McGill University
Faculty of Dentistry
11th Annual Research Day

Thursday, April 7th, 2016
Evo - La Plaza, 420 Sherbrooke West
Welcome to the 11th Annual Research Day of McGill’s Faculty of Dentistry!

Unbelievable but true – the Annual Research Day is in its 11th year and once again, an exciting and diverse program, including a keynote lecture by Dr. Philippe Campeau (CHU Sainte-Justine, Université de Montréal), oral presentations by our trainees as well as a stimulating poster session awaits you. The quality and quantity of abstract submissions were excellent, which makes the work of the program committee a real joy.

As in previous years, the two student members of the program committee, this year’s Chair Sreenath Madathil and Vice-Chair Dimitra Athanasiadou, were key in the preparation of the Research Day. They invited and communicated with the keynote speaker, did the fund-raising, were integral in putting the program together, formed the judging committees, recruited trainees as session chairs, and prepared this booklet. In brief, this Research Day would not have been possible without the excellent work by Sreenath and Dimitra. Similarly, Marlene Balena’s administrative and organizational support was outstanding – mostly happening ‘behind the scenes’ but invaluable to make this day a success.

Organizing and participating in the activities of the Research Day is a great opportunity for those trainees who are interested in contributing to the development of the event and learning how operations like this are put together. We have two new nominees who hope to be the Vice-Chair 2017/Chair 2018, please, vote with the ballots that are found in the front desk. The results will be announced at the end of the day.

I would like to take the opportunity to highlight the pivotal role Mari Kaartinen has played for the Annual Research Day. In 2006, Mari had organized the 1st Research Day and was instrumental in nurturing this event over the coming years. She acted as Research Day Advisor for ten years and although officially not being involved any longer this year, she still provided valuable input along the way. Please join me in whole-heartedly thanking Mari for her exceptional foresight and initiative in creating this event, which provides a forum every year to highlight the research done in our faculty and to interact and discuss, in brief to enjoy science!

Finally, a big thank you to the sponsors of this event, the session chairs, the award judges, and all the others lending a hand. We hope that you thoroughly enjoy the day.

Dr. Petra Schweinhardt - Research Day Advisor
On behalf of the Organizing Committee
Credits

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

1) Brain Scan: Dr. Laura Stone
2) Bioceramics: Zeeshan Sheikh
4) Histology: Dr. Mari Kaartinen

Booklet and cover design: Sreenath Madathil
Organizing Committee
Sreenath Madathil, Chair
Dimitra Athanasiadou, Vice-Chair
Dr. Petra Schweinhardt, Advisor

Event Coordinator
Marlene Balena

IT and AV Coordinators
Dr. Nora Makansi

Oral Presentation Award Judges
Dr. Petra Schweinhardt
Dr. Jocelyne Feine
Betty Hoac
Mark Keboa

Poster Presentation Award Judges
Dr. Laura Stone
Garthiga Manickam
Basem Danish

Knowledge Translation Award Judges
Dr. Mari T Kaartinen (Biomedical Division)
Dr. Paul Allison (Oral Health and Society Division)

Past Winners:

**2015**
- **Orals:**
  1st Khurram Khan
  2nd Anu Edasseri
  3rd Sandrine Couldwell
- **Posters:**
  1st Betty Hoac
  2nd Garthiga Manickan
  3rd Akhil Soman
- **Knowledge Translation:**
  You-Jung Nicole Seo
  Sadaf Farookhi

**2014**
- **Orals:**
  1st Azadeh Haqiqi
  2nd Zeeshan Sheikh
  3rd Iris Boraschi
- **Posters:**
  1st Sharifa Alebrahim
  2nd Nida Amir
  3rd Fahad Siddiqui
- **Knowledge Translation:**
  Yekta Ansari
  Farnaz Rashid- Kandvani
FACULTY OF DENTISTRY
RESEARCH DAY
April 7th, 2016

Evo- La Plaza
Ambassador B
420 Sherbrooke West

Day at a glance

Program
08:00 – 09:00 Poster Set-up
09:00 – 09:15 Welcome Address: Sreenath Madathil
09:15 – 11:00 MINERALIZED TISSUE BIOLOGY AND TISSUE ENGINEERING
11:00 – 13:00 Lunch & Posters (Lunch beginning at 12:00)

13:00 – 13:45 Keynote Address: Dr. Philippe Campeau
Clinical Assistant Professor,
Department of Pediatrics
University of Montreal & Sainte-Justine Hospital

“Characterization of new skeletal dysplasias identified by next generation sequencing”

13:45 – 15:30 ORAL HEALTH AND IMPLANTOLOGY
15:30 – 15:45 Coffee Break
15:45 – 16:30 PAIN AND NEUROSCIENCES
16:45 – 17:30 PRESENTATION OF AWARDS
McGill University
Faculty of Dentistry
11th Annual Research Day

Keynote Speaker:

Dr. Philippe Campeau, MD, FRCPC, FCCMG
Clinical Assistant Professor
Department of Pediatrics
University of Montreal and Sainte-Justine Hospital

Characterization of new skeletal dysplasias identified by next-generation sequencing

Next-Generation sequencing is revolutionizing the way we practice medical genetics and drastically improved our ability to identify new disease genes. The ability to sequence 20,000 genes in a matter of hours allows us to reach a diagnosis in about a third of patients for whom a diagnosis is not clear from a clinical perspective. Limitations of the technique include poor coverage in regions of high GC content, limited detection of insertions and deletions, and a high analysis cost. This lecture will provide an overview of the field, how it changed clinical genetics, and its use in the identification of new disease genes for skeletal and dental anomalies. This will be illustrated with data on the identification of new skeletal dysplasia genes, more specifically the gene FIG4 in Yunis-Varon syndrome, and fibronectin mutations in a rare skeletal dysplasia.

Thursday, April 7th, 2016
Evo - La Plaza, 420 Sherbrooke West
### Oral Presentations

#### MINERALIZED TISSUE BIOLOGY AND TISSUE ENGINEERING

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<td><strong>OP 2:</strong> Role of ATP and ADP in communicating mechanical stimulation information to neighboring bone cells. <strong>MIKOLAJEWICZ N</strong></td>
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<td><strong>OP 3:</strong> Role of Matrix Gla protein in craniofacial development. <strong>MARULANDA J</strong></td>
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<td>10.00—10.15</td>
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#### ORAL HEALTH AND IMPLANTOLOGY

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#### PAIN AND NEUROSCIENCES

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## ORAL HEALTH & SOCIETY

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OP 1: Transglutaminase activity is required for osteoclastogenesis and osteoclast resorption via regulation of podosome belt formation

SUN H¹, KAARTINEN MT¹,²

¹ Faculty of Dentistry, McGill University, Montreal, QC, Canada
² Faculty of Medicine, Division of Experimental Medicine, McGill University, Montreal, QC, Canada

Osteoclasts are multinucleated macrophage lineage cells capable of resorbing mineralized bone. Increased osteoclast activity causes bone loss, i.e., osteopenia. Transglutaminases (TG) are a family of structurally and functionally related enzymes that catalyze the Ca²⁺-dependent cross linking of proteins through introducing an isopeptide bond between lysine residue and glutamine residue. TG family is comprised of TG1-TG7 and Factor XIII-A (FXIII-A). TG2 and FXIII-A are both expressed in monocyte/macrophage lineage cells; however, their expression in osteoclasts and their potential role during osteoclastogenesis and osteoclast resorption have not so far been explored. To address the role of TGs in osteoclasts, we used murine bone marrow-derived macrophages (BMMs) which were differentiated into osteoclasts with M-CSF and RANKL. We report here that both macrophages and osteoclasts express mRNA of TG1, TG2 and FXIII-A. Immunofluorescence microscopic analysis showed the presence of all the three enzymes in osteoclasts. To examine the role of TG activity in osteoclastogenesis, BMMs were treated during the osteoclastogenesis with NC9 - an irreversible TG inhibitor. Osteoclast size was decreased dramatically with low concentrations of NC9 and osteoclast differentiation was blocked completely with higher concentrations. When NC9 was added to the osteoclast precursors at different stages, it only inhibited the fusion stage without affecting the early differentiation stage. Consistently, resorption pit assay showed that osteoclast resorption activity was inhibited by NC9 treatment. In addition, osteoclast podosome belt formation was found to decrease when treated with NC9. Taken together, our data suggests that TG activity is required for osteoclastogenesis and osteoclast resorption through promoting podosome belt formation. Funded by CIHR.
OP 2: Role of ATP and ADP in communicating mechanical stimulation information to neighboring bone cells

MIKOLAJEWICZ N 1,2, KOMAROVA S 1,2

1 Shriners Hospital for Children, Montreal
2 Faculty of Dentistry, McGill University, Montreal

Mechanical loading is known to regulate bone function as seen in individuals exhibiting lower bone mass after exposure to microgravity in space. ATP has been proposed as the mechanical signal transducer to neighboring bone cells, however, its exact role remains unknown. In this study, we examine how diffusion and degradation of ATP contributes to the communication of mechanical information to neighboring non-connected bone cells. Individual osteoblast-like cells are mechanically stimulated by membrane deformation and subsequent changes in cytosolic calcium concentration are recorded and analysed using fura-2, a calcium-binding dye. Mechanical stimulation of single cells results in delayed transient elevations of intracellular calcium in neighboring cells. These secondary responses are abolished when a purinergic receptor antagonist is applied. We demonstrate that the apparent diffusion coefficient of the proposed purinergic mediators increases as a function of distance from the mechanically stimulated source, consistent with ATP being gradually hydrolyzed to the smaller and faster diffusing species, ADP. ARL67156 application to shift the ATP:ADP ratio reveals a change in the apparent diffusion coefficient of the propagating species. Our results support a model in which shifting ATP:ADP ratios contain information regarding severity and distance from the point of mechanical stimulation and are capable of inducing different downstream calcium responses.
OP 3: Role of matrix Gla protein in craniofacial development

MARULANDA J 1, MCKEE M D.1, EIMAR H 1, BERKVENS M 1, NELEA V 1, BORRAS T 2, TAMIMI F 1, FERRON M 3, MURSHED M 1,4

1 Faculty of Dentistry, McGill University, Montreal, Quebec, Canada.
2 Department of Ophthalmology, University of North Carolina, Chapel Hill, NC, U.S.A
3 Institut de Recherches Cliniques de Montréal, Montreal, Quebec, Canada,
4 Department of Medicine, McGill University, Montreal, Quebec, Canada.

Introduction: Congenital deformities are common and craniofacial defects constitute a significant part of these abnormalities. Genetic and environmental factors may lead to abnormal growth of orofacial skeletal elements affecting the overall structure of the face. Keutel Syndrome is a genetic disease hallmarked by midface hypoplasia and abnormal calcification of cartilaginous tissues. In the current study, we characterized a mouse model of Keutel Syndrome caused by an inactivating mutation in Matrix Gla Protein (MGP) that acts as a potent inhibitor of soft tissue calcification. To date, it is not known the mechanism by which MGP affects midface development.

