal root canals of four phantom tooth models were endodontically treated using a gutta-percha (GP) root filling material, a Zr root filling material and calcium hydroxide paste. Each phantom tooth was individually imaged using the Carestream 9000 CBCT unit at a native voxel resolution of 76  $\mu\text{m}$ , and the light and dark components of the beam hardening artifact were quantified separately using ImageJ software along three regions of the root canal. The *in vitro* study used a sample of 176 single-rooted mandibular premolar teeth. One-half of these (88) teeth were filled with GP and half were filled with a Zr material. VRFs were induced in 44 teeth in each group using an Instron Universal Testing Machine. Each root was then placed in a dry human mandible and imaged with a Carestream 9000 3D CBCT device at the native voxel resolution of 76  $\mu\text{m}$ . The images were evaluated by 6 examiners (2 oral maxillofacial radiologists and 4 resident oral and maxillofacial radiologists).

**Results:** A statistically significant difference in the measurement area of the 'dark' portion of the beam hardening artifact was found between the 3 treatment groups and in all regions of the phantom tooth root ( $p < 0.05$ ). GP root filling material showed a significantly higher measurement of the 'dark' artifact compared to the Zr root filling ( $p < 0.05$ ). A statistically significant difference was also found between all three regions of the tooth roots for the 'light' artifact ( $p < 0.001$ ). The *in vitro* study showed that sensitivity was greater for detecting VRFs in the Zr group than the GP group ( $p = 0.035$ ). However, the specificity was greater for the GP group than the Zr group ( $p = 0.028$ ). Statistically significant differences were, however, found for the oral maxillofacial radiologists for the Zr group with respect to specificity ( $p = 0.006$ ) and positive predictive value ( $p = 0.012$ ).

**Conclusion:** The use of root canal filling materials with lower K-edge material properties can reduce beam hardening artifact along the length of the root canal. The putative reduced beam hardening artifact of the Zr group improved the sensitivity of detection of artificially induced VRF. The ability to detect VRF in the Zr group was further enhanced by clinical experience.



### Abstract

#### **ASTROGLIAL PLASTICITY WITHIN THE RAT OROFACIAL PRIMARY MOTOR CORTEX INDUCED BY ENDODONTIC TREATMENT *VERSUS* TOOTH EXTRACTION**

LOPEZ GROSS JACQUELINE<sup>1</sup>, ZANJIR MARYAM<sup>2</sup>, YONA IDAN<sup>2</sup>, HWANG HO JUNG<sup>2</sup>, CHERKAS PAVEL<sup>1</sup>, BASRANI BETTINA<sup>1</sup> & AVIVI-ARBER LIMOR<sup>2</sup>

<sup>1</sup>Endodontics, Faculty of Dentistry, University of Toronto, Toronto, ON;

<sup>2</sup>Prosthodontics, Faculty of Dentistry, University of Toronto, Toronto, ON

**Background:** The primary motor cortex (oM1) is the main brain region involved in generating orofacial motor functions. Sensory inputs from teeth are crucial in modulating oM1 motor outputs and related orofacial motor functions. Astroglial cells closely interact with neurons in the brain. While the functional integrity of astroglia is critical for modulating neuronal function and oM1 motor output, altered neuronal activity can induce changes in astroglial morphological features.


**Objective:** To use the novel CLARITY technique to render the oM1 transparent, and immunofluorescence labelling to quantify morphological features of oM1 astroglia, and test the **hypothesis** that endodontic treatment vs. tooth extraction induces differential changes in astroglial structural features.

**Methods:** Male *Sprague-Dawley* rats were randomly allocated into 4 groups (n=3): Endodontic and Extraction groups received, respectively, pulpectomy or extraction of three right maxillary molars under general/local anesthesia; Sham group received anaesthesia and mouth opening; and Naïve group received no treatment. Rats were perfused on postoperative day 7. Brains were passively cleared. oM1 coronal sections (2 mm) were immunolabelled with anti-glial fibrillary acidic protein (GFAP, astroglial marker). Zeiss Lightsheet microscope (20x) was used to acquire 3D-Z-stack images (0.2 x 0.5 x 1 mm<sup>3</sup>) of oM1 layer-1. Bitplane Imaris software was used to quantify volume and surface area of astroglial processes. Statistical analysis: Repeated-measures ANOVA and *post-hoc* Duncan test as appropriate ( $p < 0.05$ ).

**Results:** A dense network of GFAP-labelled astroglial processes demarcated layer 1. As compared with control groups, pulpectomy and tooth extraction produced differential changes in the volume and surface area of astroglial processes in oM1 layer 1.

**Conclusions/ significance:** This study provides novel insights into astroglial processes associated with endodontic vs. tooth extraction treatment. Future studies will explore whether astroglia can be targeted as a novel therapeutic approach in order to improve orofacial sensorimotor recovery following dental injury and treatment.

## SOCIAL PROGRAM

Time	Thursday June 7, 2018	
12:00 - 17:00	<b>Pre-Symposium Golf Tournament – Course TBD</b>	
18:00 - 22:00	<b>Welcome Reception: Harbor Cruise??</b>	
Time	Friday June 8, 2018	
18:00 - 21:00	<b>BBQ – Hosted by U of T Alumni and Friends – Location TBD</b>	
Time	Saturday June 9, 2018	
13:30 – 18:00	<b>FREE AFTERNOON</b>	
18:00 - 22:00	<b>Silver Anniversary &amp; Graduation Celebration Dinner</b> Vantage Venues 150 King Street W, 16th & 27th Floors, Toronto	

## REGISTRATION AND TICKET PURCHASE

Symposium Registration Fee: \$ 250  
 Silver Anniversary & Graduation Celebration Dinner: \$ 100 / Ticket

Online Registration and Ticket purchase: **Opening in February 2018**  
 Payable to: **U of T Endodontic Alumni & Friends.**

**For questions related to registration, please contact Manjinder Lalh at [man4endo@hotmail.com](mailto:man4endo@hotmail.com) or Chetna Lalh at [chetna\\_lalh@hotmail.com](mailto:chetna_lalh@hotmail.com).**

## CONFERENCE ARRANGEMENTS

### Conference Venue:



#### **UNIVERSITY OF TORONTO – Faculty of Dentistry**

**ADDRESS:** 124 Edward St, Toronto ON **Lecture Room 170**

**Phone:** 416-864-8176

Follow us on Twitter @UofTDentistry and Facebook  
<https://www.facebook.com/UofTGradEndo>

### Hotel Accommodations:



#### **DOUBLETREE BY HILTON Toronto Downtown**

108 Chestnut Street, Toronto, ON, M5G 1R3, Canada

Reservations: [855-214-4563](tel:855-214-4563)

Meeting Rate: \$199.00 (UofT rate)



#### **COURTYARD Toronto Downtown**

475 Yonge St, Toronto ON M4Y 1X7

Reservations: (416) 924-0611

Meeting Rate: \$140.00 (UofT rate)



#### **DELTA CHELSEA Toronto Downtown**

33 Gerrard St W., Toronto ON M5G 1Z4

Reservations: (416) 595-1975

Meeting Rate: \$172.00 (UofT rate)