**Credits**

Cover Photo: Cover art images (clockwise from the top left)

1. Dimitra Athansiadou, Dr. Marc McKee’s lab
   *a scanning electron micrograph of mouse otoconia.*

2. Osama Elkashty, Dr. Simon Tran’s lab
   *immunofluorescence staining of human oral squamous cell carcinoma tissue*

3. Dr. Richard Hovey
   *The image represents the idea of the Lived Experience as a hermeneutical sensitivity which gilds his research.*

4. Natalie Reznikov, Dr. Didem Dagdeviren, Dr. Jean-Marc Retrouvey’s lab
   *The craniofacial characteristics of OI type III and IV subjects*
Welcome to the 14th Annual Research Day of McGill’s Faculty of Dentistry! This year the Research Day will include more than 50 oral and poster presentations from research trainees, and these presentations will cover a wide range of exciting research areas. We are also delighted to have Dr. Maria Ryan (President of the American Association for Dental Research), as the Keynote Speaker.

This year, the Research Day would not have been possible without the outstanding work from Entisar Abdulkader and Nioussah Noushi, two members of the Organizing Committee. Entisar (Chair) and Nioussah (Vice-Chair) have worked extremely hard over the past couple of months on designing the scientific program, finding a keynote speaker, and evaluating submissions. They have worked closely with Marlene Balena, who has been tremendously helpful throughout the organization process of this Research Day. As in previous years, Marlene’s support has been invaluable at all levels.

I would also like to thank all session chairs as well as judges who accepted to contribute to the evaluation of oral and poster presentations for the Research Day. The Organizing Committee is highly grateful for your contribution, as these tasks require considerable time, rigor, and energy. I would also like to thank Dr. Belinda Nicolau for her input on the organization of this year’s Research Day and all the other individuals providing technical and/or logistical support over the course of the day.

In closing, the organizing committee would like to thank the Network for Oral and Bone Health Research (RSBO) for their financial support. The RSBO’s financial support is pivotal to the success of the Research Day and allows us to give awards in order to recognize the outstanding work conducted by our graduate students.

We sincerely thank everyone for attending the 14th Annual Research Day!

Dr. Marc O. Martel (Research Day Advisor)
On behalf of the Organizing Committee
Day at a glance

08:00 – 08:45  Poster Set-up and Breakfast

08:45 – 09:00  Welcome Addresses: Dr. Elham Emami & Entisar Abdulkader

09:00 – 10:00  Oral Presentations (AM Session 1)

10:00 – 10:15  Coffee Break

10:15 – 11:15  Oral Presentations (AM Session 2)

11:15 – 13:15  Poster Session and Lunch (Lunch beginning at 12:00)

13:15 – 14:15  Oral Presentations (PM Session 1)

14:15 – 14:30  Coffee Break

14:30 – 15:30  Oral Presentations (PM Session 2)

15:30 – 16:30  Keynote Address: Dr. Maria Ryan
"Translational Research and Career Opportunities"
Chief Dental Office/Vice President - Colgate Palmolive
President of the American Association for Dental Research (AADR)

16:45 – 17:30  Presentation of Awards
Sponsors

Awards

- The Best Graduate Student Oral Presentation Awards (3 prizes) are given by the Network for Oral and Bone Health Research.
- The Best Graduate Student Poster Presentation Awards (3 prizes) are given by the Network for Oral and Bone Health Research.
- The Knowledge Translation Prize will be given by the Network for Oral and Bone Health Research.
- The Summer Research 1st Prize is awarded by the University of Tennessee (Hinman Symposium) and the Faculty of Dentistry.
- The Summer Research 2nd Prize is given by the Faculty of Dentistry.
- Dr. Stephane R. Schwartz Award for Excellence in Research (sponsored by Dr. Nikhil Sharma) will be awarded to the best GPR Poster Presentation and is given by the Division of Dentistry of the Montreal Children’s Hospital.

Past Winners:

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<td>1st Lojain Bassyoni</td>
<td>1st Osama Elkashty</td>
<td>Manuella Widjaja</td>
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<td></td>
<td>2nd Garthiga Manickam</td>
<td>2nd Balqees Almufleh</td>
<td>Mona Jillani</td>
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<td>3rd Mang Shin Ma</td>
<td>3rd Hieu Pham</td>
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2018 GPR Posters:

- Jordan Albino
- Hafsa Alami Laroussi
Organizing Committee
Entisar Abdulkader, Chair
Nioushah Noushi, Vice-Chair
Dr. Marc O. Martel, Advisor
Marlene Balena, Event Coordinator

Oral Presentation Award Judges
Dr. Mary Ellen Macdonald
Dr. Laura Stone
Balqees Almufleh
Mark Keboa

Graduate Poster Presentation Award Judges
Alissa Levine
Sreenath Madathil
Dimitra Athanasiadou
Konstantinos Mastorakis

Summer Research Poster Presentation Award Judges
Dr. Svetlana Komarova
David Wu
Shalom Benzaquen

GPR Poster Presentation Award Judges
Dr. Svetlana Tikhonova
Haider Al-Waeli

Knowledge Translation Award Judges
Dr. Marc Martel
Dr. Christophe Bedos

Oral Presentation Session Chairs
Hieu Pham, Heba Madi, Linda Lubin-Jerome, Arishdeep Jagde,
Richa Richa, Abdalgader Alhozgi

IT and AV Coordinator
Sreenath Madathil
Keynote Speaker:

Dr. Maria Ryan, DDS, PhD
Chief Dental Office/Vice President - Colgate Palmolive
President of the American Association for Dental Research (AADR)

"Translational Research and Career Opportunities"

Translational research is bidirectional using the findings of laboratory research to develop new diagnostic tools and treatments and similarly using clinical findings to develop new research ideas for laboratory investigation. The translation that occurs from bench to chairside and back to the bench is extremely inter-disciplinary and very rewarding research. Clinical research can ultimately result in new preventive strategies and regulatory approvals for new therapeutic or diagnostic interventions. The speaker will share her experiences as a translational scientist leading to a rewarding career path in both academia and industry.
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<td>Bacteria Degrade the Specialized Basel Lamina of the Junctional Epithelium</td>
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<td>OP 3 - JEYACHANDRAN D</td>
<td>The Effect of Microporosity on the Bioactivity of Scaffolds for Bone Regeneration</td>
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<td>09:45 — 10:00</td>
<td>OP 4 - DALLISON B</td>
<td>Pilot Study of Efficacy of Oxygen Delivery Biomaterial for Ischemic Skin Preservation</td>
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<td>OP 5 - KANG H</td>
<td>Changes in Cell-Type Population and Mesocortical Dopaminergic System in the Prefrontal Cortex in Chronic Neuropathic Pain</td>
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<td>OP 6 - GUADARRAMA BELLO D</td>
<td>Nanocavitiated Titanium Surfaces Influence Osteogenic Cell Behavior</td>
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<td>OP 7 - TANDELA M</td>
<td>We are what we are: Religious Discrimination and Oral Health of the Muslim Community in Quebec.</td>
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<td>13:30—13:45</td>
<td>OP 9 - JAHAN K</td>
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<td>OP 13 - HENDRICKSON-REBIZANT J</td>
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P 12  ABUNADA L  
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OP 1 Acetylcholinesterase Inhibitors (AChEIs) and the Risk of Bleeding and Ischemic Events in Non-Hypertensive Patients with Alzheimer’s disease

AL-HAMED FS¹, KOUNIARIS S¹, TAMIMI F¹, MARIE L³, KEZOUH A⁴, MADATHIL SA¹, KARP I⁶, NICOLAU B⁵, BADRAN Z¹, TAMIMI F¹
¹ Faculty of Dentistry, McGill University, Montreal, Québec, Canada
² Hospital Regional Universitario de Malaga, Avenida Carlos Haya SN, 29010, Malaga, Spain
³ Faculté de pharmacie, Université de Montréal, Montréal, Québec, Canada
⁴ Department of Epidemiology and Biostatistics, Lady Davis Institute, Montreal, QC, Canada
⁵ Department of Epidemiology and Biostatistics, Western University, London, Ontario, Canada
⁶ Department of Periodontology, University of Nantes, Nantes France

ABSTRACT:
Objectives: The objective of this study was to determine the association between acetylcholinesterase inhibitors (AChEIs) and the risk of bleeding and cardiovascular ischemic events in non-hypertensive Alzheimer patients.

Methods: A nested case-control study was conducted on 507 cases and 2028 controls for the risk of bleeding events, and on 555 cases and 2220 controls for the risk of ischemic events (angina, myocardial infarction (MI) and stroke). This study was conducted using the UK Clinical Practice Research Datalink (CPRD) and Hospital Episode Statistics (HES) databases between 1998–2013. The study cohort consisted of Alzheimer’s Disease (AD) patients aged 65 years. The case groups included all AD subjects in the database who had a bleeding event or ischemic event during the cohort follow-up. Four controls were selected per each case.

Results: We identified 507 cases and 2028 controls for the bleeding event cohort and 555 cases and 2220 controls for the ischemic event cohort. Concerning bleeding risk, there was no significant difference between AChEIs users and non-users (Adjusted OR=0.93, 95% CI= 0.75-1.16, p=0.52). The use of AChEIs was associated with an increased risk of angina (adjusted OR=2.58, 95% CI= 1.01-6.59, p=0.0469), and MI (adjusted OR=1.89, 95% CI= 1.07-3.33, p=0.0277). Regarding adherence to treatment, low adherence to treatment (PDC < 0.2) was associated with an increased risk of angina (OR=8.29, CI= 1.84-37.30, p = 0.01). Past users of AChEIs were at increased risk of stroke (adjusted OR=1.51, 95% CI= 1.00-2.27, p=0.0500).