Objectives:

1. Characterize the craniofacial phenotype in the Mgp-/- mice
2. Investigate the mechanism of action of MGP in craniofacial development

Methods and Results: Cephalometric analyses of microCT images of wild type and Mgp-/- heads revealed a severe midface hypoplasia and a class III malocclusion in the latter genotype. X-Gal staining of the cranial complex of a reporter mouse demonstrated high Mgp promoter activity at the cranial sutures, cranial base synchondroses and nasal septum (NS). While sutures and cranial base synchondroses were normal, there was progressive ectopic calcification of the NS in MGP-deficient mice. Indeed, we observed a shortening of the NS in the mutant strain. Transgenic restoration of Mgp expression in the chondrocytes alone was sufficient to correct the craniofacial anomalies in Mgp-/- mice, suggesting a local role of MGP in the developing NS. Although Ki57 staining did not show any alteration in cell proliferation, TUNEL assay showed a marked increase of apoptotic chondrocytes in the calcified NS, which may explain the impaired growth of this tissue in Mgp-/- mice.

Conclusions: MGP deficiency in mice causes midface hypoplasia and skeletal malocclusion. The local expression of MGP prevents the calcification of the nasal septum cartilage and plays a major role in craniofacial development.
OP 4: A comparative study into the oral and neck wound healing between mice and the regenerative Axolotl.

CHARBONNEAU AM, ÅSTRÖM P, SALO T, ROY S, TRAN SD

1 Cancer and Translational Medicine Research Unit, Medical Research Center Oulu, Oulu University, Oulu, Finland
2 Department of Stomatology, University of Montréal, Montréal, Canada
3 Faculty of Dentistry, McGill University, Montréal, Canada
Ψ Corresponding Authors

Introduction: Oral, face and neck tissues enable us to eat, breathe and communicate. When surgeries are needed because of cancerous tissue resection, congenital defects or trauma, tissues of the cranio-facial complex must be restored to ensure an acceptable quality of life. In pursuit of reducing hospitalization cost and providing a better outcome for patients we have undertaken an investigation on oral and neck wound healing. We have compared the response of an identical wound induced in a regenerative specie, the axolotl, and a corresponding mouse model, who like humans, heals wounds through scar formation.

Materials and Methods: Punch biopsies (2.5mm) were used to induce a wound through the chin and tongue of both species mimicking a traumatic lesion to this region. Over an extended time course analysis, external pictures and histology was performed on both species.

Results: Both animals demonstrate acceptable survival rates to the large injury. Within 24 hours the mouse wound was closed while the axolotl wound closed at 14 days. Haemorrhage is substantial during the mouse surgery while little amounts are noted with the axolotl. The first cells to migrate over the axolotl’s wound were keratinocytes and epithelial Leydig cells while the mammalian response included only keratinocytes. An acute granulocytic inflammatory response was noted between the 6 and 12 hours in the axolotl while in mammalian model the peak occurred at 48 hours. Our tissue injury model also provided, for the first time, a very detailed description of the oral and neck tissues regeneration in the axolotl.

Conclusions: Based on this comparative study between mammalian and amphibious regenerating species several distinctive differences can be observed suggesting reasons for the axolotl’s ability to regenerate and the limitations in mammals. The results could one day be used to develop novel treatment tools to cranio-facial trauma care.
OP 5: The adipocytes-specific role of SMPD3 in energy metabolism

ALEBRAHIM S¹, KHAVANDGAR Z¹, KISS ROBERT S²,³, MURSHED M¹,²

¹ Faculty of Dentistry; McGill University, Montreal
² Department of Medicine, McGill University, Montreal
³ Research Institute of McGill University Health Centre, Montreal

Sphingomyelin phosphodiesterase 3 (SMPD3) is a lipid metabolizing enzyme produced primarily in the skeletal tissues - bone and cartilage. SMPD3 cleaves sphingomyelin (a membrane lipid) to generate ceramide and phosphocholine, two important metabolites regulating multiple cellular activities. Interestingly, we noticed a reduction in the abdominal fat pad in fro/fro mice that lack SMPD3. We found that when fed a high-fat diet, fro/fro mice are protected from the diet-induced obesity and from diabetes. In order to examine the role of osteoblast-derived SMPD3 in the observed phenotype, we analyzed a mouse model, fro/fro; Col1a1-Smpd3 that lacks SMPD3 in all the tissues except bone. We examined the effects of the high-fat diet on energy metabolism in these mice and found that these mice are partially protected from diabetes. This observation raises the possibility that SMPD3 deficiency in the non-skeletal tissues may be, at least in part, responsible for the observed protection. In agreement with this notion, we found that Smpd3 is expressed in both white and brown adipose tissues. This later result prompted us to investigate the role of SMPD3 in adipocytes. We used an adipogenic cell line, 3T3L1, to ‘knock-down’ Smpd3 expression by using the sh-RNA techniques. Once the useful clones were screened and characterized, they were examined for the expression of adipocyte markers, lipid biosynthesis, deposition and breakdown in response to insulin signaling. Our data showed that there is a significant decrease in the expression of the adipogenic markers Peroxisome proliferator-activated receptor gamma (PPAR-γ) and CCAAT/enhancer-binding protein alpha (C/EBP-α). Also, there is a reduced synthesis and deposition of lipids in the Smpd3 ‘knocked down’ cells.

In summary, beside the potential role of bone-specific SMPD3 in energy metabolism, this current study provides the evidence that there is an adipocytes-specific role of SMPD3 in energy metabolism.
OP 6: Characterization of alloys produced with new system for processing dental prosthesis

ALAGEEL O$^1$, ABDALLAH M-N$^1$, ALSHEGHI A$^2$, CARON E$^3$, TAMIMI F$^1$

$^1$ Faculty of Dentistry, McGill University, Montreal, QC, Canada
$^2$ Department of Mining and Materials Engineering, McGill University, Montreal, QC, Canada
$^3$ DRPD, Montreal, QC, Canada

Removable partial dentures (RPDs) are traditionally made by a casting technique. Laser-sintering is a new additive manufacturing technique for fabricating RPDs metal frameworks quickly with high precision and at low cost. The objective of this study was to characterize the mechanical, crystallographic, and biocompatibility properties of RPDs alloys made from cobalt-chromium (Co-Cr) and processed by laser-sintering technique and compare them to those made of conventional casted Co-Cr alloys.

Methods: Co-Cr samples were fabricated by conventional casted (CC) and laser-sintering (LS) techniques; two groups of LS alloys (LS-1 and LS-2) were used in this study. The mechanical, physical, and crystallographic properties of the alloys were evaluated using three-point bending test, Vickers hardness measurements, X-ray diffraction (XRD), Pycnometry, micro–computed tomography (micro-CT), and Scanning Electron Microscopy (SEM). The releases of toxic metal ions from Co-Cr alloys was measured using inductively coupled plasma atomic emission spectroscopy (ICP-AES). The alloys biocompatibility was assessed by Alamar Blue viability assay and cytotoxicity lactate-dehydrogenase (LDH) assay on human epithelial cells.

Results: Laser-sintered alloys showed higher density, hardness, flexural strength, and fatigue resistance compared to conventional casted alloy ($p<0.05$). Laser-sintered alloys are more homogenous in porosity and micro-structure than the casted alloys. Both laser-sintered and casted alloys are biocompatible. Conclusion: Laser-sintered alloys are more precise and present better mechanical and physical properties than casted alloy for removable partial denture.
OP 7: New magnesium-strontium (Mg-Sr) based alloys; corrosion and cytotoxicity

TOP M¹, ASCENCIO PINEDO M³, PEGULERYUZ MO², TABRIZIAN M¹.

¹Faculty of Dentistry, McGill University, Montreal.
²Mining & Materials Engineering, McGill University, Montreal.
³Chemical Engineering, McGill University, Montreal.

Magnesium has become increasingly popular during the last decade for the researchers who work on biodegradable metallic implants. It is a promising material due to its superior bio-compatibility, low density, and good mechanical properties. This study aimed at investigating the corrosion rate and electrochemical behavior of novel magnesium - strontium - calcium - zinc (Mg-Sr-Ca-Zn) based alloys and evaluate their biocompatibility via cytotoxicity testing.

Three different alloys (Alloy A; Mg-Sr-Ca, Alloy B; Mg-Sr-Ca-Zn, Alloy C; Mg-Sr-Ca-Zn) were cast and scanning electron microscopy (SEM) was used for general observation of the surface morphology and for the microstructural characterization of the alloy samples. WE43—a corrosion resistant Mg alloy—was utilized as control. Immersion tests were conducted on the samples using simulated body fluid (SBF)¹ to elucidate their corrosion resistance. Corrosion rate was calculated by measuring hydrogen. Two parameters; the corrosion potential (E_corr) and the corrosion current density (i_corr) was used to evaluate the corrosion behavior. The in vitro cytotoxicity of the alloys was examined using human umbilical vein endothelial cells (HUVEC) and rat osteoblast precursor cells (MC 3T3).

SEM observation showed that for the cast alloys exhibited a fine uniform grain structure. An indirect cytotoxicity test using MTT and Alamar Blue (AB) assays revealed that for both HUVEC and MC 3T3 cells all three alloy compositions exhibited results similar to those obtained with WE43 (p<0.05). There were no statistically significant differences observed between Alloy B and Alloy C, which has different amounts of zinc (p>0.05). These findings suggested that the alloys were highly biocompatible with HUVEC’s and MC 3T3 cell in vitro.

OP 8: Developing sociocultural competency in dental professionals: ideological challenges and ways forward for dental education

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Background: Within the North American context of rising social inequities in oral health, sociocultural competency and social responsibility in dental professionals is a rapidly growing concern. Though undergraduate dental education has begun to address these areas, there exist few initiatives within continuing dental education (CDE); this is especially true regarding low income and marginalized populations.

In response, representatives of the Québec Antipoverty Coalition, dental regulatory bodies, University of Montreal, McGill, and independent artists have partnered and produced a series of online capsules, videos, and a social realist film on poverty. These teaching tools have been integrated into an onsite credited CDE course that uses transformative learning theory to foster critical reflection and practice changes.

Methods: From April to August 2012, a qualitative case study was conducted in a Montreal dental clinic that participated in this course. Our goals were to explore learning processes and understand perceived outcomes. Staff (n=15) participated in three educational group activities (8 hours) and a series of semi-structured individual interviews. Three weeks of observation at the reception desk also took place. Data sources included fieldnotes, clinic documents, transcribed group discussions and interviews. Using QDA Miner, data was coded and categorized according to phases of transformative learning and emergent themes.

