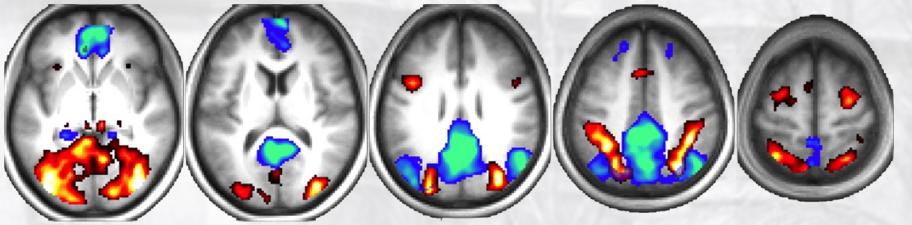
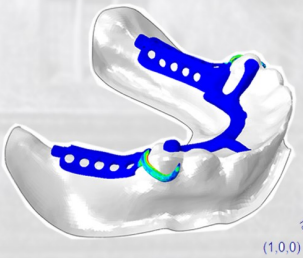
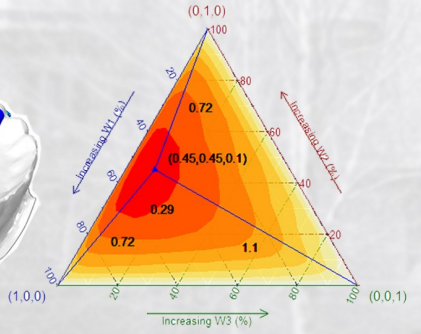
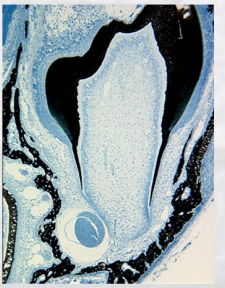
McGill University
Faculty of Dentistry
12th Annual Research Day









Thursday, April 6th, 2017
New Residence Hall, 3625 Ave du Parc

Faculty of Dentistry
McGill University
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Montreal, QC, Canada H3A 0C7

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12th Annual Research Day of McGill's Faculty of Dentistry

Welcome to the 12th Annual Research Day of McGill's Faculty of Dentistry ! This year, we are delighted to have Dr. Eduardo L. Franco (Faculties of Medicine and Dentistry, McGill University) as the Keynote Speaker. The Research Day will also include more than 40 oral and poster presentations from students of our faculty, and these presentations will cover a wide range of exciting research areas.

This year's Research Day would not have been possible without the outstanding work from Dimitra Athanasiadou and Haider Al-Waeli, two graduate students part of the Organizing Committee. Dimitra (Chair) and Haider (Vice-Chair) have worked extremely hard over the past couple of months in order to find a keynote speaker, design the scientific program, and secure funding to support this event. They have worked closely with Marlene Balena, who has been tremendously helpful throughout the preparation process of this Research Day. Marlene's support has been invaluable, particularly at the administrative level, but also when trying to find a location to host this event. Over the past few months, Dimitra, Haider and Marlene have exchanged countless emails, phone calls, and had several meetings to ensure the success of this year's Research Day.

I would also like to thank all session chairs as well as judges who accepted to contribute to the evaluation of oral and poster presentations for the Research Day. The Organizing Committee is highly grateful for your contribution, as these tasks require time, rigor, and energy. I would also like to thank Mr. Sreenath Madathil, who contributed to the preparation of the booklet, and all other individuals providing technical and/or logistical support over the course of the day. Finally, I want to thank Dr. Mari Kaartinen, who gave us great advice in order to organize the Research Day. Mari served as the Research Day advisor for several years and her guidance was very much appreciated.

As in previous years, the Organizing Committee received the names of nominees who might serve as the next Vice-Chair/Chair for the 13th (2018) and 14th (2019) editions of the Research Day. All attendees are encouraged to support one of the nominees by voting at the front desk. The outcome of the nomination process will be announced at the end of the day.

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

Sponsors

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RÉSEAU DE RECHERCHE EN SANTÉ BUCCODENTAIRE ET OSSEUSE

Credits (Cover Page)

- Upper image provided by Dr. Laura S. Stone: Adapted from: HBM (2015) 36:2075-2092.

- Bottom left image provided by Eng. Ammar Alsheghri and Dr. Faleh Tamimi Marino: “Finite Element Analysis (FEA) of a cobalt-chromium (Co-Cr) removable partial denture framework showing stresses developed in the denture.”

- Bottom middle image provided by Mr. Sreenath Madathil: “Ternary plot used in a novel statistical technique, using Bayesian approach, in the field of life course epidemiology.”