Conclusions: The use of AChEIs may not affect the risk of bleeding, however, it increased the risk of angina and MI in non-hypertensive AD patients. Low adherence to AChEIs was strongly associated with higher risk of angina. However, due to small sample size of the study populations, further studies are recommended to assess the effect of AChEIs in AD patients.
OP 2 Bacteria Degrade the Specialized Basal Lamina of the Junctional Epithelium

FOUILLEN, A1,2,3*, GRENIER D4, BARBEAU J2, BARON C3 and NANCI A1,2,3
1 Laboratory for the Study of Calcified Tissues and Biomaterials, 2 Department of Stomatology, Faculty of Dental Medicine, and 3 Department of Biochemistry and Molecular Medicine, Faculty of Medicine, Université de Montréal, Montréal, Québec, Canada.
4 Oral Ecology Research Group, Faculty of Dentistry, Laval University, Quebec City, Québec, Canada. Submitting author: aurelien.fouillen@umontreal.ca

The junctional epithelium (JE) is a specialized portion of the gingiva that seals off the tooth supporting tissues from the oral environment. This relationship is achieved via a specialized basal lamina (sBL) which to date is known to comprise three unique proteins - AMTN, ODAM and SCPPPQ1- and Laminin-332. These interact to structure the supramolecular organization of this sBL and determine its adhesive capacity. Despite its critical and strategic importance and continued exposure to bacteria, little is known on the susceptibility of the sBL to bacterial activity. The objective of this study was to evaluate the impact of various oral bacteria on the sBL using molecular biology and complementary imaging approaches. SDS-PAGE and western blot analysis with trypsin like proteases as well as incubation with Porphyromonas gingivalis revealed that all sBL constituents, except SCPPPQ1, were rapidly degraded. Mass spectrometry confirmed that SCPPPQ1 was not degraded. To observe the impact of P. gingivalis on the sBL network, we have incubated the bacteria on both a reconstituted and a native sBL and examined the outcome by atomic force microscopy and scanning electron microscopy (SEM). The bacteria destroyed the reconstituted supramolecular network in their vicinity creating a peripheral space around them. After two hours of exposure, SEM analysis of the native sBL revealed the presence of a shallow depression around the bacteria. After 6 h, the affected peri-bacterial area became deeper and cavitated, suggesting active degradation of the native sBL as well. We show here for the first time that P. gingivalis, one of the major bacteria implicated in chronic periodontitis, and related enzymes can attack the individual components of the sBL as well as alter the supramolecular organization of this critical adhesive extracellular matrix. These results highlight the importance of the sBL in PD and open the door for new treatment paradigms.
OP 3 The Effect of Microporosity on the Bioactivity of Scaffolds for Bone Regeneration

JEYACHANDRAN D1, FAIRAG R2, LI L2, HAGLUND L2 AND CERRUTI M1*

1Department of Mining and Materials Engineering, McGill University, Montreal, Canada; 2Experimental Surgery, Montreal General Hospital, Montreal, Canada

Scaffold microporosity plays an important role in bone tissue engineering as it promotes osteogenesis by improving protein adsorption and cell adhesion. Current techniques to impart microporosity in scaffolds like thermally induced phase separation have some limitations, like scaffold shrinkage and long solvent sublimation time.

In our study, we prepared Bioglass-Poly(lactic-co-glycolic acid) (BG-PLGA) scaffolds with a microporous PLGA phase by solvent casting/particulate leaching, using paraffin microspheres as a porogen and citrisolv as the leaching solvent. Microporosity was absent in scaffolds leached with hexane. We hypothesize that the microporosity in PLGA can enhance the bioactivity of the BG-PLGA composite and promote osteogenesis by enhancing BG dissolution and cell attachment. To test this hypothesis, we did simulated body fluid (SBF) immersion tests and cell assays on both citrisolv leached (CL) and hexane leached (HL) scaffolds.

We observed larger apatite deposition upon SBF immersion on CL than HL scaffolds at all time points analyzed (from 96 hours to two weeks), showing that microporosity did enhance the bioactivity of the BG-PLGA composites. Both CL and HL scaffolds supported Mesenchymal stem cell adhesion, proliferation and differentiation. We are currently doing further tests to understand if the enhanced bioactivity is due to changes in BG reactivity in the BG-PLGA scaffolds and if this could lead to differences in cell activity at early time points.
Damaged or inadequate blood supply can result in tissue ischemia. Reestablishment of vasculature takes time during which necrosis can occur since reduction of blood flow limits the supply of oxygen and nutrients and interferes with the waste and fluid removal. Presently treatment options are limited and loss of ischemic tissue is unavoidable. We developed a degradable biomaterial gel system to deliver oxygen directly to tissues. This study aimed to evaluate preclinical efficacy of this oxygen-producing biomaterial (O2gel) to prevent ischemic necrosis and its spreading in full thickness random skin flaps.

An ischemic skin flap model was developed on rats to assess the material. Three sides of a 9x2cm full thickness flaps were dissected. then to prevent revascularization, a silicone sheet was inserted. For the control group, only the silicone sheet was inserted under the flap. The experimental received the O2gel between the silicone sheet and the skin. Oxygen release from O2gel was evaluated in vitro in PBS using an oxygen microprobe. In vivo, necrosis and dermal oxygen tension were monitored over 6 days in the proximal, middle and distal zones of the flaps. Then the animals were euthanized, and tissues underwent H&E staining. Control flaps rapidly became necrotic: 33±11% by 48h up to 49±17% at day 6. With subdermal O2gel necrosis reached 16±8% at 48h and 30±14% at day 6 and thereafter remained stable. Over 6 days, oxygen levels remained between 1-3.5%. Necrosis of the distal portion of the skin flap was delayed using O2gel but not prevented. Secondary necrosis in the middle part of the flap was prevented indicating prolonged survival of skin with restricted blood flow, sufficiently long for the native vascular bed to remodel and re-establish blood supply. This study indicates that further experimentation is warranted to develop materials that can completely mitigate necrosis in ischemic tissues that occurs at early times post induction of ischemia. Nonetheless it provides compelling proof of concept that materials can improve survival of tissue at least to augment conventional treatments or to buy time until surgical intervention,
OP 5 Changes in Cell-Type Population and Mesocortical Dopaminergic System in the Prefrontal Cortex in Chronic Neuropathic Pain

KANG, H, TOPHAM, L, MILLECAMPS, M, GREGOIRE, S, LEE, S, OGUNDEJI, M, STONE, L

1Integrated Program in Neuroscience, McGill University, Montreal
2The Alan Edwards Centre for Research on Pain, McGill University, Montreal
3Faculty of Dentistry, McGill University, Montreal
4Faculty of Medicine, Department of Pharmacology and Therapeutics, Anesthesiology, Neurology and Neurosurgery, McGill University, Montreal

Chronic pain is one of the most debilitating conditions from which patients suffer. It is often of unknown causes, and highly comorbid with affective disorders. Despite continuous effort to improve patients’ quality of life, understanding the condition and improving the treatment efficacy is desperately needed. Many chronic pain conditions are associated with massive structural and functional alterations in the Prefrontal Cortex (PFC) along with other structures in the central nervous system. To explore the possible causes, we evaluate structural changes by studying cell-type population, and functional changes by studying mesocortical dopaminergic system. Dopamine, a monoamine neurotransmitter which plays critical roles in reward and motivation, is also crucially involved in pain. While its importance in chronic pain conditions has been well demonstrated in mesolimbic system, mesocortical system in the PFC and its implication in chronic pain has not yet been extensively studied. The goal of this time-course study is to see if there are changes in different cell-types (neurons, astrocytes, microglia), and mesocortical dopaminergic system in the PFC using a mouse model of chronic neuropathic pain. The time-points of interest are 2-week (sub-chronic), 6-month and 12-month (chronic) post-injury. Thus far, at 2-week time-point, there was no significant changes in cell-type populations, which suggests that structural change of the PFC is not due to the loss of specific cell-type. Tyrosine Hydroxylase expression in the PFC was significantly decreased, only at 2-week but not at 6-month post-injury. These data suggest that maladaptive plasticity in mesocortical dopaminergic system may vary with duration of pain.
OP 6 Nanocavitated Titanium Surfaces Influence Osteogenic Cell Behavior

GUADARRAMA BELLO D1; FOUILLEN A1,2; BADIA A3; NANCI A1,2

1Department of Stomatology, Université de Montréal, Montréal
2Department of Biochemistry and Molecular Medicine, Université de Montréal, Montréal
3Department of Chemistry, Université de Montréal, Montréal

Nanoscale physical modifications of medically-relevant metals are a compelling determinant of cell behavior. Cell-substrate interactions and related signalling pathways determine the response of the host tissue and therefore the success of implants. Here, we demonstrate the versatility of a simple chemical oxidative treatment with H2SO4/H2O2 to nanocavitate titanium surfaces and achieve a unique mesoporous surface network. Our previous work has revealed that such surfaces significantly influence osteogenic activity, both in vivo and in vitro. They also exhibit antibacterial properties. Here, the objective of our work was to determine the effect of this nanocavitated surface on the cell adhesion apparatus. Osteogenic cells were cultured on polished (control) and nanotextured surfaces for periods of 6, 24, and 72 h. Results from immunofluorescence analysis revealed an increase in the number of focal adhesions per cell area, and in their length and maturity on the mesoporous surface as compared to the control. Gene expression for various focal adhesion markers, including paxillin and talin, and different integrins (e.g. α1, β1, and α5) was also significantly increased. Scanning electron microscopy results revealed that the mesoporous surface promoted the presence of more filopodia on cells. Initial analysis using atomic force microscopy suggest that filopodia on the nanocavitated surface require more lateral force to detach. These cell extensions displayed abundant and distinctive nanoscale lateral protrusions of around 10-15 nm in diameter that intimately molded the nanopore walls.

The increase in number of focal adhesions, as well as the abundance of filopodia with nanoprotusions, that exhibit an apparent ‘stronger’ adhesive strength, altogether likely positively contribute to increasing cell adhesion, and thereby alter the nanoscale biomechanical relationships that regulate cell behavior.
OP 7 We are what we are: Religious Discrimination and Oral Health of the Muslim Community in Quebec.

TANDALE M¹, BEDOS C¹

Introduction: The Muslim community is the second largest religious group in Canada and represents about 3.2% of the total population. Sometimes, they are confronted with discrimination and violence based on their religion, as it has happened to the Muslim community 2 years ago with a terrorist attack on a mosque in Quebec City. Although oral health research in Canada has focused on multiculturalism, scarce research attention has been given to the issue of religious discrimination.

Objectives & Methodology: 1) to better understand how religious discrimination may affect oral health and the oral health-related behaviours of Muslim people, 2) to identify potential pathways between religious discrimination and people's oral health. We used qualitative exploratory study design and recruited participants having experienced religious discrimination in health care or in daily life, practicing the Muslim religion, being 18 years old or more, and being able to communicate in English. We conducted face-to-face, semi-structured interviews. Interviews are audio recorded and transcribed verbatim. We analyse these transcripts using a thematic content analysis.