Results: Analysis revealed four interrelated workplace ideologies that constrain learning and practice changes: 1) private market ideology; 2) biomedical orientation to care; 3) a focus on equality (vs. equity); and 4) social categorization of underprivileged patients. Importantly, positive shifts in thinking included better understanding the causes of poverty, life on welfare, patient behaviours as well as increased self-awareness on the part of participants.

Conclusion: Developing sociocultural competency and social responsibility in dental professionals represents a tremendous yet worthwhile challenge. Knowledge generated through this study provides important insight into implications for dental education, regulation and oral health policy.
OP 9: Understanding oral care experiences and challenges for children with Autism Spectrum Disorder (ASD), parent’s prospective

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The unique characteristic of children living with Autism Spectrum Disorder ASD can make it challenging for the maintenance of their oral health. Children living with ASD may display unpredictable behaviours and communication patterns that act as barriers for them to receive proper oral care. Many studies have explored the oral health status and unmet dental needs of children with ASD worldwide (1-3), however, the concerns and experiences of parents of children living with ASD regarding the oral health has not been thoroughly researched as a topic yet. For that, this research is aimed to exploring in depth the child parent’s experience and concerns about achieving positive oral health of their child. (2) A qualitative research approach was specifically chosen for this research because of its utility to obtain deeper understandings of the experience of autism and oral health. The researchers adopted Interpretive Phenomenology (IPA) approach which explicitly illuminated in depth the parent’s experience and concerns toward oral health while they take care of their children with ASD. IPA utilized to understand complex biopsychosocial aspects of oral health practices and to develop knowledge that will be applicable in clinical practice. Initial data analysis revealed three main themes: Feeling Guilty, Continues concern and loneliness. This first-hand knowledge and understanding is not only of value to new parents with children living with ASD in determining how to provide optimum oral care children living with ASD, but also has the potential to inform clinical knowledge and practice of treatment approaches that are most effective for their care. This research will help to inform the development of coherent and adaptive health system that responsive to the oral health needs of children with ASD achieving better Oral Health Related Quality of Life (OHRQL) for those children.

OP 10: Interdependencies between CYP2A6 and smoking on the risk of head and neck cancers among Canadian Caucasians

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Background: Tobacco smoking is a major risk factor for squamous cell carcinomas of the head and neck (SCHNC). The genetic variant CYP2A6*2 may alter individuals’ risk of SCHNC as well as smoking behaviour. However, the interdependencies between these exposures on SCHNC risk have not yet been well characterised among Caucasians.

Aims: To estimate the extent to which cigarette smoking: a) alters the risk for SCHNC associated with the CYP2A6*2 (A/T) single nucleotide polymorphism; and b) mediates the association between CYP2A6 and SCHNC association in this population.

Methods: We analysed a subsample of Caucasian smokers from a hospital-based case-control study of SCHNC risk including 317 cases with histologically confirmed SCHNC and 296 non-cancer controls recruited from outpatient clinics at four hospitals in Montreal. Detailed information on smoking, alcohol consumption and other domains were collected by interview, and DNA isolated from oral brush samples was genotyped for the CYP2A6*2 locus. Smoking intensity was estimated from the average reported cigarettes smoked per day and dichotomized. Relative risks of SCHNC were estimated by logistic regression odds ratios (OR) and 95% confidence intervals (CI).

Results: Compared to AT/AA carriers and low intensity smokers, homozygote (TT) carriers and heavy smokers had the highest SCHNC risk (OR=2.00; 95% CI=0.64, 6.22) followed by the TT-low smokers (1.29; 0.41-4.08), and AT/AA-heavy smokers (OR=1.23; 95%CI=0.27-5.49). There was indication of supra-multiplicative and supra-additive interactions between smoking and CYP2A6*2. Mediation analyses of the TT variant with smoking intensity yielded non-significant total (OR=1.46; 95% CI=0.40-4.08), direct (OR=1.38; 95% CI=0.57-3.34) and indirect effects (OR=1.06, 95%CI=0.95, 1.18), with the proportion of increased risk mediated by heavy smoking estimated to be 17.7%.

Conclusion: Individuals who were smokers and homozygote CYP2A6*2 TT carriers had a higher risk of SCHNC, although majority of the effect associated with the TT genotype may to attributed to factors other than smoking.
OP 11: Papoose boards in Dentistry: A scoping review

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Purpose: The purpose of this study is to examine the extent of existing literature and identify the research gap(s) in the existing literature, with the objective to understand the reason behind the continuing use of papoose board and its consequences on children, parents and dental health professionals.

Methods: In this scoping study we have adopted Arksey and O’Malley’s six-stage methodological framework, as modified by Levac et al. We designed a comprehensive search strategy for Medline (Ovid) that was then adapted to Biosis (Ovid), CINAHL, Embase (Ovid) and Web of Science. The Medline strategy comprised a combination of medical subject headings (MeSH), keywords, truncations and Boolean operators. Initial search generated 465 references and after reading abstracts we identified 78 studies that form the basis of our analysis. Full text of these studies was retrieved and data charting and analysis is ongoing.

Preliminary results: The findings after analyzing 37 articles relate to two major themes i.e. the perspectives of dental health professionals and parents regarding the use of papoose board. So far no studies have been found related to children perspectives. Parents rank papoose board amongst the three least acceptable behavior management techniques but their acceptance increases after receiving reassurance regarding the use of papoose board from dentists. Dental professionals’ preferences for using papoose board appear to depend on various factors such as the personality of the dentist, the way in which they use it, their practice setting and their professional training.

Conclusion: To our knowledge, this is the first such review and we hope that mapping the literature on papoose board will help us to identify potential gap(s) and develop future study based on these finding. Furthermore, the studies charted so far are reflecting that existing literature lacks studies eliciting children voices.
OP 12: Patients satisfaction with laser-sintered versus cast metal removable partial dentures: a crossover pilot clinical trial


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Background: Laser-sintering technology has been recently introduced in dentistry and showed great advantages which include increasing the quality of restorations and reducing the manufacturing costs. Although, several laboratories worldwide produce laser-sintered removable partial dentures on daily basis, no clinical studies have been published yet to evaluate the clinical performance or patient satisfaction of laser-sintered removable partial dentures.

Objective: The purpose of this crossover double-blinded clinical trial was to compare removable partial dentures (RPDs) fabricated using the traditional (casting) method with RPDs fabricated with CAD/CAM laser-sintering technology in terms of patient satisfaction.

Methods: Patients seeking RPDs in the undergraduate clinic at McGill University were asked to participate in the study. Patients were treated according to standardized clinical procedures. For each patient, two dentures were fabricated from one final impression. One by casting technique and the other by laser-sintering. Patients were given randomly one denture and followed-up after 1, 2 and 4 weeks. Then, they were given the second denture and followed-up again. At each follow-up visit, patients filled McGill Denture Satisfaction Instrument. At the end of the study patients were asked which denture they prefer to use later. The treating dentist, the lab technician and the patient were blind to treatment allocation.

Results: 12 patients were recruited; 9 completed the study and included in the analysis while 3 were excluded. Patients were significantly more satisfied with laser-sintered dentures in general satisfaction, ability to speak, ability to clean and chewing efficiency (P<0.05). At the end of the study, 5 patients preferred the laser-sintered denture, 1 preferred cast and 3 did not have a preference.

Conclusion: Laser-sinter technology was able to produce a more satisfying treatment to patients especially regarding general satisfaction, ability to speak, ability to clean and chewing efficiency.
OP 13: Establishing maxillofacial oncology and reconstruction registry and retrospective analysis of patient treated for oral cancer at oral and maxillofacial surgery department

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Purpose: Data of Oral and Maxillofacial oncology patients are sparse especially regarding evidence for treatment decisions, which makes the clinical decision more challenging to apply to specific clinical scenarios.

The goal of this project is to create a searchable database of patient records for retrospective hypothesis based research on patients with maxillofacial oncologic pathology and reconstructive needs treated by the Department of Oral and Maxillofacial Surgery (OMFS) at McGill University Health Centre.

Methods: An HTML based data collection system (REDCap) was used to create oral cancer database, the Maxillofacial Oncology and Reconstruction Registry, to receive patients’ information from medical records. Then, the registry was used to extract data on number, demographic distribution, treatment rendered, reconstruction and outcomes for patient treated from 2008 to 2015. Data analysis included descriptive statistics.

Results: A total of 217 cases were identified in the registry. Oral cavity cancer was most common in males (55.3%). Squamous cell carcinoma accounts for 65.4% of all histologic types of cancer. Tongue was the most common site (31.8%). 85.7% received curative surgical resection alone (58.6%) followed by adjuvant radiotherapy in 24.2% and adjuvant chemotherapy in 13.4%. Most of the cases were treated for stage I cancer (33.1%). Neck dissection was performed in 55.9% of the cases. Negative margin was achieved in 88.7% of patients. Overall survival of the treated cases was 89.8% within the specified period of the study.

Conclusion: The present study suggests that the database plays a relevant role for the oncology service by generating a pool of important data related to cancer. By using these data, it is possible to carry out epidemiological studies and use them as resources that allow analysis of the quality of care given to oncology patients, which consequently, may generate improved measures in the care offered to this population.
OP 14: Knowledge translation in Restorative and Prosthetic Dentistry

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Dentists should make their clinical decisions based on the best evidence available. However, implementation of an evidence-based practice (EBP) by dentists is very limited, especially in the field of restorative and prosthetic dentistry. Therefore, the aim of this research project was to identify and find a solution for barriers preventing EBP implementation. To identify the barriers, we designed and applied a paper format self-administered questionnaire on dental students. In order to find a solution, we conducted a systematic review on the survival of single-unit crowns and dental fillings performed on posterior permanent teeth.

Our results demonstrated that less than two in ten students base their restorative treatment-planning on the best available evidence and this may be due to students taking too long to find an answer to the clinical question and the difficulties in identifying the best available evidence for each specific scenario. Our systematic review showed that the more the remaining tooth structure is available, the lower the failure rate among restorative treatments. It also suggested that vital teeth with two or fewer walls left should be restored with crowns, whereas teeth with more tooth structure should be restored with dental fillings, preferably amalgam restorations. Non-vital teeth with two or fewer walls left should be treated with crowns with post and core, whereas those with more tooth structure should be treated only with crowns.

In conclusion, dental students rarely apply EBD principles into practice and the main barrier was lack of time. Therefore, the strategy proposed in this project was to provide easily accessible evidence-based knowledge. Our knowledge synthesis showed the areas of weakness in the literature, either by high-risk of bias or lack of information, to address many of the restorative clinical scenarios that dental students and clinicians encounter for decision-making.
OP 15: Pathological changes in expression of the BDNF/NTRK2 signaling pathway in the prefrontal cortex in a mouse model of neuropathic pain

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Aim: Chronic pain is associated with persistent remodeling of the prefrontal cortex (PFC) in humans and long-term changes in gene expression in rodent models. Epigenetic modifications, including DNA methylation, regulate long-term changes in gene expression. We hypothesize that DNA methylation contributes to the induction and maintenance of chronic pain. Using genome-wide DNA methylation analyses, we recently showed a massive reorganization of the DNA methylation landscape in PFC occurs in rats nine months after induction of neuropathic pain. Bioinformatics analysis revealed significant decreases in the methylation of the promoter region of Brain-Derived Neurotropic Factor (BDNF), its receptor TRKB, and numerous intracellular downstream targets of BDNF activation, including MAPK1, AKT1 and CREB1. The aim of this study was to examine changes in the expression of multiple genes within the BDNF-signaling pathway in the PFC of mice at different time points after the induction of neuropathic pain.

Methods: Male CD-1 mice underwent either spared nerve injury (SNI) or sham-surgery control. Prefrontal cortex was collected for quantitative reverse transcription-PCR (QRT-PCR) at acute (1-day post-injury), sub-chronic (2 weeks post-injury), and chronic (6 months post-injury) time points. QRT-PCR analyses examined expression of BDNF, NTRK2, MAPK1, AKT1 and CREB1 at each time point. Behavioral assays for cold and mechanical hypersensitivity (Acetone and Von Frey), and physical impairment (Rotarod) were performed at sub-chronic and chronic time points.

Results: Significant increases in gene expression of BDNF, its receptor NTRK2 and downstream effectors was detected 6 months post-SNI compared to controls. Moreover, mRNA levels were positively correlated with the pain sensitivity in animals.

Conclusion: Changes in expression levels of genes within the BDNF signaling pathway, especially 6 months post-injury, suggests that this network plays an important role in persistent pain at the supraspinal level. Furthermore, this dysregulation throughout the BDNF pathway was predicted by our genome-wide methylation study.

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OP 16: Factors associated with acute and chronic painful Temporomandibular Disorders: Preliminary results

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Introduction: Temporomandibular Disorders (TMD) are a type of orofacial pain which affect the muscles of mastication and/or the temporomandibular joint. Painful TMD is estimated to ensue in 5-19% of the general population. It is considered as the second most commonly occurring musculoskeletal disorder after chronic low-back pain.

Objective: The aims of this study are to assess the association between putative risk factors and both (i) clinically significant pain on Grade Chronic Pain Scale (GCPS II-IV), and (ii) chronic temporomandibular disorders (TMD) pain (pain ≥ 6 months).

Methods: Participants were recruited from the Jewish General Hospital (JGH) and McGill University undergraduate dental clinics. The recruitment process involved: (1) signing the consent form, (2) patients’ interview (10-20 minutes), and (3) saliva collection (± 5 mL).

Results: Total recruited participants were 43 patients; 24 patients from the JGH, and 19 from McGill University.

Aim 1: Results show that 24 patients (53% females) had clinically significant pain (GCPS II-IV). The non-clinically significant pain (GCPS I) group consisted of 19 patients (47% females). The pain intensity was significantly different in both groups (Mean GCPSI = 34.6 and Mean GCPS II-IV = 65, P < 0.05). As well, the comorbidities were significantly different in both groups (Mean GCPS I = 2.1 and Mean GCPS II-IV = 3.3, P < 0.05).

Aim 2: Results show that 13 patients (24% females) had acute TMD pain. However, 30 patients (76% females) had chronic TMD pain. The pain intensity was significantly different between the groups (Mean acute = 55.6 and Mean chronic = 49.8, P < 0.05). Also, the comorbidities were significantly different (Mean acute = 2.3 and Mean chronic = 2.9, P < 0.05). Finally, acute pain patients were significantly older than chronic pain patients (Mean acute age = 53.7 and Mean chronic age = 41.5, P < 0.05).
OP 17: Potential contribution of inflammation in the transition of acute to chronic orofacial pain in a novel mouse model with TMJ mechanical overloading

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Temporomandibular joint (TMJ) associated orofacial pain is one of the most difficult-to-treat forms of pain due to its prevalence and chronicity. The problem stems from both a lack of animal models that accurately represent clinical conditions and a lack of understanding of the molecular and cellular mechanisms underlie TMJ pain. Since inflammation plays a critical role in many other acute and chronic pain conditions, in our study, we aim to establish a mouse model of TMJ related orofacial pain, and use it as a tool to investigate the potential contribution of inflammation in the transition of acute-to-chronic pain. One of the etiologies for onset of orofacial pain is mechanical overloading of TMJ caused by trauma or prolonged forced mouth opening during dental procedures. Therefore, we established a mouse model adapted from Winkelstein et al. by repetitive, forced opening the jaw at its maximum for 1.5 hours for 5 days. Development of mechanical hypersensitivity in the TMJ region was confirmed by increased head withdrawal frequency to a von Frey filament on the first day of jaw-opening. Such mechanical hypersensitivity persisted for a month even after protocol termination. TMJ dysfunction was confirmed by reduced food intake after 24 hours of fasting. Bone and cartilage remodeling in the mandibular condyle of TMJ was also observed through H&E staining. To investigate inflammatory profile, we are currently performing RT-qPCR to measure pro-inflammatory cytokines (TNFa, IFNg, IL6) levels in serum and masseter muscles at different stages after pain onset. We are also performing immunohistochemistry of the brainstem to study changes in glial cell activation and distribution in the central nervous system. This study will illuminate whether and which key inflammatory mediators are involved in the acute-to-chronic phase transition of TMJ related orofacial pain, and thus reveal new therapeutic strategies.
P 1: Metabolic changes in a mouse model of Osteogenesis Imperfecta due to collagen type I mutation.

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Osteogenesis imperfecta is a genetic disorder characterized by increased fracture risk, low bone mass with increased bone turnover and short stature even in cases of mild, well-controlled disease. Osteocalcin (OCN) is now established as a bone-derived regulator of insulin homeostasis. The objective of this study was to examine the circulating levels of osteocalcin as well as metabolic phenotype in young, 4 weeks old Col1a1Jrt/+ mice with osteogenesis imperfecta due to collagen type I mutation (OI) and corresponding wild type (WT) controls. Using ELISA, we have found that total OCN, as well as active, under-carboxilated fraction of OCN (GLU 13) were significantly increased in the OI mice compared to the WT. We examined respiratory parameters such as rate of oxygen consumption (VO2), rate of carbon dioxide production (VCO2), as well as the respiratory exchange ratio (RER) and the measurement of energy expenditure for a subject (HEAT) using Oxymax metabolic cages. While no significant difference in VO2, VCO2 or RER was observed between OI and wild type in either sex, both male and female mice demonstrated significant decrease in night time average energy-expenditure (HEAT). Using dual-energy x-ray absorptiometry (DEXA), we have found that not only BMD and BMC, but also the fat mass was significantly decreased in OI mice compared to WT. We suggest that increased bone turnover due to collagen type I mutation may lead to increase in circulating osteocalcin, which in turn affects whole body metabolic and fat homeostasis. This mechanism may potentially contribute to growth retardation observed in OI.
P 2: siRNA- Mediated Noggin inhibition enhances Osteogenesis

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In spite of bone’s natural regeneration ability following an injury, several clinical conditions cause critical size defects (CSD). The gold standard for CSD treatment is bone grafting, associated with several morbidities. Growth factors have been identified for clinical use such as bone morphogenetic proteins (BMPs). Nevertheless, their short half-life and poor bioavailability require huge doses for therapeutic effects. Endogenous BMP antagonists, such as Noggin, could be inhibited to increase the bioavailability of BMPs and accelerate bone healing. Small interfering RNA (siRNA) is a practical approach to inhibit Noggin. Among various non-viral siRNA delivery vehicles, lipid-based nanoparticles (LNPs) are in the most advanced stage of development. We hypothesize that delivery of Noggin siRNA by LNPs can enhance osteogenesis and accelerate bone healing in CSD. We plan to test our hypothesis by exploring the effects of this system in vitro on osteoblast-like cells and in vivo in a rat femoral CSD model.

We have characterized the physicochemical properties of a commercially-available LNP. We have also assessed the ability of the LNP- siRNA complex to transfect a rat osteoblastic cell line. Treatment with 50nM fluorescently-labeled control siRNA resulted in over 90% transfection efficiency and excellent cell viability as confirmed by FACS, confocal and fluorescent microscopy. A library of Noggin siRNAs was screened and one siRNA was identified to be effective in over 60% Noggin gene knock-down after 24 hours and over 70% protein down-regulation after 48 hour treatment confirmed by RT-qPCR and ELISA, respectively. We observed a consequent 40% up-regulation in BMP signal downstream genes, Smad1 and 5, in vitro after 48 hours. A significant increase in both Alp activity and mineralized matrix formation (Alizarin Red) was observed after 10 day treatment with this LNP-Noggin-siRNA.

Evaluation of in vivo effects of the LNP- Noggin siRNA system on bone formation will be undertaken in a rat femoral CSD model. Preliminary results demonstrate localized accumulation of fluorescently-labeled siRNA at the site of bone defect over time, confirmed by serial in vivo imaging. Animals treated with Noggin siRNA will be sacrificed at different time-points after surgery to confirm the continuous Noggin knock-down and consequent BMP up-regulation by Western Blot, RT-qPCR and immunohistochemistry. The quality and quantity of newly-formed bone at the site of injury will be evaluated by X-ray, micro-CT scan, histology, and biomechanical testing.

This study will provide a practical approach to accelerating bone formation via endogenous BMP signal up-regulation and enhancing the potency of minimal safe doses of exogenous BMP. The results from this study will pave the way for the safe clinical management of such impaired bone healing conditions by avoiding the administration of toxic and unsafe doses of exogenous BMP, currently in practice.
Background: Mutations in the matrix Gla protein (\textit{MGP}) gene in humans lead to Keutel syndrome, a rare autosomal recessive disorder, hallmarked by diffused cartilage calcification, midface hypoplasia, pulmonary stenosis and vascular calcification. \textit{MGP} is highly expressed in chondrocytes and vascular smooth muscle cells, preventing the abnormal mineralization of the extracellular matrices secreted by these cells. \textit{Mgp} ‘knockout’ (\textit{Mgp}/-) mouse, a model for Keutel syndrome, displays most of the phenotypic features of the human disease. Earlier, we demonstrated that a loss-of-function mutation in \textit{Phex} gene is sufficient to prevent mineral accumulation in the \textit{MGP}-deficient arteries. Also, we showed that elastin (\textit{Eln}) haploinsufficiency causes a significant reduction of vascular calcification in \textit{Mgp}/-;\textit{Eln}+/-- mice.