Preliminary findings: Participants reported discriminatory experiences like judgemental stares and bad comments in public places which instigated frustrations, and they wary about their own safety. In the health care system, some participants reported experiencing longer waiting time, less appointment time with various doctors (i.e. enacted stigma). This leads to lack of trust in health care professionals in general, a preference to consult Muslim doctors, and in some cases an anticipation of discrimination in the dental healthcare system (i.e. felt stigma). Three participants felt that they were treated more disrespectfully because of their Islamic identity. It generated participants' lack of trust towards dentists, avoidance of the dental clinic that discriminated them and, ultimately, unresolved dental problems.
Head and neck irradiation therapy, medication side effects and Sjogren’s autoimmune disorder cause a discomforting dry mouth condition that accentuates carries and halitosis. To restore normal salivary flow, we are attempting to engineer miniature human salivary secreting units. For tissue engineering, cell culture media and biomaterials encourage growth and organization. Interestingly, an example of cell expansion and organization is seen with the development of the avian chick; therefore, we hypothesize that the yolk component is a suitable biomaterial for tissue engineering. Accordingly, we manually isolated yolks and a centrifuge transformed it to a translucent liquid biomaterial known as the egg yolk plasma (EYP). In the EYP and in mixtures with: cell culture media, NaOH and egg white, we grew human acinar salivary gland cells (NS-SV-AC cell line) for 14 days. Live/Dead stain stained the cell permitting survival rate quantifications with image analysis. Ki-67 and collagen I-V human antibodies examined these protein expressions. A rheometer tested the mechanical properties of the liquid and freeze-thaw induced gelled EYP. A 3D extrusion based bioprinter 3D-printed the gelled biomaterial. In terms of results, the EYP alone at pH 6 did not promote survival. Survival was achieved with EYP pH modifications to 7.4 using either cell culture media, NaOH or EW. Over time, the cells in the growth conditions continuously expressed Ki-67 but weren’t producing collagen. The EYP was a liquid with visco-elastic values (G’, G’’) of 0 and longer freezing times proportionally induced a stiffer gel >0-300 Pa. The gelled EYP could be bioprinted into structures with cell type interfaces having mm in height. This introductory report provides evidence for growth of human cells without cell culture media. The EYP liquid with the pH modifying additives or the EYP gel can provide nutrition and structure for human tissue engineering at very low costs and high availability.
Bone defects result from injuries that do not repair without medical intervention. Autologous bone graft, the gold standard for treating bone defects, is challenging due to (a) donor scarcity and (b) donor site morbidity that follows the procedure. Regenerative medicine has shown potential as an alternative intervention; it is based on the use of scaffolds which mimic the structure of the tissue that requires repair and simultaneously supports, reinforces and organizes the regenerating tissue. An injectable chitosan sponge with rapid gelation time has been previously developed in our lab and shown to be a biocompatible, biodegradable, and potentially osteoconductive scaffold. Based on these results, the current project is focused on the encapsulation of pre-osteoblasts within the scaffold over a period of 4 weeks. The \textit{in vitro} characterization of the cell-laden sponge was done through scanning electron microscopy showing the cells attaching to the internal microstructure of the scaffold. The adhesion of the cells was confirmed by a vinculin staining kit. Moreover, proliferative quantification was assessed through Alamar Blue assay. Furthermore, cryosections of the cell-laden sponges were stained for alkaline phosphatase, osterix and Von Kossa. Subsequently, the loaded scaffold was implanted in a mouse fracture model to study its bone repair potential. Ultimately, this sponge may be a clinical alternative to bone graft by decreasing the burden of complications associated with graft donor sites while simultaneously encapsulating cells able to deliver therapeutic agents at the site of injury.
Changes associated with the development of pain involve the reorganization of pain circuitry, and alterations in gene expression. mTOR is a highly evolutionarily conserved serine/threonine kinase that regulates cell homeostasis through key cellular processes, including cell growth and proliferation, translation, autophagy, and cytoskeleton organization. mTOR is present in two structurally and functionally distinct multiprotein complexes: mTORC1 (mTOR Complex 1) and mTORC2. mTORC1 regulates the rate of mRNA translation. Much less is known about mTORC2, which has recently emerged as a key signaling molecule in a variety of cellular processes.

To study the role of mTORC2 in pain, we selectively ablated rictor, a key protein within the mTORC2, in Nav1.8-positive nociceptors. To ensure that behavioral effects are not a result of aberrant developmental changes from the conditional knockout of Rictor, immunohistochemistry and western blot analysis were performed. We also studied the effect of rictor conditional knockout (cKO) on intracellular signaling following inflammation and tissue injury. Furthermore, we used a drug compound, A-443654, that activates mTORC2.

Our behavioral experiments demonstrate that rictor cKO mice exhibit reduced hypersensitivity in a model of inflammatory pain, complete Freund’s adjuvant, but not in the model of neuropathic pain, spared nerve injury. Western blotting and immunohistochemistry confirmed that developmental effects do not contribute to the observed phenotype. Administration of the mTORC2 activator A-443654 induced mechanical and thermal hypersensitivity.

Our study demonstrates for the first time the central role of mTORC2 in nociceptors in the development of pain hypersensitivity in response to inflammation.
OP 11 Bioinformatic Analysis of Mouse PFC DNA Methylation in Response to Acute, Sub-Chronic and Chronic Neuropathic Pain

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Abstract

Aim of Investigation:
Chronic pain is associated with functional and anatomical remodeling of prefrontal cortex (PFC), which is implicated in pain modulation and pain-related comorbidities. Following therapeutic intervention, this remodeling can be partially reversed. Understanding the underlying mechanisms may clarify chronic pain pathobiology and reveal new treatment approaches.

DNA methylation is a gene expression regulator responsive to environment, and is an ideal candidate mechanism to mediate PFC plasticity responding to chronic pain. We have shown PFC DNA methylation undergoes significant changes 6 months post-spared nerve injury (SNI) and thousands of PFC genes were differentially methylated.

This study used epigenome-wide methylation analysis, tracking PFC changes post-SNI at acute, sub-chronic and chronic timepoints and identifying pain-related genes and functional pathways. We hypothesized DNA methylation mediated changes in PFC gene expression, influencing chronic pain development and maintenance.

Methods:
Male six-week old CD-1 mice underwent SNI or sham surgery and PFC was harvested at 2-days, 2-weeks or 6-months post-injury. DNA was bisulfite-converted and Illumina sequencing determined gene-specific DNA methylation levels. Bioinformatic analyses determined differential methylation, and functional pathway analysis identified pain-relevant genes related to chronic pain development and maintenance.

Results:
Comparing SNI and sham animals at acute, sub-chronic and chronic timepoints revealed DNA methylation changes in hundreds of genes with the chronic timepoint having the greatest number.

Discussion/Conclusions:
Identifying pathways unique to timepoint or injury condition may reveal specific mechanisms regulating chronic pain development and maintenance. Determining the key regulatory pathways or epigenetic mechanisms underlying chronic pain may provide novel intervention targets or therapies.
OP 12 The FIAT Transcriptional Repressor as a Drug Target for Bone Regeneration

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Activating transcription factor 4 (ATF4), a member of the basic domain/leucine zipper family of transcription factors that can dimerize with other leucine zipper proteins, plays a pivotal role in regulating osteoblast differentiation and function. Our laboratory has identified FIAT (Factor Inhibiting ATF4-mediated Transcription), as a leucine zipper binding partner that inhibits the transcriptional activity of ATF4. Transgenic mice overexpressing Fiat exhibit a low bone mass phenotype while a global Fiat knockout showed reciprocal changes. Thus FIAT emerged as a valid drug target for bone regeneration.

The goal of this study was to use a high throughput screen to identify compounds that disrupt the ATF4/FIAT interaction to find small molecules that could increase bone mass. We have generated a FIATzipper-GAL4-DNA Binding Domain fusion (DBD-FIAT ‘bait’) and an ATF4zipper-VP16 Activation Domain fusion (AD-ATF4 ‘target’) to establish a mammalian two-hybrid assay. In this assay, the DBD-FIAT fusion binds the promoter of a secreted luciferase reporter construct. Interaction of the bait with the AD-ATF4 target through the leucine zipper interface reconstitutes a strong transcriptional activator and results in high levels of luciferase expression. Compounds that disrupted luciferase expression in the two-hybrid assay without influencing transcription from the fused GAL4-VP16 control were considered hits. After screening 135,000 compounds and performing dose-response testing, 8 compounds were selected for additional screening. Preliminary data has defined the tolerance/survival of MC3T3-E1 osteoblastic cells upon treatment with the drugs, allowing for further investigation of the effects of the compounds on differentiation and mineralization. Three (3) compounds have a positive effect on differentiation and mineralization of MC3T3-E1 cells as measured by alkaline phosphatase and calcein staining, respectively. These preliminary data support the hypothesis that compound(s) blocking the interaction of FIAT with ATF4 would increase osteoblast activity and provide valuable information for further in-depth in vitro experiments and in vivo pilot studies.
OP 13 Understanding the Role of Protein Gamma-Carboxylation in Craniofacial Development

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Congenital anomalies are a major cause of perinatal lethality, affecting 2-3% of all newborns. A significant number of these infants have abnormal craniofacial development, such as midface hypoplasia. Midface hypoplasia is observed in several human disorders, including Keutel Syndrome, which is caused by autosomal recessive mutations in matrix Gla protein (MGP) – a potent mineralization inhibitor expressed by chondrocytes. We recently demonstrated that MGP-deficient (Mgp-/-) mice present with shorter antero-posterior measurements of the skull, causing midface hypoplasia. Additionally, both the nasal septum and spheno-occipital synchondrosis (SOS) are abnormally calcified in these mice. Although cephalometry analyses on Mgp-/- heads suggested a critical role for nasal septum in midface development, the relative contributions of the nasal septum and SOS are not well understood.

To study the effects of the nasal septum and SOS on craniofacial development, we generated a mouse model (Ggcxch-/-) in which chondrocytes lack the enzyme gamma-glutamyl carboxylase (GGCX). GGCX modifies specific glutamic acid (Glu) residues of MGP and other Gla proteins to carboxylated glutamic acid (Gla) residues. Cephalometric analyses were performed on micro-CT scans of the heads from the Ggcxch-/- mice and control mice at ages 5, 10 weeks and 6 months. Ggcxch-/- mice showed ectopic calcification of the SOS, however nasal septum calcification was not observed. Interestingly, cephalometric analyses demonstrated a complete absence of midface hypoplasia. Our findings suggest that GGCX activity is required for the prevention of SOS, not nasal septum, calcification. Comparing the craniofacial phenotypes of Ggcxch-/- and Mgp-/- mice, we conclude that nasal septum calcification is the primary cause of midface hypoplasia in this model.

Our work provides information on the role of protein gamma-carboxylation and calcification of cartilaginous tissues in midface hypoplasia. Ongoing studies on various mouse models will be important in understanding the causes, onset, progression, and possible treatments for patients with craniofacial dysplasias.
OP 14 Dental Students’ Willingness to Work with Underserved Populations in Northern, Remote and Isolated Communities in Canada

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Populations living in remote areas of Canada have higher rates of dental decay compared to the general population. This means that children and adults from these areas are more likely to experience periodontal diseases, malnutrition, diabetes, malocclusions, behavioral problems, sleep loss and poor learning due to tooth decay. Although these communities have a great need for care, there is less available than in other areas because not many dental professionals are present in these communities.

To increase access to oral health care for Canadian northern, remote, isolated and other underserved populations, a McGill team and several partners created the Canadian Dental Connection website (www.dentalconnection.ca) to link oral health professionals to these communities. The website includes a job matching service and training modules to help prepare professionals to work in the target areas. However, to attract candidates to the website and then to underserved regions, an understanding of oral health professionals’ perception of dentistry in northern, remote and isolated communities and the factors that influence their willingness to provide care in these areas is needed. This encompasses understanding and illustrating dental students’ views of underserved populations in these communities in relation to dentistry and their disposition to serve in these communities after graduation.

To address these aims, we are conducting a qualitative descriptive study combining individual interviews and focus groups. We conducted eight semi-structured individual interviews with McGill undergraduate Dentistry students and performed a thematic analysis. The themes that emerged from these interviews are being used to animate focus group discussions to further develop and refine the ideas brought up in the interviews. In this presentation, we will showcase the findings from the ongoing qualitative analyses, which ultimately will be used to improve the Canadian Dental Connection website.
P 1. Comparison of Sleep Oral Parafunctional Behaviors between Acute and Chronic Painful TMD Patients

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Many studies support the association between oral parafunctional habits (OPH) and the painful Temporomandibular Disorders (PTMD). The aim of this study was to evaluate sleep OPH between Acute and Chronic PTMD patients.

Eligible patients with acute or chronic PTMD were recruited from four dental clinics. TMD diagnoses were assigned by dental specialists using Research Diagnostic Criteria (RDC/TMD). Acute PTMD was defined as PTMD lasting >3 months, and chronic at or <3 months or more than three months. The validated Oral Behaviour Checklist, GAD-7, PHQ-9 were used to assess the OPH, anxiety and depression, respectively. Linear and logistic regression analyses were used to assess the primary aim.

A total of 251 patients with PTMD out of which 45 acute (18%), 206 chronic (82%) were assessed. There was no significant difference in mean age (P= 0.90) and both groups were majority female (83% and 77%, P = 0.28).The mean score of clenching or grinding during sleep was higher among chronic (mean=2.47) than acute (mean=1.83; P=0.02). A borderline difference was found for the mean of sleep in a position that put pressure on the jaw between acute (mean = 2.59) and chronic cases (mean = 3.04, P= 0.07). Chronic cases were almost 3 times as likely to report clenching or grinding while asleep than acute (OR = 2.45, P=0.01). All analyses were adjusted by depression, anxiety, age, gender and pain intensity.

Clenching or grinding OPH during sleep are more common among chronic than acute PTMD cases. No significant association was found between groups for sleep position, suggesting that participants were not over-reporting oral habits.
P 2. Fatigue Characteristics in Acute and Chronic Painful Temporomandibular Disorders (TMD): a Case-Control Study.

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Aim: Painful TMD (PTMD) is a common condition causing pain and disability. Its prevalence ranges from 5 to 12%. PTMD is a significant public health problem. It is crucial to prevent PTMD from becoming chronic, which is more difficult to manage. However, we do not know what factors distinguish acute from chronic PTMD. It is suggested that there may be a reciprocal relationship between fatigue and painful TMD. The aim of this case-control study was to assess fatigue as potential phenotype to differentiate acute from chronic PTMD.

Methods: Eligible patients were recruited from four dental clinics in Montreal and Ottawa, Canada. They received a diagnosis of TMD based on the Research Diagnostic Criteria and reported their level of pain and disability using the Graded Chronic Pain Scale. We assessed fatigue severity and functionality using the Fatigue Severity Scale (FSS), a validated and reliable method of evaluating the impact of fatigue. Chronic TMD pain was defined at a cutoff of (i) three months (CP3), and (ii) six months (CP6). Multivariable logistic analyses were used to assess the primary aim.

Results: Out of 318 TMD cases recruited, fatigue was present in: (i) 25% of acute TMD pain and 40% of chronic TMD pain with CP3; (ii) 25% of acute TMD pain and 42% of chronic TMD pain with CP6. Regardless of pain definition, the number of chronic cases reporting fatigue was significantly different from acute (P<0.05) using (CP3: OR=1.97, 95%CI=1.10-3.56; CP6: OR=2.14, 95%CI=1.29-3.57). When adjusted by age, gender, anxiety and depression, the odds ratio remained significant (CP3: OR=1.93, 95%CI=1.04-3.57; CP6: OR=1.96, 95% CI=1.15-3.31).

Conclusions: Patients with chronic TMD pain were more likely to present fatigue than acute cases. These results suggest the fatigue maybe a potential risk factor for the transition from acute to chronic pain.
P 3. Patients’ E-readiness to use E-health Technologies for Oral Health - Study Protocol

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Introduction: E-oral health technologies such as teledentistry applications have been used to reduce oral health illiteracy, to optimize education, to increase communication of patients with their health care providers and to facilitate the exchange of information and access to health care services. Literature highlights the importance of e-readiness in the adoption and implementation of e-health technologies. However, to our knowledge there is no study investigating the perspective of patients in this regard. Therefore, the objective of this study is to explore the patients e-readiness in the field of dentistry.

Methodology: Using a qualitative approach and the interpretive description methodology we will use the purposeful maximum variation sampling and snowball techniques to recruit study participants aged 18 and above. Activity theory will be used as study conceptual framework. Data collection will consist of Face-to-face, semi-structured, 60-90-minute interviews and will continue until saturation is reached. Thematic analysis approach including interview debriefing, transcript coding, data display and interpretation will be used.

Expected Outcomes from the study: The results of this study will promote knowledge base in the field of e-oral health. Furthermore, these results will be used to create an e-oral health readiness framework that could be used in future research on this concept.

Conclusions: A better understanding of e-health is of public health importance since it could lead to the implementation of effective policies based on patients’ perceptions and needs. The results of this study ultimately facilitate the use of e-health technology among dental professionals and their patients.
P.4 Co-Culture of Osteoblasts and Endothelial Cells in a Chitosan/ GDP Scaffold to Improve Angiogenesis and Osteogenesis for the Treatment of Critical Size Bone Defects

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Despite the ‘self-healing’ properties of bone, non-union bone injuries, often known as critical size bone defects (CSBD) can result from congenital conditions, tumor resections, and trauma [1]. Thus, significant effort has been made recently to find a biomaterial that when placed at defect site can act as a scaffold to restore native structure and function. Many of these biomaterials fail due to the lack of enough vascular supply typically present in native bone matrix [2]. As a result, the need for a suitable biomaterial continues to grow.

The objective of this work is to improve vascularization and bone regeneration in the chitosan/guanosine diphosphate scaffold discovered previously through co-culturing osteoblasts and endothelial cells [1, 3]. This multilayered scaffold is ideal because it acts similarly to native tissue and allows for crosstalk between cells in different layers. The rapid gelation property of this scaffold allows for localization at site of injury which is crucial for tissue regeneration [1, 3]. Various experiments were performed to determine ideal co-culture configuration. Alamar Blue assays were performed to evaluate the effect of encapsulation on co-cultured cells for proliferation. Experiments are underway to quantify the release of pro-angiogenic factors important in the crosstalk between cell types such as Vascular Endothelial Growth Factor and Alkaline Phosphatase [4].

The results found provide a foundation for the successful co-culture of pre-osteoblasts and endothelial cells in the chitosan/guanosine diphosphate sponge. The co-culture in the multi-layer formation at ratio 1:1 provided an environment in which cellular activity was increased compared to mono-cultures and showed an ordered organization with distinct patterns when compared to others. We expect this configuration will be most appropriate to achieve desired properties, allow for cross-talk between the two cell types and better mimic the native bone matrix. More research is needed regarding the viability of the co-culture in-vivo.
P 5. Psychosocial Stressors as an Underlying Mechanism Linking Low SEP to Oral Cancer

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Introduction: Upper aerodigestive tract cancer (UADTC) is a group of malignancies arising in the mouth, throat and larynx. Each year there are approximately half a million UADTC cases and 300,000 deaths due to these cancers worldwide. The existence of a gradient between socioeconomic position (SEP) and UADTC is well established, and greater exposure to psychosocial stress in low-SEP environments has been suggested as a major explanatory mechanism underlying this association. The concept of allostatic load (AL) has been proposed as a physiological explanatory mechanism linking stress to health. However, to data only a few studies have investigating these associations.

Aim: To estimate the extent to which low SEP is associated with oral cancer risk. In addition, we will estimate how much of this association is explained by psychosocial stressors.

Methodology: We use data from the India HeNCe Life study, a hospital based case-control study investigating the aetiology of UADTC. Cases (n=350) newly diagnosed with primary squamous cell carcinomas in the oral cavity and non-cancer outpatient controls (n=371) frequency-matched to cases according to age and sex were selected at the Governmental Dental and Medical Colleges in Calicut, Kerala, India. In-person interviews using of a structured questionnaire and life grid collected information on several exposures (e.g., behavioural, SEP, family environment factors). We also collected biological specimens for human papillomavirus detection. Data analysis will involve: (i) descriptive statistics; (ii) t-test and χ² test to explore bivariate associations between key variables; (iii) unconditional logistic regression to investigate associations between indicators of SEP and indicators of cumulative psychosocial stress and oral cancer adjusting for potential confounders (e.g., socio-demographic, age); and (iv) path analysis to identify the potential pathways linking SEP and oral cancer.

Conclusions: Findings from this project will provide new information on the role of stress in the relationship between SEP and oral cancer.
Introduction: More than a million Canadians live with environmental sensitivities. These people experience various symptoms and deeply struggle in all aspects of their life. We still know very little, though, about how they access dental care services and manage their oral health.

Objectives: a) understand better how people with environmental sensitivities access to dental care services; b) describe their perspective regarding their oral health, and c) describe their needs regarding oral health and access to dental care.

Methods: Our qualitative descriptive study is based on face-to-face, semi-structured interviews with people suffering from environmental sensitivities. The participants are recruited from associations of environmentally sensitive individuals. Our analytic approach follows the 6-steps method described by Braun and Clark. This research is participatory and includes an advisory committee composed of people with environmental sensitivities.

Preliminary Results: Coping with their health conditions and finding access to dental care services was a big challenge for most participants. Participants explained that it was extremely difficult for them to access dental clinics that could fulfill their basic needs for two major reasons; dentists' lack of awareness on environmental sensitivities, and presence of fragrance, chemical products, and wireless technology in dental clinics. To facilitate their access, they recommended the dental clinics to be a scent- and smoke-free so that they could endure the clinical environment during their treatment.

Conclusion: We expect that our finding will lead to greater recognition of people with environmental sensitivities: dentists should try to better accommodate this population according to their condition and specific needs.
P 7  A Systematic Mapping of the Effect of Drugs on Implant Osseointegration.

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Abstract

Dental implants are widely used in dentistry to replace missing teeth. The success of titanium implants depends on their interlocking with the surrounding bone which is referred to osseointegration. Many systemic medications (SM) influence bone metabolism which could affect osseointegration. Identifying the effects of SM on dental implant success is crucial for treatment planning. However, there is no previous comprehensive systematic mapping on the effect of SM on bone-implant osseointegration (BIO). The aim of this study is to review the impact of all known drugs families on BIO by using Artificial Intelligence. We conducted an electronic search of PubMed, Midline (OVID) and Embase (OVID) databases using specific mesh-terms and keywords. Clinical and animal studies that assessed the effect of SM on BIO were included. The articles obtained were used to generate a machine learning algorithm based on supported vector machines. After training the algorithm to recognize inclusion and exclusion articles, the program was then used to screen the entire literature on BIO. The most recent search was performed in July 2018. Data extraction and quality assessment were performed following the PRISMA guidelines for systematic reviews. The algorithm screened 543927 articles from the entire literature on BIO found in the PubMed database. The included articles were 247 articles in the final analysis (64 clinical studies, and 183 animal studies). The results showed that statins, antihypertensive, oxytocin, and hyperbaric oxygen drugs enhanced BIO. Whereas, methotrexate, aspirin, PPI, SSRIs, and warfarin impaired BIO. Yet, some drugs revealed inconsistent results in BIO such as bisphosphonate, parathyroid hormone replacement, diclofenac sodium, ibuprofen, insulin, metformin, and estrogen replacement therapy. In conclusion, SM can have either a positive or negative effect on BIO. Therefore, medical and drug history should be carefully assessed before any dental implant procedure and further standardized clinical studies are recommended.
P 8. Characterization of the Antibacterial Potential of the Protein SCPPPPQ1

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In studies aimed at determining the bacterial susceptibility of the specialized basal lamina attaching the junctional epithelium to the tooth surface, we have observed that all its components, except SCPPPPQ1, were rapidly degraded by Porphyromonas gingivalis. In addition to its unique resistance to degradation, our data further suggested that SCPPPPQ1 exhibits antibacterial capacity.