Aims of the study: In the current study, we pursued novel genetic approaches to 1) investigate how PHEX deficiency may affect vascular calcification and 2) establish a correlation between the elastin content and arterial calcification.

Results: We examined the role of fibroblast growth factor 23 (FGF23), a phosphate regulating hormone and a downstream effector of PHEX, on the development of medial calcification in \textit{Mgp}/- mice. We crossed \textit{Mgp}+/-- mice with \textit{ApoE-Fgf23} overexpressors to generate \textit{Mgp}/-;\textit{ApoE-Fgf23} mice. These mice showed reduced serum phosphate levels and a complete correction of the arterial calcification phenotype. In a separate breeding experiment, we used humanized \textit{ELN}+/+;\textit{Eln}-- mice that produce human elastin instead of endogenous elastin, albeit at a significantly lower levels. We crossed these mice with \textit{Mgp}+/-- mice to generate \textit{Mgp}/-;\textit{ELN}+/+;\textit{Eln}-- mice. Alizarin red staining and histology revealed that despite MGP deficiency, there was a complete absence of minerals in the arteries of 4 week-old \textit{Mgp}/-;\textit{ELN}+/+;\textit{Eln}-- mice.

Conclusions: Our findings indicate that PHEX deficiency, via upregulation of FGF23, reduces serum phosphate levels, which may in turn prevent medial calcification. Also, there is a direct correlation between arterial elastin content and severity of vascular calcification.

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P 4: Generation and analysis of a transgenic mouse model for osteoblast-specific expression of PHOSPHO1, an enzyme critical for bone mineralization.

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Introduction: Phosphatase orphan 1 (PHOSPHO1), is a member of the haloacid dehalogenase (HAD) superfamily of Mg²⁺-dependent hydrolases, which shows high affinity to phosphocholine, and phosphoethanolamine. This intracellular enzyme is expressed at 100-fold higher levels in the mineralized tissues, in comparison to the ‘soft’ tissues. It has been suggested that PHOSPHO1 plays a crucial role for the initiation of matrix mineralization by generating inorganic phosphate in the bone microenvironment. Deficiency of PHOSPHO1 in mice leads to skeletal abnormality, osteomalacia, scoliosis, and spontaneous fracture.

Objective: The aim of the current study is to investigate whether osteoblast-specific restoration of Phospho1 expression in Phospho1⁻/⁻ mice will prevent the skeletal abnormalities seen in these mice.

Methods: Recently we have generated 5 Col1a1-Phospho1 transgenic founder lines. We used the 2.3 kb proximal Col1a1 promoter to drive the transgene expression in osteoblasts. We mated these mice with Phospho1⁻/- mice eventually to generate Phospho1⁻/-;Col1a1-Phospho1. Genotyping PCR was performed on genomic DNA isolated from the tail biopsies. The transgene expression profile was examined by semi-quantitative reverse transcription PCR on multiple tissue samples. Finally, the bone mineralization status were examined by histomorphometric analyses of undecalcified bone samples embedded in methylmethacrylate.

Results: Our genotyping data confirmed that out of 5, 3 founder lines transmitted the transgene to the offspring enabling us to generate Phospho1⁻/-;Col1a1-Phospho1 mice. Our gene expression analyses using semi-quantitative reverse transcription PCR showed that the transgene expression is restricted to bone. Restoration of Phospho1 expression in bone corrected the mineralization defects associated with PHOSPHO1 deficiency.

Conclusion: We successfully generated Col1a1-Phospho1 transgenic lines with bone-specific expression of Phospho1. Analyses of Phospho1⁻/-;Col1a1-Phospho1 mice reveal that PHOSPHO1 acts locally to regulate bone mineralization.
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Marfan syndrome is the most common type-I fibrillinopathy characterized by severe skeletal complications, including low bone density (osteopenia), long bone overgrowth, scoliosis, kyphosis and others. Mutations in the fibrillin-1 gene are responsible for this disorder, however how fibrillin-1 mutations lead to the skeletal problems is poorly understood. Bone undergoes continuous remodeling by coupled activities of osteoblasts (bone forming cells) and osteoclasts (bone resorbing cells). The N-terminal fragment of fibrillin-1, rF23 (63kDa) and its sub-fragment rF31 (32 kDa) were recently identified as strong inhibitors of osteoclastogenesis in vitro and in vivo in healthy animals (Journal of Cell Science (2013) 126: 4187). To examine if fibrillin-1 fragments exhibit sufficient anti-resorptive activity in disease associated with osteoclast activation, we used ovariectomized mice as a model of estrogen deficiency induced osteoporosis. Animals were randomized into a control group (ovariectomized, untreated), an experimental group treated with rF31 fragment and a positive control group treated with Zoledronic acid. Animals were sacrificed at 4 weeks, and bones were collected for analysis. Bone densitometry, biomechanical testing, X-ray and histomorphometric studies were performed. The initial analysis demonstrated that ovariectomy-induced low bone mass phenotype was partially reversed upon treatment with the rF31 fragment. These data suggest that fibrillin-1 fragments have a potential for use as novel anti-resorptive agents.
Background: Proton pump inhibitors, over-the-counter drugs taken by millions of patients, diminish bone accrual. Accordingly, we hypothesized that these drugs could impair bone healing and implant osseointegration. This study investigated the effect of post-operative systemic administration of omeprazole on bone healing and implant osseointegration in rat tibiae.

Methods: In 24 Sprague–Dawley rats, a titanium implant was placed in the left tibia, and a bone defect was created in the right tibia. During the 2 weeks following surgery, 12 rats were treated with omeprazole (5 mg/kg, daily) and the other 12 with saline. Then, after euthanasia, the volume (mm3) of the cortical defect and the percentages of newly formed bone in the defect, were assessed using microcomputed tomography; peri-implant bone volume/tissue volume and bone-implant contact percentage were assessed by histomorphometry.

Results: Omeprazole-treated rats presented larger cortical defects (2.75 ± 0.59 mm3, p = 0.003 versus 2.11 ± 0.36 mm3; p = 0.002) and a lower percentage of newly formed bone in the defects (28.62 ± 13.12; 45.89 ± 9.73; p = 0.003) than controls. Omeprazole-treated rats presented lower peri-implant bone volume/tissue volume (14.3 ± 7.3% versus 30.8 ± 11.0%; p < 0.001) and bone-implant contact (23.3 ± 10.8% versus 41.8 ± 13.3%; p < 0.001) than controls.

Conclusion: Systemically administered omeprazole impairs bone healing and implant osseointegration.
**P 7: SSRIs hinder bone healing and implant osseointegration in rat tibiae**

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**Background:** Selective Serotonin Reuptake inhibitors (SSRIs) are a class of drugs that are widely used to treat depression. SSRIs have been shown to have adverse effects on bone accrual and may cause bone fracture. Therefore, we hypothesized that SSRIs could interfere with the osseointegration of dental implants. The aim of this in vivo study was to investigate the effect of SSRIs on titanium implant osseointegration and bone healing.

**Methods:** A total of 24- female, 10-weeks-old Spargue-Dawley rats were anesthetized; two unicortical defects were created in both tibial metaphysis of each animal. A custom made titanium implant was placed in the left metaphysis while the right defect was left empty. After that, rats were assigned randomly into two groups and they received a daily dose of either Sertraline (SSRI) (5mg/kg) or saline. After two weeks, they were euthanized and bone samples were retrieved. Micro-CT and histomorphometry were used to assess bone healing and implant osseointegration. Statistical analysis was performed using student’s t-test.

**Results:** Micro-CT analysis showed that the bone defects were larger (p< 0.02) in Sertraline-treated rats (2.60+0.8 mm³) compared to the controls (2.11 + 0.36 mm³). Furthermore, the average percentage of osseointegration was lower (p<.0.05) in Sertraline-treated rats (34.4 + 7.17 %) compared to the controls (40.2 + 13.3 %). In addition, histomorphometric analysis revealed that the number of osteoclasts in the unicortical defect was higher in the Sertraline-treated rats compared to the controls.

**Conclusion:** Our results suggest that SSRIs hinder bone healing and interfere with implant osseointegration. Therefore, these drugs should be considered as potential risk factors for osseointegration and bone healing in dental and orthopedic interventions.
P 8: Hierarchical nanoparticulate structure of avian eggshell

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The calcitic avian eggshell protects the chick embryo from physical trauma and pathogenic microorganisms, while at the same time providing calcium to the enclosed growing chick skeleton prior to hatching. The eggshell contains osteopontin (OPN), a mineralization-regulating phosphoprotein also found in bones, teeth, and otoconia of the human inner ear. To investigate protein-mineral relationships in the eggshell, immunoblotting of demineralized eggshell protein extracts showed prominent OPN bands, and immunohistochemical localization of OPN of demineralized eggshell revealed the highest amount of OPN in the vertical crystal layer (VCL), followed by the middle palisades layer (PL). Atomic force microscopy (AFM) revealed calcitic subunit structures having an average cross-sectional area of 531 nm² in the outermost VCL and 1450 nm² in the PL. Transmission electron microscopy (TEM) revealed smaller mineral nanoparticles (5-7 nm in diameter) comprising the larger subunit structures. Nanoindentation correlated higher hardness values with smaller nanoparticle size, thus showing decreasing hardness across the shell thickness from the outside to the inside (VCL>PL). To examine whether OPN might regulate nanoparticle size, we grew calcite crystals in the presence of OPN. SEM revealed that OPN altered external crystal morphology. Crystals washed with NaOH to remove surface-bound OPN showed a broad spectral peak between 2850 and 3000 cm⁻¹ (observed by Raman spectroscopy on intact crystals), and protein bands (observed by SDS-PAGE on dissolved crystals), demonstrated OPN occlusion within the crystals. AFM of the internal structure of the grown crystals revealed nanoparticles (not observed when OPN was omitted) that were smaller at high OPN concentration (5.9 μM) than at low OPN concentration (0.9 μM), consistent with OPN’s inhibitory role on mineralization. In conclusion, these observations provide details of the nanostructure of avian eggshell, and on protein-mineral relationships related to eggshell hardness. Funded by CIHR
P 9: Chiral Switching of Biomineral Induced by Single Amino Acid Enantiomer