The objective of our study was to determine the extent of the antimicrobial potential of SCPPPPQ1 and characterize its mode of action.

To this end, we have exploited molecular biology and complementary imaging approaches.

Incubation of P. gingivalis with recombinant SCPPPPQ1 resulted in over 75% reduction in bacterial number. Structural imaging revealed the production of numerous outer membrane vesicles that are part of the bacterial response to environmental stress. Furthermore, the interaction of SCPPPPQ1 with P. gingivalis caused significant membrane disruption, which correlated with internal structural changes. Super-resolution fluorescence microscopy showed that the protein formed a beaded coating on the outer membrane of the bacteria. This association with the membrane was confirmed by colloidal-gold immunolabeling visualized using scanning electron microscopy. Finally, ongoing studies with various peptides derived from SCPPPPQ1 indicate that the antibacterial capacity is sustained by specific regions of the molecule.

These results indicate that SCPPPPQ1, a unique protein naturally-expressed by the junctional epithelium, can directly attack P. gingivalis via the outer membrane, resulting in the death of the bacteria. This unexpected finding may represent a component of the innate response of the body to periodontal disease that may be exploited in novel therapeutic strategies.

This work is supported by CIHR, Canada Research Chair and Shriners Hospital.
Tailoring the surface chemistry of CoCr alloys is of tremendous interest in many biomedical applications. In this work, we show that CoCr can be modified by diazonium electrografting provided the surface is not homogeneously covered with an oxide layer. Cyclic voltammetry (CV) and X-ray photoelectron spectroscopy (XPS) show the electrografting of a poly(aminophenylene) (PAP) layer on CoCr when treated at a reductive potential (CoCr−0.5 V), whereas no PAP film was formed on CoCrOCP and CoCr1 V, treated at open circuit and anodic potentials respectively. Based on XPS results, we attributed the electrografting to the formation of carbide bonds between PAP and the inhomogeneous thin oxide layer of CoCr−0.5 V. We then show an example of application of PAP coatings on CoCr and prove that the presence of a PAP coating on CoCr−0.5 V results in a 5-fold increase of the adherence of poly methyl methacrylate (PMMA) to PAP-coated CoCr compared to uncoated samples; this is of prime significance to improving the long-term stability of dental prostheses. These findings support the importance of reducing the oxide layer for effective functionalization of metal oxides with aryl diazonium salts and suggest a promising surface modification approach for biomedical applications.
P 10. Sulforaphane Increases Drug-mediated Cytotoxicity Toward Head-Neck Cancer Stem Cells

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Head and neck cancer ranked seventh in the rate of incidence in Canada. More than 90% of head and neck cancers are squamous cell carcinomas (HNSCC) with overall survival rate of 64.5%. One suggested cause for treatment failure is the limitation of chemotherapy efficacy by its severe toxic side effects. Another possible cause is the presence of cellular subpopulation inside the tumor that is treatment resistant and tumorigenic termed cancer stem cells (CSCs). Thus, reducing the dose of chemotherapy while maintaining its efficiency and targeting CSCs is critical for improving the treatment outcome of HNSCC. Recently, the broccoli extract sulforaphane (SF) was successfully tested as a combination therapy targeting cancer stem cells.

Titrations of SF standalone or combined with two chemotherapies were tested on HNSCC-CSCs of human cell line UM-SCC-12 and non-cancerous human stem cells. Concentrations of SF tested were comparable to SF plasma levels following ingestion of fresh broccoli sprouts. The treatment effects on cell viability, proliferation, self-renewal, and gene expression were measured. Our results revealed that SF reduced HNSCC-CSCs viability in a time- and dose-dependent manner. SF-combined treatment increased the cytotoxic activity of the conventional chemotherapies against CSCs, with no effect on non-cancerous stem cells’ viability or function. SF-combined treatment inhibited HNSCC-CSCs clonogenicity and self-renewal ability. SF activated the caspase-dependent apoptotic pathway by down-regulation of BCL2 and up-regulation of BAX. SF also decreased the expression of self-renewal and stemness-related genes.

In conclusion combining SF with low doses of chemotherapy increased cytotoxicity against HNSCC-CSCs, with no effects on healthy cells. The combined treatment may be of therapeutic benefit in clinical settings in reducing the toxic side effects of chemotherapy and increasing its effect. Our data, combined with other studies, suggest that SF can be used with lower doses of chemotherapy as co-treatments to the benefits of the patients.
P 11. A Contribution of Acute Post-Operative Pain Towards Neuropathic Pain after Breast Cancer Surgery - 3-Month Prospective Cohort Study

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Aim: The aim of this study is to determine the contribution of acute post-operative pain towards the development of neuropathic pain (NP) 3 months after breast cancer surgery (BCS).

Methodology: In 3-month prospective cohort study, female breast cancer patients (>18 years) who underwent first BCS were recruited from Segal Cancer Center, Montreal. The study outcome was NP occurrence at 3 months post-surgery, as well as the Douleur Neuropathique-4 (DN-4) score. Collected data was acute post-operative pain, anxiety, depression, type of surgery, axillary status, and NP. Presence of NP was assessed at 3 months post-surgery by telephone using the DN-4 instrument. Linear and logistic regression analyses were used to assess the contribution of acute pain in the incidence of NP.

Results: At 3 months post-surgery, 45 patients (24%) reported NP. The most frequent DN4 terms describing NP were: burning (31%), electric shock (21%), itching (31%), numbness (24%), pin and needles (24%). DN-score at 3 months was positively associated with current pain intensity ($\beta= 0.11$, $P=0.003$), and pain during movement ($\beta=0.59$, $P=0.006$), both assessed at 7 days post-surgery. These associations were not confounded by depression ($\beta=0.15$, $P=0.01$). Furthermore, acute pain increased the likelihood of higher DN-4 score (OR = 1.63), even if this association was not statistically significant. Furthermore, numbness was correlated with current pain intensity ($r= 0.13$, $P=0.02$), and tingling and pins and needles were correlated with pain during movement at 7 days ($\beta= 0.17$, $P < 0.03$).

Conclusion: NP at three months is associated with acute post-operative pain and its intensity. Pins and needles and numbness are both associated with acute pain.
P 12. Can Young Bone Marrow Cells Reverse Aging in Bone?

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Aging is at the core of many degenerative diseases such as osteoporosis. In the past, aging was thought to be immutable; however, recent discoveries have shown that systemic manipulations, such as parabiosis or administration of young plasma, can counteract many important symptoms of aging. Aged bone marrow may regulate at least some of the general hallmark indicators of aging. Therefore, we hypothesized that transplantation of young bone marrow (BM) cells in old mice could reverse aging in bone, brain and metabolism. Our objective is to develop a mouse model of old mouse transplanted with young BM and then examine bone remodeling, cognitive functions and energy metabolism.

C57BL/6-Tg (CAG-EGFP)1Os/J mice of two different age groups: (6-weeks and 18-months) were used as donors of enhanced-GFP positive BM cells. Recipient C57BL/6 mice (18-month old) were total-body irradiated to eliminate their endogenous BM, and then were transplanted (tail vein injection) with donor EGFP BM cells. Recipient mice were randomized into three groups and transplanted with: a) BM cells from young donor, b) BM cells from old donor, c) Reference group: no irradiation and no BM transplantation.

We successfully created a model of “old mice transplanted with young EGFP BM cells”. The lethal dose required to ensure complete myeloablation of BM in recipient mice was between 10-12 Gray. Also, at least 5 X10⁶ BM donor cells were required to ensure complete engraftment in recipient mice. Moreover, our preliminary results showed that the survival rate was not significantly different between the three tested groups.

It was possible to create a mouse model of old mice transplanted with young bone marrow. The findings of this study could radically alter our understanding of aging in bone, and direct further examination of the cell signaling process involved in age-related diseases such as osteoporosis.
P 13. Predictors of Pain and Problematic Opioid use after Oral and Maxillofacial Surgery: Description of Study Protocol

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Background: Every year, millions of patients undergo oral and maxillofacial surgeries (OMFS) in North America. Acute pain after OMFS is common, but evidence indicates that a subset of patients may develop persistent orofacial pain symptoms. Concerns have also been raised about the potential abuse and misuse of opioid analgesics among patients undergoing dental treatment, including OMFS.

Study Objective: The first objective of this study will be to examine the extent to which patient demographics (i.e., age, sex) and psychological variables (negative affect, catastrophizing) relate to pain intensity after OMFS. The second objective will be to examine the extent to which patient demographics and psychological variables relate to prolonged opioid use and prescription opioid misuse among patients prescribed opioids after OMFS.

Study Design and Methods: This will be a prospective, observational study conducted among 100 adult patients undergoing OMFS at the Montreal General Hospital (MGH) dental clinic. Patients will be asked to complete baseline questionnaires before undergoing surgery and at fixed time points (i.e., 1 week, 1 month, 3 months) after surgery to assess pain, psychological, and opioid-related variables.

Data analysis: Linear regression analyses will be conducted to examine the relation of patient demographics and psychological characteristics to pain intensity after OMFS. Regression analyses will also be conducted to examine whether these variables are significantly associated opioid use and opioid misuse at each of the follow-up time points.

Expected findings & impact: Despite the frequent occurrence of pain after dental procedures, the factors that contribute to the intensity of pain and problematic opioid use after OMFS remain largely unexplored. Findings from this study are expected to provide new insights into the determinants of pain and problematic use after OMFS. Our findings might ultimately help prevent the occurrence of these problems among patients undergoing OMFS and other

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Introduction: Refugees are migrants who experience harsh conditions such as environmental disasters, violence, and war, and are forced to leave their home country. Children make up almost half of the refugee population. The complex migration trajectory and underdeveloped healthcare systems in source countries often lead to poor oral health status of the refugee population. Literature suggests that improving the oral health of refugees is a global priority. To facilitate access, it is important to explore the oral health experiences of refugee children to improve their oral health status. Therefore, the objective of the study is to explore how Canadian refugee children experience oral health and access to oral health care.

Methodology: The study will use a qualitative approach and a focused ethnography methodology. The participants will be children 6-12 years of age and their parents. Participants will be recruited from the Montreal Children’s Hospital Refugee Clinic. Snowball technique will also be used to recruit study participants, if required. Face to face, semi structured, 20 - 40 minutes interviews will be conducted. Data will be analyzed using a thematic approach including interview debriefing, transcript coding, data display and interpretation.

Expected Outcomes: This study will contribute to the oral health of refugee populations in Canada by addressing the gap in knowledge related to the experience of Canadian refugee children regarding accessing oral health care and their experience of care. This study will also contribute towards improving the oral health-related quality of life of refugee children.

Conclusion: Our aim is to work together with refugee families to improve the overall health status of refugee children. With this study, we will endeavor to understand the perspective of these children. The study results will contribute to oral health of refugee children in Canada by exploring their experiences in accessing and receiving oral health care.
P 15. Resilience in Adolescent Chronic Pain: An Exploration of Resilience Resources, Coping Mechanisms, and Protective Psychological Factors

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Adolescents with Chronic Pain (CP) are vulnerable to negative outcomes such as disability and impaired quality of life; they often miss schools, are unable to maintain social contacts, have sleep disturbances, and suffer from anxiety and depression. The continuation of avoidance coping behaviour beyond normal healing time had been shown to result in negative consequences such as Disuse Syndrome, a state associated with physical deconditioning, sick role behaviour, psychosocial withdrawal, as well as negative and catastrophic beliefs. Through Gadamer’s Philosophical Hermeneutics, we explore individual positive thought processes, adaptation efforts, coping mechanisms, as well as resilience resources (beneficial social situations, friendships, and solid family ties) that minimize the impact of pain and its consequences. The goal is to liaise with fellow physicians, allied researchers, and policy makers to modify, adapt, and improve current adolescent CP services. This way, we can help patients foster skills that will allow them to adapt positively, regain a balanced social life and live successfully despite their pain.
Abstract: Tobacco kills over 1 million people annually in India making it a major public health concern. Tobacco is consumed in various forms across all age groups, gender and geographic areas. To tackle major public health issue, various tobacco prevention/cessation policies and interventions have been introduced and implemented by the Indian government. The objective of this review is to analyze the success of different tobacco interventions implemented in different states of India and to assess the level of tobacco awareness these policies have resulted in among the population. The current review is a result of syntheses of 28 articles found via Ovid Medline search which was divided into 3 categories; Location (India and 29 states and 7 union territories), use of tobacco (smoking, pan chewing, tobacco chewing, smokeless tobacco, bidi, cigarette smoking and reverse smoking) and tobacco use cessation (tobacco control, tobacco prevention, smoking prevention, intervention programs, tobacco cessation smoking cessation, health policies, health education). The MeSH terms used for the search were ‘India’, ‘smoking’, ‘tobacco use cessation’. Articles were screened based on title and abstract and further based on full text.

Majority of the interventions including school-based health program Project Mytri (Mobilizing Youth against Tobacco Related Initiatives) and community based program Project ACTIVITY (Advancing Cessation of Tobacco in Vulnerable Indian Tobacco Consuming Youth) show a significant effect on tobacco use outcome especially in young adults. The most successful interventions were the ones with continued support from the government and/or NGOs in sustaining the tobacco quit rate. Least successful ones involved Project EX-India and interventions implemented poorly without any framework and follow-ups. Tobacco use can be controlled by school and community-based interventions, teachers and community leaders can be trained to make sure there is a continued implementation of the strategy. Interventions focusing pregnant women should be explored as most of the current interventions focus on teenagers and men. Intersectoral involvement is required to tackle this major public health issue.
P 17. Risk Factors of Chronic Post-Surgical Pain After Oral and Maxillofacial Surgery: A Literature Review

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INTRODUCTION: Chronic post-surgical oral pain is a very common and disabling complication which affects the quality of life. Chronic pain after oral surgery is highly prevalent in many surgical patients and is often accompanied by a significant decrease in oral function with reduced body image, reduced ability and willingness for social contact and can lead to misuse of analgesics. The aim of this literature review was to evaluate current understanding of risk factors leading to post-surgical chronic pain after oral surgery.

METHODOLOGY: We performed a systematic search of the PubMed and Medline Ovid databases and assessed 523 studies that investigated chronic pain after different types of oral surgeries. To identify the independent predictive factors for chronic post-surgical oral pain, we assessed 25 eligible studies in the final analysis. Several putative risk factors have been suggested to contribute to the development of chronic post-surgical pain. These risk factors of in each surgical group were examined.

CONCLUSION: Risk factors and variables leading to chronic post-surgical oral pain are: preoperative pain, gender and psychological factors such as anxiety and depression. These variables should be evaluated and managed among patients undergoing oral surgery to help and reduce the burden of chronic pain after oral surgery. More effective intervention and better management can be done by early identification of the predictive factors.

OUTCOMES FROM THE STUDY: The results of this study will promote knowledge and awareness. Poor prevention, delayed diagnosis and poor management can be result of chronic post-surgical pain. Therefore, dental practitioners must be aware of patient status to better manage this prevalent clinical issue.
ABSTRACT: India is a country with a current population of 1.3 billion, and one that is growing at an exponential rate. This population explosion comes with its challenges, and one of them is successfully implementing health programs. Oral diseases are a public health problem that affect general health and quality of life of the people. India currently lacks a proper nationwide strategy to tackle oral diseases and although the Indian Dental Association (IDA) launched the National Oral Health Programme to provide 'optimal oral health' for all by 2020, we still need tried and tested strategies to achieve this target.

This study aims to shed light on some of the strategies undertaken by successful health programs that improved health status. Article search for this review was done both electronically and manually using databases like PubMed, Medline and Google Scholar. A total of 1323 non-duplicated articles were retrieved from initial searches. A total of 21 articles were included in the final assessment after full text assessment for eligibility. This review focusses on 3 main programs namely Revised National Tuberculosis Program (RNTCP), Pulse Polio and The National AIDS Control Programme (NACP). The pulse polio program was a monumental success and led to India achieving a “Polio free status” by WHO, whereas the RNTCP too has impressive strategies like DOTS, to achieve its target of “TB free India” by 2025. Many of these strategies such as increasing awareness regarding oral hygiene practices, promoting tobacco cessation and improving outreach can be applied to achieve better oral health status for the people of India. This study can help in advocating for better future oral health programs with targeted strategies.
P 19. Effect of Prescription Drug Monitoring Programs on the Misuse of Opioid Analgesics

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Opioid crisis has emerged as a major public health problem. Since their advent as primary means of analgesia, there has been an explosion in their prescription and utilization. Most gravely affected regions include North America (with fentanyl and its analogues), Africa and Middle East (with tramadol).

Opioid crisis encompasses a wide range of issues including, opioid misuse, abuse, addiction, overdose, mortality, neonatal abstinence (opioid misuse during gestation), associated spread of blood borne diseases like HIV and HCV (i.v. opioid use). This has resulted in the decrease in overall life expectancy of the population and thus is becoming a major cause of concern. The implications are not only associated with public health but also involves social and economic welfare of the country.

Several coordinated and multidisciplinary approaches have been employed to tackle opioid crisis in the USA. A major component of it includes the implementation of prescription drug monitoring programs (PDMP). PDMP’s are state run programs that collect, store, disseminate and track information regarding federally controlled substances (including opioids). This helps recognize aberrant opioid use patterns and timely inform appropriate authorities to curb the epidemic before further escalation. With the implementation of PDMP’s there has been a significant decrease in the prescription of opioids.

The aim of this project has been to consolidate and summarize the information and data from different PDMP. A rapid review was done and will be presented here on the published literature, to evaluate the effect of PDMP on opioid abuse, misuse, toxicity, overdose related deaths, prescribing practices and the specific features associated with greater positive effect- suggesting best PDMP practices and future areas of potential growth with the incorporation of newer strategies and technology.

Keywords: Prescription drug monitoring program (PDMP); opioid abuse/ misuse/ overdose/ poisoning/ addiction/ prescribing.
P 20. Synergistic Interactions Between Stress Induction and Temporomandibular Joint Disorders in Mice

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Temporomandibular disorder (TMD) refers to the malfunction of the temporomandibular joint and the surrounding tissue involved in maintaining proper movement of the mandible. It has been shown that sustained mouth opening in laboratory mice – by bite block – has led to dysfunction, indicating that clinical interventions which require excessive mouth opening may play a role in the development of TMD (Wang et al., 2017). In this project, we sought to elucidate whether or not an induced state of acute or chronic stress incited an inflammatory response that, when compounded with sustained mouth opening, manifested itself as TMD in mice. Experimental and control groups were pre-selected from an initial group of twenty C57BL/6 male mice. The final groups were designated as follows: experimental – open + stress (n = 5); experimental – stress (n = 5); and control (n = 5). Preliminary testing was performed to establish baseline levels of facial nociception, sucrose preference and body weight in naïve mice. The experimental groups were then subjected to a 24-hour restraint protocol. Chronic and acute stress states were confirmed with follow up von Frey assay, sucrose preference testing, body weight measurements, and forced swim testing. Following the subsequent mouth opening procedure, the effect of compounding stress and mouth opening was verified with von Frey assay, as well as real-time qPCR analysis of inflammatory cytokines in the mice masseter muscle. After the 24-hour restraint protocol, we found that mice displayed hypersensitivity and mechanical allodynia in the temporomandibular joint region, in addition to generalized depression-like behaviours. Following sustained mouth opening, however, we found no significant difference in the mechanical hypersensitivity or inflammatory profiles between the open + stress and open groups. Further routes of experimentation and analysis are required to determine whether or not states of acute or chronic stress contribute to the development of TMD.
Oral cancers are a major public health issue, especially in Asian countries. Although their major risk factors are well understood, a considerable amount of variability in risk in different populations remains unexplained. Consumption of polycyclic aromatic hydrocarbons produced during repeated heating of cooking oil has been shown to increase the risk of gastric and colorectal cancers. However, the evidence on the association between repeating heating oil and oral cancer is limited. Therefore, we estimate the extent to which consumption of reheated cooking oil is associated with oral cancer risk. We used data from the South Indian site of HeNCE life study, an international hospital based case-control study investigating the aetiology of head and neck cancers. Consecutively newly diagnosed, histologically confirmed oral squamous cell carcinoma patients were recruited at major tertiary Hospitals in Kozhikode, India (n=350). Controls were non-cancer outpatients selected randomly in clinics at the same hospitals as the cases (n=371). In person interviews collected information on socio-demographics, behavioural and dietary factors, including questions regarding reheated cooking oil habits.

We implemented a Bayesian unconditional logistic regression to estimate the association between reheated cooking oil consumption and oral cancer risk, adjusting for potential confounders. To properly propagate the uncertainty in missing values in the reheated oil variable, we adopted a full Bayesian imputation technique.

Most participants were males (55%), 60 years old on average. 33% of cases reported reheated cooking oil, compared to 22% of controls. 44 cases and 34 controls had missing information on this variable. Under a missing completely at random assumption model, reheated cooking oil was associated with 76% increase in oral cancer risk (OR=1.76, 95%CI=1.01 – 2.57). When this assumption was relaxed, the strength of association increased. Although issue of recall bias cannot be ruled out, our results are in agreement with risk observed in other cancer sites.
P 22. Cholinergic Function as a Linkage between Oral Health and Dementia

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Dementia is a highly prevalent ailment that represents a major burden for healthcare systems, affecting over 45 million people worldwide. Such disorders have been linked to peripheral diseases, e.g., inflammation of the oral cavity and tooth loss. Neurological and oral diseases can be seen as the result of the ageing process, in which injury accumulated during life leads to both disorders. Interestingly, degeneration of cholinergic neurons affects salivation, as well as several other measurable indicators, such as higher intraocular pressure and lower bone density.