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Chirality exists at all levels, from molecules to galaxies, and is found in biomineralized structures such as shells and pathologic inner ear otoconia. Specifically pertaining to calcium carbonate, this biomineral records Earth's transition from an inorganic to a biologic world, and chiral switching is ubiquitous in many hardened structures of invertebrate marine and terrestrial organisms. In biology, at the molecular level, differences in the handedness of biomineralized, spiraling architectures of calcium carbonate polymorphs are thought to result from the actions of chiral biomolecules called enantiomers (L- and D-forms). Recently, we found that chiral hierarchical vaterite (calcium carbonate) toroids can be induced by the chiral acidic amino acids Asp and Glu, acidic amino acids rich in mineralization-regulating proteins of both invertebrates and vertebrates. Here, we report on a previously undescribed chiral switching mechanism for calcium carbonate vaterite toroids involving only a single enantiomer form of Asp. High-resolution scanning electron microscopy (SEM) and transmission electron microscopy (TEM), and focused ion beam (FIB) sectioning, revealed that the entire evolution process of single enantiomer amino acid (L-Asp)-induced chiral switching in vaterite toroids can be separated into two stages: i) a platelet layer tilting stage towards an achiral vertical organization, and ii) a platelet layer rotation stage with successional chiral switching events at the surface of the vaterite toroids. RosettaSurface energy-minimization simulations of amino acid docking, and direct SEM measurements, showed a rotation angle of 22.5°. In conclusion, this finding provides insight into how simple molecules can create hierarchically organized, biomineralized suprastructures. Funded by CIHR.
Bone defects are bone injuries that will not repair without medical intervention. Currently, the gold standard treatment is an autologous bone graft. However, this intervention is challenging due to (a) donor scarcity and (b) donor site morbidity that follows the procedure. Tissue engineering 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 purine/chitosan sponge with rapid gelation time has been developed showing to be a biocompatible, biodegradable, and potentially osteoconductive scaffold. Based on these results, the current project is focused on the characterization of a form-filling adenosine diphosphate/chitosan/ceramic (ACC) sponge to be used as a bone repair scaffold. The physico-chemical and in vitro characterization of the sponges was done through Scanning Electron Microscopy, showing a highly interconnected porous surface. These results were supported with micro Computed-Tomography images which yielded a 3D model of the sponges and a porosity of more than 80%. X-ray Photoelectron spectroscopy and Fourier Transform Infrared Spectroscopy provided the sponges’ chemical composition and configuration, confirming the presence of hydroxyapatite and tricalcium phosphate within the sponges. A water retention test showed the sponges could retain up to 4 times their own water weight. Moreover, cellular characterization was done using pre-osteoblasts (MC3T3). An alkaline phosphatase assay showed that mineralization of cells was not reduced by the concentration of adenosine used. Those findings were confirmed by an alizarin red assay. A live/dead analysis was performed to determine the viability of the cells both on and inside the sponges. These results show the sponges’ potential as a delivery system for encapsulating nanoparticles, genes and growth factors. The loaded scaffold can then be implanted in a critical sized defect rodent model. Ultimately, this sponge may be a clinical alternative to bone graft by decreasing the burden of complications associated with graft donor sites while simultaneously delivering a therapeutic agent at the site of injury.
P 11: Dicalcium phosphate cements prepared from Synthetic Hydroxyapatite

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Introduction: Synthetic bioceramics showed acceptable results as bone substitutes as they provide excellent biocompatibility and osteoconductivity properties. Dicalcium phosphate cements could be prepared by mixing basic calcium phosphate as β-TCP with certain acid as phosphoric acid. The current study is showing the preparation of brushite cements from synthetic hydroxyapatite. Also, it addresses the effect of changing the molarity of phosphoric acid and the addition of monocalcium phosphate monohydrate (MCPM) on the setting time, mechanical properties and the amount of brushite production of the resultant cements.

Materials and methods: Powder to liquid ratio was set to 2 for preparing brushite cements from Synthetic hydroxyapatite. Different concentrations of phosphoric acid were used for cement fabrication (3, 4, 5, 6 and 7 molar). In addition, MCPM was added to powder phase with different weight ratios of 10, 20, 30 and 40%. For all formulations, 0.5 M citric acid was used as a reaction modifier. The resultant cements were characterized in terms of setting times using Gilmore needles, mechanical properties using Universal testing machine (Instron) as well as, crystallography with X-ray diffraction (XRD).

Results and Discussion: Our findings revealed that increasing both the concentration of phosphoric acid and the addition of MCPM had a negative effect on the compressive strength of fabricated cements; however, they resulted in a considerable rise in the Brushite production. Setting time was accelerated by increasing phosphoric acid molarity, but it was improved when more MCPM was included into the powder phase.

Conclusion: Our findings established the possibility using synthetic hydroxyapatite, phosphoric acid and MCPM to get brushite cements of variable properties.
P 12: Surface chemical treatment using diazonium chemistry to facilitate chemical bonding between metals and composite resin

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Objective: Composite resins do not adhere well to dental alloys. This can cause problems such as failures at the composite-metal interface in dental prostheses and bracket debonding in orthodontic treatments. The aim of this in vitro study is to develop a new surface treatment, based on diazonium chemistry which facilitates chemical bonding between metals and dental composite resin.

Methods: Stainless steel and cylindrical cobalt chromium samples were coated with diazonium ions to allow covalent binding of the composite resin to their surfaces through immersing them in an emulsion of Bis-GMA monomer and an initiator to polymerize the Bis-GMA on the surface of the diazonium layer. The surface chemical composition of the treated metal samples was analyzed by X-ray photoelectron spectroscopy (XPS) and the tensile bond strengths between the composite resin adhesive and surface-treated metal alloys were measured. The diazonium adhesive was also tested on two models of orthodontic brackets and the shear bond between the brackets and the tooth was also assessed.

Results: XPS confirmed the presence of a diazonium/Bis-GMA coating on the treated metals; the bond strength between coated metals and Bis-GMA was 2 to 3.6 folds higher than the bond between untreated metals and Bis-GMA. Conclusion: Diazonium/Bis-GMA adhesion can be used to increase the bond strength between dental alloys and composite resins. Clinical significance: Diazonium/Bis-GMA adhesion can effectively achieve a strong chemical bond between different alloys namely stainless steel and cobalt chromium and composite resin. This can help in reducing bracket de-bonding and achieving a reliable bond in composite repair of fractured porcelain in porcelain fused to metal indirect restorations.
Objective: We have recently developed a new type of dental adhesives based on diazonium ions. The objective of this study was to assess the biocompatibility and endurance of this adhesive when used to bind poly methyl methacrylate (PMMA) onto dental alloys.

Methods: Polished samples of titanium (Ti), stainless steel (SS) and cobalt chromium (Co-Cr) were coated with a diazonium based adhesive. Untreated samples served as controls (n=12 per each condition). X-ray photoelectron spectroscopy (XPS) was performed to characterize the elemental compositions of the different surfaces. Biocompatibility of the coated alloys was assessed with human gingival fibroblasts (HGF). Inductively coupled plasma (ICP) and total organic carbon (TOC) technique were used to quantify the ions and organic matters released from the diazonium coated alloys. Endurance of the adhesives was assessed by exposing the samples to autoclaving and thermocycling. The tensile strength of the PMMA-alloy bond was also tested.

Results: XPS revealed that high surface concentration of carbon and oxygen in the coated samples than the controls, indicating the presence of the adhesive (p<0.05). Diazonium coatings on dental alloys did not release toxic chemicals and they were compatible with human fibroblasts. Moreover, the diazonium adhesive increased the strength of the bond between PMMA and the dental alloys and it remained higher even after incubation in aging conditions (i.e. thermocycling, autoclaving).

Conclusions: Diazonium adhesives can create biocompatible coatings on dental alloys that can be used to create a strong durable bond between dental alloys and PMMA.
At present there are no effective treatments for spinal cord injury (SCI), although many researchers are interested in neural regeneration, none are focused on developing biomaterials to target remyelination process post-SCI. We successfully developed a novel, rapidly-gelling, injectable chitosan sponge with a highly desirable remyelination properties at the site of injection. We hypothesize that the chitosan sponges can be used pertinently as a three-dimensional scaffold to carry, sustain and deliver cells and growth factors to diseased or malfunctioning tissues, and can thus be potentially used to promote remyelination post-SCI. Moreover, chitosan-based scaffolds have been extensively used in bone tissue engineering and explored for bone regeneration and in humans and various animal models like mice, rats, rabbits, dogs and sheep. Promising results in these trials have been attributed to chitosan's ability to promote osteogenesis and increase bone deposition by up-regulating specific genes.

Evidence from these studies supports our choice of chitosan, especially that it has an inherent characteristic of inducing bone formation. In addition, chitosan as a biomaterial is biocompatible, biodegradable and is very versatile in terms of physical and chemical modifications. The main objective of this project is to investigate the combination of injectable chitosan sponges and the osteoinductive potential of GFs, stem cells or other therapeutic agents for their capacity to improve bone healing which could be an alternative to conventional grafting techniques (auto- and allografts). Moreover, due to its biological and physicochemical properties, the chitosan sponge provides an adequate microenvironment for the enclosed cells, promoting and controlling their viability, proliferation and sustained release of therapeutic molecules.
P 15: 3D Printed Cultures Eggcellent for Rapid Drug Screening

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Introduction: Currently, three-dimensional (3D) bioprinting has a vast array of applications. Simultaneously, when it comes to drug screening, the scientific community is questioning the relevance of standard 2D cultures as compared to a 3D in-vivo environment. It seems therefore inevitable to use 3D printing technology to rapidly and accurately produce more relevant cultures. We have examined the use of egg yolk as an artificial matrix. As multiple types of cells can be separately printed, we are expecting to perform cancer drug testing in a 3D printed culture environment for rapid personalized drug screening.

Material & Methods: Centrifugation and freezing are used to modify the yolk’s physical properties. Testing of mechanical properties was conducted at 37°C on a rheometer. Fluorescent lung fibroblasts (IMR-90) and primary cultured human salivary gland fibroblast (ACHuSG) are seeded inside of the material. Imaging illustrates the development. Similar to a bowl, half of a porous quail eggshell holds the printed material.

Results: A transparent phase of the yolk known as plasma was obtained. 96 hours of freezing yields a material theoretically qualified as a gel. Extending the freezing time also changes the material properties. ACHuSG cells have been successfully isolated and seeded into the material; separately, IMR-90’s also. The cells are all spheroidal, heterogeneous and amalgamate. The wells were either supplemented with water or media and demonstrate survival, division and morphological differences. Characterization of the cast reveals varying pores sizes on the eggshell surface depending on porosity inducing treatments.

Conclusions: The tuneable gel permits cell heterogeneity, division and survival; therefore, it holds a promising future for its application in tissue engineering of 3D tissues. With a biofriendly, porous sacrificial cast we hope to create a new type of 3D tissue cultures. By diffusion through the eggshell, the efficient drugs specific to each patient’s pathology will be determined.
Objective: To compare life-course patterns of major risk factors of head and neck cancer (H&NC) between countries (Canada and India) with different burdens of disease.