We seek to investigate whether aging of the cholinergic system is a pathway through which oral health affects cognition. We are doing so by identifying clusters of oral health status and cognitive functioning among middle-aged and elderly individuals. We summarized the literature on the field in a directed acyclic graph (DAG), analyzing causal relations within the interactions of both diseases. Furthermore, we are estimating whether the indicators of cholinergic activity are cross-sectionally associated with these clusters across different age groups.

We use baseline data from the Canadian Longitudinal Study on Aging (n=30,000). The study measured cognitive performance and oral health using Rey Auditory Verbal Learning Test and MAT, and self-reported oral health respectively. Cholinergic indicators involved reports of dry mouth, intraocular pressure and bone density. After hierarchical cluster analysis, dendrograms and heat maps are being formulated. Next, we are developing a model to the joint probability of having cognitive disorders and oral health outcomes through multivariate generalized linear regression models adjusted for potential confounders and stratified by age groups.

Thus, by comparing cholinergic activity estimators across age cohorts, we aim to understand the effects of ageing on such clusters. This may provide useful information for public health policymakers, consequently improving both oral and neurological health care, as well as the early detection of such health issues.
P 23. Assessing Dentistry’s Oral Health Research Course: Student Perspective

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The aim of this study was to explore students’ perceptions of the 4-year longitudinal Oral Health Research class in the Faculty of Dentistry of McGill University. As the first students that have experienced all 4 years of the new course have graduated in 2018, course evaluations can provide helpful insights about the new course from the perspective of the graduates.

This research can be classified as a cross-sectional study using a questionnaire assembled from other pre-existing questionnaires that have been validated. The questionnaire is targeted at graduating students that have experienced all 4 years of the newly introduced Oral Health Research class. The questionnaire used is composed of sixty-one total questions broken down into five different categories. The categories include a general assessment, an academic assessment, a teaching assessment, an instructor assessment and a classroom/lab atmosphere assessment.

Seven graduates of the class of 2018 participated in the study, which corresponds to a response rate of 18.42%. Most of the respondents were women (71.43%) and the mean age of the respondents was 26.14 years old. The general mean for the entire questionnaire was 2.31 out of 4, a score which reflects that the curriculum is more positive than negative. Out of the five different categories, the lowest ranked was the classroom/lab atmosphere assessment, with a score of 2.11, and the highest ranked was the academic assessment, with a score of 2.50. Despite some categories being ranked lower than others, all of the five categories ranked overall more positive than negative.

Dental graduates from the class of 2018 have expressed through the questionnaire that the Oral Health Research course is generally more positive than negative. Specific steps could be taken to further improve the course, especially in areas that graduates have scored lower. As for this study, future academic years should be surveyed and compared statistically to previous academic years to establish a basis for comparing effects of changes in the curriculum or to track students’ perception throughout the years. Furthermore, the questionnaire could be distributed while graduating students have not yet graduated, in order to get a better turnout from the survey; something that was not possible with the class of 2018.
P 24. Systematic Review Screening Method Using Artificial Intelligence

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Abstract

Even though systematic reviews are the “gold standard” for synthesizing primary research, they are limited when answering complex questions such as “what drugs could affect osseointegration in my patient?” answering a question such as this one is unfeasible with current methods because it would require over 500 systematic reviews (one for each of the 500 drug categories defined in PubMed) that could translate to an estimated 620 years of work using traditional methods. Thus, the objective of this project is to develop an artificial intelligence algorithm for partial or complete automation of the steps involved in the process of generating systematic reviews. This tool would enable the execution of an evidence-wide synthesis to answer a complex and immediate clinical question: what drugs can affect osseointegration.

We conducted an electronic search of the PubMed database using the following Mesh Terms and keywords: ([Pharmacological Action Category]), OR (“Osseointegration/drug effects”[Mesh]) AND (“Dental Implants”[Mesh]) and subsequently generated a machine learning algorithm from the 547,927 entries obtained. Articles eligible for review included studies evaluating systemic medications on implant osseointegration in clinical and animal models. The algorithm screened titles and abstracts using pre-specified inclusion and exclusion criteria and was subsequently verified by two independent reviewers. We tested various algorithms and found that sequential minimal optimization provided maximum accuracy. The algorithm was then trained to recognize the concepts and entities of each article. These concepts and entities were used to classify the articles using a machine learning classifier trained by an operator. In our preliminary work, we observed that screening 5% of the original search could be enough to train the algorithm in order to screen the remaining 95%. Through the second screening of our dataset, we were able to improve our true positive rate by 31%. This tool could make complex systematic reviews increasing time-efficient.
Introduction: Canada received over 400,000 refugees between 2011 and 2017. Evidence suggests this population has poor oral health, limited access to dental care, and that social workers play an important role in their dental care process.

Objective: To understand the experiences and perceptions of dentists and social workers regarding dental care of refugees in Montreal.

Methods: The study builds on a larger project that used focused ethnography. We conducted face-to-face interviews with a purposeful sample of dentists and social workers using a modified McGill Illness Narrative Interview (MINI) guide. Interviews, with six dentists and three social workers, took place in the offices of participants, lasted 50-60 minutes, and were audio-recorded. We also completed an interview report that described the context of each interview. The interviews were then transcribed verbatim, and analyzed thematically, and integrated with data from the larger study.

Results: Participants experienced personal barriers (language, difference in culture, lack of oral hygiene education, and finance) and institutional barriers (complex and excessive paperwork and bureaucracy, delays or non-reimbursements of claims, and an outdated repertoire) regarding dental care of refugees. Dentists had a variety of motivators for providing care to refugees. Some considered providing care to everyone in need was integral to their professional code of ethics while others saw it as a way of giving back to the community.

All participants agreed that education is the most impactful solution to improving oral health of refugees. Refugees must be educated about the dental care system and importance of oral hygiene while dental professionals and social workers must update their knowledge about government policies and programs.

Conclusions: Dentists and social workers played an essential part in aiding dental care for refugees. Their experiences highlighted important barriers to dental care and proposed solution has potential of improving and dental care of refugees.
Objective: Since 2015, there has been a global effort to decrease the use of unnecessary antibiotics through antibiotic stewardship programs. The literature suggests that dental practitioners should favor a single pre-operative antibiotic dose rather than a multi-day post-operative course of antibiotics for the prevention of infection in certain procedures. (1) In spite of this, a previous audit performed by this group (unpublished data 2016-2017) demonstrated that 51% of patients undergoing outpatient Oral and Maxillofacial Surgery procedures (bone grafts, implants, third molar extractions) performed at the Montreal General Hospital received 5 to 7 day post-operative courses of antibiotics. Following feedback regarding our 2016-2017 findings in March 2017, all house staff were advised to prescribe a single pre-operative dose of antibiotics (2g Amoxicillin or 600 mg Clindamycin) 30 to 60 minutes prior to incision in in an effort to decrease antibiotic exposure in this patient group. A prospective chart review was performed to assess any changes in prescribing practice and to determine rates of infection.

Methods: A prospective electronic patient chart review was performed of all cases having bone graft, implant placement or third molar extractions between April 1, 2017 and April 1, 2018. Information regarding timing, dosage and duration of antibiotic usage and presence or absence of post-operative infection were collected and analysed. Data collected retrospectively in 2016-17 were combined with the present data in order to increase sample size for more accurate comparison of infection rates.

Results: 373 cases were included in the study: 188 implants, 94 bone grafts, 32 simultaneous bone graft and implant, and 59 third molar procedures. Overall, 16% of these patients received no antibiotics, while 54% and 31% received post-operative or pre-operative antibiotics respectively. Versus the 2016-17 study period, a significant increase was observed in the administration of pre-operative antibiotics overall due primarily to the use of pre-operative antibiotics for implant surgeries (Table 1, p<0.05). In contrast, whereas there was a significant increase in post-operative dosing for bone graft procedures, there no significant change in the administration of post-operative antibiotics overall (Table 1). Combined data (2016 to 2018) revealed that there was no significant difference in infection rate seen whether pre-operative or post-operative antibiotics were administered (Table 2, p>0.05).

Conclusions: This study suggests that the feedback given in March 2017 may have had a beneficial effect as we observed an increase in the administration of a single pre-operative antibiotic dose. However, there is still room for
Osteogenesis Imperfecta subjects present with typical craniofacial characteristics that have been described from a qualitative aspect in the literature. Such findings are particularly prone to personal biases. To obtain quantitative data of the craniofacial characteristics of OI patients, we wrote and published an automated facial annotation using the Python and R programming languages. Our sample consisted of three groups of patients affected by OI (type I, III and IV) as well as a control group. A case-control study was conducted on a total of 306 (M:145/F:161) patients. The Individuals affected by OI where part of the BBDC 7701 study conducted at Shriners Hospital in Montreal, Canada. These patients were grouped according to their OI classification (88 OI type I; 28 OI type III; 57 OI type IV; 133 control).

Mean shapes for each group were computed using Generalized Procustre Analysis (GPA) which rotates and scales for optimal superimposition reducing error coming from different head positioning. This enables us to focus on the morphological features of the subjects. Each patients’ landmark distance was computed from its analogous landmark on the control mean shape using Euclidean geometry. This method serves purpose of highlighting and locating the differences in morphology of the OI types. Three different facial ratios in addition to lower face height (LFH) were also computed which are more traditional means of analysis.

Reports from the literature of specific facial characteristics such as triangular face in patients affected by OI are confirmed by our quantitative analysis. Our results also suggest that these manifestations are present in various severity depending on the type of OI. Type III subjects are the more severely affected. Furthermore, strong similarities between the facial shapes of type I and type IV patients challenge our current understanding of the facial manifestations of the disease.
Introduction Hyposalivation has been linked to oral infections, dental decay, pain and dysgeusia. To reverse this condition, research teams worldwide are conducting in vitro experiments using immortalized human salivary gland cells. A widely used and well characterized human salivary gland cell line since the ‘80s, HSG, has recently been found to be cross-contaminated by HeLa. Thus, a replacement human salivary gland cell line is needed for research. NS-SV-AC, a human salivary gland cell line, holds some promise to become the new standard salivary gland cell line. In this work, we describe the methodology to determine whether NS-SV-AC is an accurate model for human salivary gland research.

Objectives We examine the capacity of NS-SV-AC to maintain a cellular barrier through measurement of transepithelial electrical resistance (TEER). MDCK1, a canine kidney epithelial cell cell line known to form a functional epithelial monolayer, will serve as control.

Results NS-SV-AC and MDCK1 are grown and seeded on porous membrane inserts. TEER is measured using an EVOM Epithelial Voltohmmeter. 4x10^5 cells of both cell lines are seeded on a porous 6 well plate insert (4.4x 10^4/cm^2). MDCK took 1 day to form a confluent monolayer under microscope. NS-SV-AC took 15 days to become confluent as its growth on a porous membrane was significantly slower than on a plate. The adjusted TEER values of MDCK read 307 Ohms (D0), 330.25 Ohms (D5), 473.75 Ohms (D15) and 389.5 Ohms (D19). In contrast, NS-SV-AC values read 233.75 Ohms (D0), 191.5 Ohms (D10), 168.5 Ohms (D15), 230.75 Ohms (D16), 164.25 Ohms (D26) and 159.5 Ohms (D30).

Conclusion NS-SV-AC is unable to maintain membrane integrity making it a less than ideal model for in vitro human salivary gland research. Establishing and characterizing a novel human salivary gland cell line can bring great benefits for the field of salivary gland research.