Method: We conducted a hospital-based case-control study in Canada (460 cases, 458 controls) and India (350 cases, 371 controls). Cases newly diagnosed with primary squamous cell H&NC and non-cancer controls were selected from the same hospitals and frequency-matched by age and sex. Interviews using a structured questionnaire and life-grid collected information on behaviours (e.g., tobacco smoking, alcohol consumption, paan chewing, oral health, sexual habits), indicators of socio-economic position (SEP) and family environment in 3 life periods: childhood, early and late adulthood. Personal and socio-political events were used as chronological references during the interview to aid participant recall. Oral samples were collected for human papillomavirus (HPV) analysis.

Country- and sex-specific average trajectories of intensity of exposure to behavioural risk factors were estimated as flexible functions of age using generalized additive model-based regression splines. SEP and sexual habit history were summarized as boxplots for each life period. Additional age-specific measures (e.g., age of behaviour initiation) were compared.

Results: Observed Canada-India differences in life-course patterns of exposure will be discussed considering the socio-cultural context in these countries. Although SEP improved in both countries over consecutive life periods, this gradient was considerably lower in Canada than in India. Canadian cases initiated and achieved their highest intensity of tobacco and alcohol consumption 2-5 years earlier than Indian cases. However, the latter consumed higher amounts of both throughout their lives. Indian females rarely consumed tobacco and alcohol, but chewed more smokeless tobacco compared to Indian males. Indians showed conservative sexual practices compared to Canadians, which was reflected in markedly different HPV infection rates.

Conclusion: Contextual life-course interpretation of risk factor history is essential to understand the multifaceted etiology of H&NCs.
P 17: Risk factors related to chronic pain after breast cancer surgery: A 3-month prospective cohort study

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Aim: Chronic pain after breast cancer surgery (CPBCS) is significant clinical problem affecting 13%- 93% of patients. Furthermore, 5% to 10% of CPBCS cases are estimated to suffer from severe and disabling CPBCS. Thus, the primary aim of this prospective 3- month cohort study was to identify pre-, intra- and post-operative factors related to CPBCS risk.

Method: Ninety five female patients who were incident cases with breast cancer and who were scheduled to undergo breast cancer surgery were recruited from Jewish General Hospital. Baseline data was collected on age, pre-operative pain, anxiety, depression and optimism. Telephonic follow-up interviews were conducted at seven days after surgery to assess the acute pain and three months after surgery to assess the chronic pain using brief pain inventory scale by the same investigator. Intra-operative data on type of surgery, radiotherapy and chemotherapy was assessed from physicians chart. Univariate and multivariable logistic regression analyses were used to assess risk factors for CPBCS.

Results: At the 3-month follow-up interview, 45(55%) of patients reported CPBCS out of which 20 patients (44.44%) had mild pain (NRS 1–3), whereas 24 patients (53.33%) reported moderate pain and one patient (2.22%) had severe pain (NRS >7) in the breast region. In the multivariable analyses, including the pre-operative factors, pre-operative pain [odds ratio (OR) = 3.68, p = 0.05] increased the CPBCS risk 3-month after surgery. Furthermore, pre-operative pain [OR = 4.41, p = 0.05] remained related to CPBCS, when the model included pre-, intra- and post-operative factors. Age, psychological factors (anxiety, depression and optimism) and clinical variables (type of surgery and chemotherapy) did not contribute to CPBCS.

Conclusion: These results demonstrate that pre-operative pain increases the risk of CPBCS and therefore should be considered an important factor to be evaluated and managed for breast cancer surgery patients to reduce the burden of CPBCS.
Aim: To conduct a systematic review to identify the potential risk factors related to chronic pain after breast cancer surgery (CPBCS). CPBCS is a significant clinical problem affecting 8%-71% of patients. Many pre, intra and post-operative factors have been postulated to serve as potential risk factors for CPBCS.

Method: The literature search was undertaken from January, 1995 to October, 2014 using the Medline Ovid, Cochrane Central Register of Controlled Trials (CENTRAL), CINHL and EMBASE databases. Articles were considered relevant if they included breast cancer surgery, and had assessed CPBCS.

Result: We identified 2858 publications and 46, which met the eligibility criteria, were included in this review. From those, 12 (n = 1205) were randomized clinical trials, 11 (n =5833) were retrospective cohort and 10 (n = 4243) were prospective cohort studies. Neuropathic nature of CPBCS was investigated in 13 studies and three performed quantitative sensory testing. The potential risk factors assessed were: demographics, medical condition, type of surgery, type of anesthesia, number of lymph nodes involved, cancer characteristics, complications after surgery, adjunctive therapy, and psychological factors. The results showed that the most common factors associated with CPBCS were: axillary lymph node dissection (56.3%), young age (<40 years) (45.5%), post operative acute pain (40%), depression (35.7%), and radiotherapy (26.7%). Anxiety (21.4%), complications after surgery (6.2%), pre-operative pain and chemotherapy (10%) were less common factors associated with CPBCS.

Conclusion: There were considerable variations among studies - study designs, sample population, definition of chronic pain, pain scale used, surgical techniques, analgesic strategies, and adjunctive therapies. Demographics (age), clinical (radiotherapy) and psychological factors (depression) appears to contribute to CPBCS. A comprehensive inclusion of demographics, clinical and psychological factors in a prospective cohort design need to be used by researchers attempting to identify the risk factors related to the development of CPBCS.
P 19: Temporomandibular disorder related pain among adolescents in Montreal – a qualitative study

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**Background:** Temporomandibular disorder (TMD), can be defined as a number of musculoskeletal conditions in people that involve pain and dysfunction in the temporomandibular joint, the masticatory musculature, or both. In a recent study conducted in Montreal, Quebec, TMD-related pain prevalence of 11.5% (31/316) was calculated in adolescents between 14 to 17 years of age. Comorbidities such as headaches, neck and back pain were also associated with TMD-related pain with little research evidence reported in the literature about the qualitative aspects of this chronic pain.

**Objective:** The purpose of our research is to conduct a qualitative study among adolescents in Montreal, investigating their experiences of living with TMD-related pain.

**Methodology:** In this qualitative study 10 to 15 adolescents diagnosed with TMD-related pain via self-reported questionnaire and clinical examination through the McGill TMD clinic will be recruited. The interviews will be recorded and transcribed verbatim followed by an interpretive phenomenological analysis.

**Significance:** TMD-related pain is a significant problem for affected adolescents and has an extensive impact on their overall quality of life, leading to stress, emotional problems and somatic complaints. Thus, a qualitative analysis will increase our understanding of the adolescent’s experiences living with TMD-related pain and will help provide a tailored treatment plan utilizing a multidisciplinary approach.
P 20: Blocking CSF1R signaling on macrophages in peripheral nerves attenuates injury-triggered neuropathic pain

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The importance of neuroimmune interaction in neuropathic pain has been evidenced by the involvement of immune cells in peripheral and central sensitization. Macrophage-colony stimulating factor (M-CSF) is a growth factor associated with macrophage survival, activation, proliferation, and differentiation. In this study, we investigated whether blocking signaling between MCSF and its receptor CSF1R can be effective in relieving neuropathic pain.

Partial sciatic nerve ligation (PSNL) was performed in mice. Macrophage phenotype in injured nerves was analyzed using fluorescence activated cell sorting (FACS). Animals were treated with a CSF1R inhibitor, PLX5622, in both preventive and reversal paradigms. The effect of PLX5622 on macrophage number and function was assessed by FACS. Animal neuropathic pain behavior was monitored using von Frey hairs and acetone test.

Following PSNL, massive CD45+ CD11b+ CD68+ macrophages were detected in sciatic nerves. The accumulation was peaked at D3 and reduced at D14 and D28 post-PSNL. However, the number of macrophages in injured nerves remained significantly higher than that of uninjured nerves. CD86+ macrophages increased dramatically at D3 post-PSNL. CD206+ macrophages were also increased. CD86 expressing macrophages were dominant over CD206+ macrophages at all examined time-points. GFP+ hematogenous macrophages were sharply increased at D3 post-PSNL, which contribute mainly to the pool of CD86+ macrophages, whereas the composition of CD206+ macrophages were not affected by the influx of hematogenous macrophages. Significant alleviation of both mechanical and cold allodynia was observed after PLX5622 treatment in both preventive and reversal groups. While PLX5622 reduced the total number of macrophages in injured nerve, it affected more specifically CD86+ macrophages, as a consequence, various pro-inflammatory cytokines were reduced.

Inhibiting macrophage activation with CSF1R inhibitor is effective in attenuating neuropathic pain behavior. It is important to further identify unique signatures of nerve resident non-hematogenous and hematogenous macrophages which could be a potential therapeutic target.
Oral health care is amongst one of the highest unmet needs of people living with HIV/AIDS (PLWH/A) due to the barriers they face accessing care, including stigmatization. PLWH/A have reported being treated differently by dental professionals, or even being refused care. Having said that, we still know very little about how PLWH/A experience stigmatization accessing dental care and how they are affected by these negative experiences.

Our objective is to better understand the lived experiences of PLWH/A with respect to accessing and receiving quality dental services in Quebec. In particular, we would like to explore the difficulties and stigmatizations they face trying to fulfil these needs.

We will adopt a participatory approach and an interpretive phenomenological research design. We invited members of COCQ-SIDA (Coalition des Organismes Communautaires Québécois de lutte contre le SIDA) and ACCM (AIDS Community Care Montreal) to collaborate with us at all stages of our research. In order to gain an in-depth understanding of the perspectives and experiences of PLWH/A, we will use a qualitative approach, namely interpretive phenomenology, which is particularly appropriate for understanding and describing complex and sensitive experiences. We will conduct semi-structured in-depth interviews with six to 10 English-speaking adults living with HIV in Montreal, using an interview guide. The interviews will be recorded and transcribed. The transcriptions will then be interpretively analysed, supported by narratives of the interviewees.

In addition to submitting an article to a scientific international journal and presenting in an international conference, we plan to publish a report in the Journal of the Canadian Dental Association for Canadian dentists. We will also target dental students, through the development of workshops at McGill University. Our co-researchers in the community will also use the findings of the study to better support the dental needs of their community members.
Dental caries is one of the most prevalent oral diseases, and causes pain, infection, tooth loss, and negative impacts on quality of life. Although diet is one of the main factors contributing to dental caries, it can also play a preventive role. Indeed, specific foods seem to have an anticariogenic effect. Functional food describes, “Food products fortified with special constituents that possess advantageous physiological effects”. To explore how functional foods can be beneficial to oral health, this project investigate longitudinal associations between functional food intake and children’s dental caries incidence using baseline, 1st and 2nd visit data from The Quebec Adipose and Lifestyle Investigation in Youth (QUALITY) Cohort.

The specific aims are: (i) To describe the distribution of functional food intake and prevalence of dental caries, at baseline, 1st and 2nd follow ups; (ii) To examine the impact of functional food intake at baseline on children’s dental caries at the 2 and 3rd follow ups.

**Methodology:** Our study includes data from 3 visits of QUALITY Cohort, an ongoing prospective study aimed at understanding the natural course of obesity among Quebec children. A total of 630 Caucasian children aged 8–10 years at baseline and their biological parents, at least one of the parents being obese, were recruited in Montreal and Quebec City areas. Dental caries was assessed using the World Health Organization criteria and measured using the Decayed Missing Filled Surfaces (DMFS) index. Socio-demographic, oral health behaviors were collected using structured questionnaires. Dietary information was collected using 24-hour recall information. A nutritionist interviewed each child on one weekend day and two weekdays, randomly chosen. Children where asked what they ate during the day and their parents were asked to specify the brands and recipes used. Data analysis involve descriptive and regression analysis. We will present preliminary results in this presentation.
P 23: Needleless device to inject dental local anesthesia

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Background: Local anesthesia is used to control pain in dental procedures. It is administrated through long fine needle to infiltrate the tissues (Infiltration) or block the main nerve (Nerve block). Many patients experience phobia from dental injections and usually restrain from any necessary dental treatments.

Objectives: The aim of this project was to optimize a pain-free needleless jet device for local anesthetic delivery.

Methods: The needleless jet was used to inject saline mixed with 1% Methylene blue & 0.1% Borax in Ballistic gelatin blocks (Dimension 5×3 centimeter). Different pressures (130 to 170 PSI) and volumes of injections (0.2-0.3ml) were assessed. The optimized injection set up was then tested in a pig jaw to assess infiltrations in the lower alveolar sockets and in a Theil cadaver to assess inferior alveolar nerve block.

Results: Shape of liquid spreading through the gelatin was similar to a wavy motion. The depth of infiltrations was probably related to pressure and volume of injections. In the cadaver, the inferior alveolar nerve and the medial pterygoid muscle were colored with the bluish dye. Also the lower sockets in the pig jaw were infiltrated with the injected mixture.

Conclusion: Switching from ordinary needle injection to needleless jet injection could bring a paradigm shift in the field of dentistry, which will benefit both the patients and the dental clinicians. This jet device could replace the needle injection in dental applications because it can deliver injectable solutions to the most commonly targeted tissues. At this point further clinical investigations would be needed to introduce the device into clinical practice.
P 24: Improving Dental Care Access to Wheelchair Patients: Dentists’ and Hygienists’ Perspective – Research Proposal

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Introduction: Canada has a handicapped population of around 4.4 million and 2.9 million of them have strict mobility limitations. With significant restrictions in their daily activities, health care access is one of the disparities they must overcome. In the case of dental care services, these individuals have to face different difficulties in the pathway to reach dental care: from the beginning, when they attempt to find a clinic able to receive them, up to the moment when they are receiving dental treatments. In Quebec there is neither a clear guideline nor a regulation to treat wheelchair patients. A previous study in the Oral Health and Society division from the Faculty of dentistry, McGill University has explored and identified barriers to access to dental services from the wheelchair patients’ perspective. Thus with the attempt to improve the access to dental services results pertinent the understanding from the all participants’ point of view.

Objectives: The aim of this study is to explore the dental professionals’ experiences and perspectives in treating wheelchair patients in order to identify the ideal strategies to create in guidelines for treating this community.

Methods: We will conduct an ethnographic study by observing the interaction between patients and dental staff during dental consultation. Which it will develop in 20 dental private offices and in 4 dental clinics located at hospitals in Montreal. The findings will be triangulated with formal and informal semi-structured interviews of dentists and hygienists before and after the observation. The data was interpreted by inductive thematic analysis.

Significance: The actions from this study are addressed to three different axes:

1) Dental professionals: by creating a guideline of good practice and defining dental policies regarding dental care access to wheelchair patients.

2) Academia: development of the programs of professional capacitation

3) Population: information to the community.
**P 25: Immediate loading of 2-unsplinted-implant mandibular overdenture: disease-oriented and patient-oriented outcomes**

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**Aim:** To assess clinical and patient-centered outcomes of immediately loaded implants in individuals wearing a 2-unsplinted-implant mandibular overdenture for up to two years.

**Material and Methods:** In this clinical trial, 18 individuals (62.4 ± 7.7 years) were treated by means of maxillary denture, 2 immediately loaded implants, 2 Locator® attachments (Zest Anchors LLC, Escondido, USA) and a mandibular overdenture. Three implants (OsseoSpeed TXTM, DENTSPLY Implants, Mölndal, Sweden) were placed in the interforaminal mandibular area and locators were inserted on the right and left side implants. The unloaded midline implant served as a control. The immediate loading was done within 24 hours of surgery. Clinical and radiographic data, patients’ satisfaction and quality of life were collected at baseline (T0), 12 (T1) and 24 (T2) months after immediate loading. Brunner-Langer approach was used for statistical analysis.

**Results:** Implant failure rate was 11.1% (per patient). None of the non-loaded implants failed over 2 years. The median change of radiographic and direct marginal bone loss were 0.19mm (IQR=0.48, p=.003), and 0.45mm (IQR=0.97, p<.0001) from T0 to T1, and 0.09 mm (IQR= 0.36, p>.05) and 0.14 mm (IQR= 0.55, p>.05) from T0 to T2, respectively. The implant stability quotient increased from T0 to T 2(p<.0001). There was no clinical outcome difference between the non-loaded and loaded implants. Patient-centered outcome improved (p<.0001) over 2 years.

**Conclusion:** No statistically significant differences regarding annual failure rates, marginal bone-loss and implant stability was found between loaded and non-loaded implants up to two years. Furthermore, patient-reported outcomes improved over 2 years.
Circadian rhythms are physical, mental and behavioural changes that follow a roughly 24-hour cycle, responding primarily to light and darkness in an organism’s environment. A molecular clock has been characterized in immune cells and response. The time of the day seems critical to the nature of the immune response in the disease inflammatory and healing processes following surgery.

Chronotherapy, the dosing of medications with reference to critical 24-h rhythms of disease activity and the pharmacokinetics of medications, has been applied to the treatment of various medical conditions (e.g., rheumatoid arthritis, asthma, hypertension). Moreover, it has been shown to decrease the adverse effects of anticancer drugs.

Periodontitis is a chronic inflammatory disease characterized by progressive destruction of the tooth supporting apparatus, mainly treated by surgery resulting in pain, redness and swelling. Management of these postoperative signs and symptoms is frequently based on pharmacological control of local and systemic mediators of pain and inflammation.

Non-steroidal anti-inflammatory agents have a significant control of postoperative signs and symptoms. Reducing the dose of these medications to decrease the potential adverse effects and to achieve the same or added efficacy is an important research and clinical question to be addressed.

**Aims:** to investigate the clinical efficacy of non-Steroidal anti-inflammatory drug (Ibuprofen) chronotherapy in the periodontal surgery healing. The specific aim will be to estimate the clinical efficacy of dosing timing dependency of ibuprofen 600 mg/800 mg (single dose per day) after open flap debridement (OFD) periodontal surgery in patients with chronic periodontal diseases.

**Methods:** we will conduct a single centre, crossover, double-blind, randomized clinical trial to fulfil our aim. We are currently developing the collaborations and logistics of the study to be able to conduct our study.
**P 27: The oral health and dental care pathways of refugees and asylum seekers.**

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**Introduction:** Canada receives approximately 25,000 refugees and asylum seekers (humanitarian migrants) annually. However, the Canadian government lacks research to guide oral health policies and allocation of funds for these precarious populations.

**Objective:** To explore human migrant’s understandings of oral health, as well as their experiences of and pathways to oral healthcare in Montreal.

**Methods:** Over the course of 12 months, we used “focused ethnography” combining semi-structured interviews with observation of dental care service. Participants included a maximum variation sample of adult humanitarian migrants who reported an oral health condition in Montreal, as well as dentists and social workers working with this population. Ethnographic analysis was informed by the McGill Illness Narrative Interview (MINI) guide.

**Provisional results (limited to humanitarian migrants):** To date, we have recruited 25 humanitarian migrants from five global geographic regions.

**Initial Illness Narrative:** Majority of participants had an oral health condition preceding migration. Explanatory model: Most participants identified excessive consumption of refined carbohydrates and inadequate oral hygiene as the main causes of oral diseases.

**Services and response to treatment:** Those with access to oral health care reported positive treatment experiences. Barriers to oral health care included: No dental insurance and exorbitant dental fees; long waiting times to dental appointments; and inadequate information about the dental healthcare system.

**Impact on life:** Oral diseases negatively affect the lives of participants with reported impacts ranging from feeling of discomfort to “wasted lives.”

**Conclusions:** Oral health remains a major concern for humanitarian migrant populations. While policies and programs are emerging on a global scale to reduce the oral health gap, many migrants in Montreal are living with oral conditions negatively affecting their daily activities. Governmental policies guaranteeing care and provision of oral health care services by non-governmental organizations will improve the oral health of this population.

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**Background:** Denture stomatitis (DS) is an oral biofilm-associated chronic inflammation of the palatal mucosa. While the etiology remains unclear, over prescription of antifungals is commonly observed in practice.

**Objectives:** To assess if palatal brushing can reduce the following in short and long term periods: (1) The formation of Candida species colonies, and (2) The clinical inflammation caused by the wear of dentures.

**Primary hypothesis:** Palatal brushing reduces the formation of Candida species colonies in denture-biofilm. Secondary hypothesis: Palatal brushing improves clinical signs of palatal inflammation in edentate individuals diagnosed with DS.

**Methods:**

**Design:** Parallel, double blind, phase II, randomized controlled trial.

**Setting and location:** Faculté de médecine, Université de Montréal.

**Intervention:** Palatal brushing + standard oral hygiene measures. Comparison: Standard oral/denture hygiene measures.

**Sample size:** \(n=180\); ensuring a power of 85\%, at alpha level of 0.025.

**Inclusion Criteria:** (1)18 years or older, (2) Wearing a maxillary complete conventional denture, (3) Moderate to severe signs of DS according to Schwartz index. 

**Exclusion Criteria:** (1) Other oral mucosal lesions, (2) Systemic conditions which predispose to Candida spp. infection like diabetes and xerostomia , (3) History of chemotherapy/ radiotherapy, (4) Used antibiotics, steroidal or antifungal agents in the 4 weeks prior to the study.

**Data Collection:** Unstimulated whole saliva, denture sonicate and palatal biofilm collected according to standardised protocol. 

**Primary outcome:** Mean change in Candida spp. CFU count presented as CFU/ml at 0, 3 and 6 months.

**Secondary outcome:** Change in clinical signs of symptoms according to Schwartz index.

**Data analysis:** Data will be entered and analyzed in a blinded fashion. Blinding will be lifted once data analysis is complete. Descriptive, bivariate and mixed models with repeated measures will be performed adhering to the intention to treat principle.

Clinicaltrial.gov reg# NCT02686632

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