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Abstract

In the past decades, the number of women enrolling in and graduating from North American dental schools has increased significantly. However, we do not have a clear picture of the proportion of women occupying leadership positions in organized dentistry, dental education groups and research organizations.

The aim of this study was to determine female representation in leadership positions in various dental and specialty associations/organizations, in dental education, in dental journals and dental researchers in dental faculties across North America.

We contacted US and Canadian dental associations and asked them to provide the total number of their members and the male/female distribution. Male/female distributions in the leadership positions were generally accessible from the organizations’ website. We collected data on the gender of Deans of North American dental schools from the school’s website as indicators of dental education. Data on the Editor-in-Chiefs of North American dental journals were gathered from their websites. Finally, the IADR provided the data on the number of researchers when they were contacted by email. Collected data underwent descriptive statistics and binomial tests (α=0.05).

Our findings suggest that women are underrepresented in leadership positions within the major North American dental professional associations. While the median ratio of female leaders to female members in professional associations is 0.97 in Canada, it is only in the United States. The same underrepresentation is evident in the national leadership of North American organized dentistry (CDA and ADA).

It was also shown that women are underrepresented in dental education and as Editors-in-Chief for oral health journals. Sixteen (16) of 77 North American dental school Deans were female, while three of 38 dental journals have female Editor-in-Chiefs. The probability of finding these ratios at random, with p-values lower than 0.05, indicates that the ratio was not balanced (1:1).

Finally, the number of female dental researchers underwent an overall increase in the past decade while the number of male researchers declined.
P 30. Chin Position in Cleft Lip and Palate Patients

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The aims of this study are two-fold: to compare the chin position between cleft lip and palate (CLP) patients and cephalometric normative data; as well as to evaluate the vertical growth of the maxilla and mandibular autorotation in CLP patients.

A total of 673 charts of CLP patients were reviewed as part of this ongoing study of non-syndromic CLP patients from the Division of Dentistry of the Montreal Children’s Hospital. A comprehensive review of dental and medical charts was completed, assessing patients’ demographic data, type of cleft and type and number of surgeries for cleft repair. After inclusion criteria were met, data from 220 patients remained. Lateral cephalometric images continue to be traced and analyzed by a single rater using Steiner-Witts, Rickett’s and McNamara methods of analysis. Preliminary results stem from a sample comprised 24 subjects divided into 2 groups: unilateral cleft lip and palate (UCLP; N=12) and bilateral cleft lip and palate (BCLP; N=12).

Compared to the normative values, the mean maxillary angle (SNA) was significantly reduced for both groups [UCLP mean 79.3 (SD 3.4) and BCLP mean 79 (SD 2.6); p<0.001]. The average difference between maxillary and mandibular lengths was also significantly increased for both groups [35.6 mm (SD 7.7) and 34.8 (SD 9.6), respectively; p<0.001]. UCLP group presented a significantly steeper mandibular plane [36.5 (SD 5.3); p<0.05]; whereas BCLP group presented a significantly increased lower facial height [74.1 (SD 10.4); p<0.001]. However, no significant difference in chin position was noted.

Overall, this study shows that there is no difference regarding the chin position of young adults with CLP. The main observed trend from the preliminary results is an antero-posterior and vertical growth deficiency of the maxilla among CLP patients, causing an increased occlusal plane as well as a clockwise rotation of the mandible and maxillary complex.

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According to the Global Burden of Disease 2015 Study, untreated caries in permanent teeth is the most prevalent oral condition worldwide, yet many people avoid getting them treated because of the discomfort or pain that this entangles. As such, painless solutions that also do not require drilling out the cavity are more sought after than ever, with nano-silver fluoride (NSF) being one of them.

This nano-silver fluoride solution has already been tested in some labs and its role is to stop cavity progression painlessly, just by applying it on the tooth, where it does not leave a stain.

The aim of this research was to test the feasibility of the method of nano-particle (NSF) formation described in some previously published scientific papers, but also to optimize the procedure used. It was found that the quantities of reagents work well as described in previous literature and it was confirmed that the temperature at which the reaction is carried out and the general kinetics should be carefully controlled for optimal results.

The stability of the nanoparticles was characterized using zeta potential, while the size of the particles was determined using dynamic light scattering and transmission electron microscopy.

The results of this research suggest that for greater stability the final solution should be dialyzed, while the importance of using a capping agent is still debatable.

In the future, studies should focus on the Minimum Inhibitory Concentration (MIC) of the solution that has been developed during this research, meaning that the lowest concentration that prevents the growth of the bacteria causing dental caries should be found.
P 32. Factors Associated with Opioid Craving among Patients with chronic Pain Prescribed Long-Term Opioid Therapy

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Background: There has been a substantial rise in the use of opioids for the management of chronic noncancer pain over the past decade. The rise in the use of opioids has been accompanied by escalating rates of prescription opioid misuse and addiction in these patients. Opioid craving (i.e., the subjective desire to consume opioids) has emerged as a robust predictor of opioid misuse and addiction. To date, however, the factors that contribute to prescription opioid craving in patients with pain remain largely unexplored. Objectives: The first objective of this study was to examine the link between opioid regimen characteristics (i.e., opioid types & doses) and opioid craving in chronic pain patients prescribed long-term opioid therapy. We also examined the relative influence of patients’ opioid withdrawal symptoms, pain intensity, and psychological factors on opioid craving. Methods: In this 14-day longitudinal diary study, patients (n = 40) completed daily diaries assessing pain, psychological, and opioid-related variables. Results: Multilevel analyses revealed that opioid regimen characteristics were not significantly associated with opioid craving. However, greater opioid withdrawal symptoms were associated with heightened opioid craving (p < .05). Daily levels of pain intensity, negative affect, and catastrophizing were also significantly associated with opioid craving (all p’s < .05). Adjusted multilevel models revealed that opioid withdrawal symptoms were no longer significantly associated with opioid craving when controlling for patients’ pain and psychological factors. Conclusions: Our findings suggest that opioid craving is not simply caused by the specific types or doses of opioids prescribed to patients, or by the opioid withdrawal (i.e., dependence) symptoms that may result from prolonged opioid use. Patient-specific characteristics, such as negative affect and catastrophizing, appear to be strong determinants of prescription opioid craving. Our findings have implications for the prevention of problematic opioid use among patients with chronic pain prescribed opioid therapy.
Preschool aged children have been reported to be the most common age group to visit the emergency department (ED) for caries-related dental problems. Although children’s oral health is heavily reliant on their parents’ practices, there is currently little evidence about the influence of parents’ oral health knowledge and beliefs on their child’s utilization of ED. This study aims to assess the association of parents’ oral health knowledge and beliefs, family sociodemographic characteristics and children’s utilization of ED for treatment of early childhood caries.

Data was drawn from preschool aged children who sought care at the Montreal Children’s Hospital ED for caries-related dental conditions. Measures included clinical examination and a semi-structure questionnaire. The child’s chief complaint and number of teeth affected by caries (Dt) were assessed by the treating ED dentist. A questionnaire answered by parents assessed child’s oral health care utilization and behaviours, familial sociodemographic characteristics and parents’ oral health knowledge and beliefs.

A total of 109 children participated in this study. Fifty-seven percent were male and the mean age was 3 years. The majority of children had never visited a dentist before and was mainly from families of low socioeconomic status and recently immigrated backgrounds. Parents demonstrated generally good oral health knowledge; however, parental perception of their children’s oral health was low. After adjusting for child’s age and gender, children from lower income families were more likely (OR 3.02, 95% CI: 1.01-9.07) to utilize the ED instead of seeking regular dental care services. Parents’ knowledge and beliefs were not associated with children’s utilization of ED.

Overall, this study shows that family income was associated with preschool children utilizing the ED for caries-related conditions. Furthermore, as parental knowledge alone is not effective in preventing the use of ED, implementation of community-based oral health promotion programs should be explored.
Sedation is an important adjunct in providing oral health care for pediatric patients with uncooperative age-appropriate behavior, anxiety, disabilities, or medical conditions. However, little is known about how sedation services are offered in Canadian pediatric hospitals and the profile of children receiving it. Thus, this study aims to analyze the differences between Canadian pediatric hospitals in matter of availability, recommendation and waiting time for dental treatments with sedation.

A web-based survey was sent to the Chief of the Division of Dentistry at 12 different Canadian pediatric hospitals. The questionnaire assessed the types of sedations offered in these hospitals, the criteria for their use, the waiting time to get access to them and the characteristics of patients benefiting from them.

A total of 10 pediatric hospitals answered the survey (response rate of 83%). General anesthesia (GA) and inhalation sedation with nitrous oxide (N2O/O2) were provided in all surveyed hospitals; whereas sedation with benzodiazepines was offered in only 60% of them. Criteria for the use of general anesthesia were fairly homogenous; however, several discrepancies were noted for the use of benzodiazepine sedation and N2O/O2 inhalation sedation. The majority of children receiving dental care under GA aged between 3-5 years; whilst N2O/O2 inhalation sedation was mainly used in children aged 6-9 years. Moreover, the average wait time for access to sedation varied significantly between provinces.

This is the first nationwide study of sedation provided in Canadian pediatric hospitals for dental care. Our results show that institutional variation exists on the delivery of sedation services as an adjunct to pediatric dental care. Furthermore, the lack of national guidelines for sedation services impairs standardized dental care among provinces. The relationship between social determinants and the use of sedation services merits further investigation to establish best dental practice and preventive care within Canadian pediatric hospitals.
P 35 Clinical and Radiographic Factors Influencing Space Closure following the Extraction of Permanent First Molar

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Extractions of permanent first molars (PFMs) have been accepted as a viable treatment option when their long-term prognosis is questionable. Successful eruption of permanent second molars (PSMs) with space closure can occur following extraction of PFMs when the right circumstances are met. Literature states that extraction time, as well as radiographic factors can increase the success rate of space closure. However, there is lack of information on the correlation between clinical findings and radiographic data with space closure outcomes. Thus, this ongoing study aims to evaluate the clinical and radiographic factors influencing space closure following the extraction of PFMs.

Children aged 6-12 years who attended the Division of Dentistry of the Montreal Children’s Hospital for extraction of PFM are included in this study. Baseline data was drawn from the preextraction clinical examination and included patients’ Angle’s classification, midline deviation, overjet, overbite, crowding, presence of open bite and crossbite. Panoramic radiographs taken prior to the FPM extraction are also used to assess second molar developmental stage, presence or absence of third molars, as well as angulations of second premolar (SPM) and PSM. Outcome is assessed in the follow-up visit by clinical and radiographic evaluations.

Preliminary results stem from 15 SPMs from 8 patients (62% male; mean age 12 years). The main aetiology for early extraction of FPMs was enamel hypoplasia (60%). At the time of FPM extraction, 73% of SPMs were at the ideal stage of development. Complete space closure occurred in 100% of the maxillary arch and in only 25% of the mandibular arch (p<0.001).

Overall, preliminary results show that the maxillary arch has a higher success rate in space closure. Furthermore, the results yielded from this ongoing study could help to identify appropriate clinical and radiographic predictors to obtain optimal results for space closure.