- Bottom right image provided by Dr. Marc D. McKee: “Histology section of mouse mandible with mineralized alveolar bone and tooth stained black.”

Booklet and cover design: Mr. Sreenath Madathil

FACULTY OF DENTISTRY
RESEARCH DAY

Organizing Committee
Dimitra Athanasiadou, *Chair*
Haider Al-Waeli, *Vice-Chair*
Dr. Marc O. Martel, *Advisor*

Event Coordinator
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Dongdong Fang

Poster Presentation Award Judges
Dr. Frances Power
Juliana Marulanda
Ninoska Enriquez

Knowledge Translation Award Judges
Dr. Marc O. Martel (Biomedical Division)
Dr. Mary Ellen Macdonald (Oral Health and Society Division)

Oral Presentation Session Chairs
Nicholas Mikolajewicz, Mohamed Nur Abdallah, Mark Keboa, Entisar Abdulkader, Jessica Italia, Gurveen Gill

AWARDS

- The Best Graduate Student Oral Presentation Awards (3 prizes) are given by the Network for Oral and Bone Health Research.
- The Best Graduate Student Poster Presentation Awards (3 prizes) are given by the Network for Oral and Bone Health Research.
- The Knowledge Translation Prize will be awarded to the student that best demonstrates the potential of their research in a 'Knowledge Translation panel' and is given by the Faculty of Dentistry.

Past Winners:

	Orals:	Posters:	Knowledge Translation:
2016	1st Akhil Soman	1st Ahmed Al Subaie	Lina Abu Nada
	2nd Juliana Marulanda	2nd Peter Lee	Mehrnoosh Alborzi
	3rd André Charbonneau	3rd Kaushar Jahan	
2015	**Orals:**	**Posters:**	**Knowledge Translation:**
	1st Khurram Khan	1st Betty Hoac	You-Jung Nicole Seo
	2nd Anu Edasseri	2nd Garthiga Manickan	Sadaf Farookhi
	3rd Sandrine Couldwell	3rd Akhil Soman	

McGill University
Faculty of Dentistry
12th Annual Research Day

McGill

Day at a glance

07:45 – 08:45	Poster Set-up
08:45 – 09:00	Welcome Address: Dr. Maryam Tabrizian & Dimitra Athanasiadou
09:00 – 10:45	Mineralized Tissue Biology & Tissue Engineering
10:45 – 13:00	Poster session & lunch (Lunch beginning at 12:00)
13:00 – 14:45	Oral Health & Society
14:45 – 15:00	Coffee Break
15:00 – 15:45	Keynote Address:

"The Wild West of Scholarly Publishing:
The Decline of the Signal-to-Noise Ratio in Science"

Dr. Eduardo L. Franco
Professor
Departments of Oncology and
Epidemiology, Biostatistics and Occupational Health
McGill University, Faculty of Medicine,
Faculty of Dentistry

15:45 – 16:30	Pain and Neurosciences
16:45 – 17:30	Presentation of Awards

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McGill University
Faculty of Dentistry
12th Annual Research Day

Keynote Speaker:

Dr. Eduardo L. Franco, BSc, MPH, DrPH, FRSC, FCAHS, OC
Professor
Departments of Oncology and Epidemiology, Biostatistics and Occupational Health
McGill University, Faculty of Medicine, Faculty of Dentistry

The Wild West of Scholarly Publishing: The Decline of the Signal-to-Noise Ratio in Science

The centuries-old paradigm of peer-review-based scholarly publishing is changing and not all of it for the better. Some 15 years ago, the open access (OA) publishing model for academic journals began a revolution in the way scientific findings are brought to the public domain. The OA model democratized access to scientific information by transferring the economic burden of sustaining academic journals from the reader to the author. OA is an irresistibly progressive and just concept that we should all embrace. However, there was a dark side to the OA movement. With electronic publishing, the low cost of maintaining a scientific journal combined with the economic incentive of charging OA fees for publishing papers were quickly perceived as a great business opportunity by groups that had no tradition or experience with scholarly publishing. The fact that researchers need to publish papers to move ahead in academia contributed a third sine qua non condition for the development of a perfect storm. Thus, some 10 years ago the world of scholarly publishing by reputable professional societies or established and experienced publishers began to be polluted by a swarm of so-called predatory publishers. The same racket was quick to sense an additional business opportunity organizing vanity conferences, knowing all too well that researchers also need to do podium presentations to be seen as productive by their institutes and universities. Today, there are more predatory publishers than serious, academic ones. Predatory journals publish anything and pay little to no attention to grievous violations of scientific conduct, such as fabrication of data and plagiarism. They would not know the difference between a serious scholarly contribution and the verbiage from someone with an anti-vaccine agenda or the rant from someone who sees the world as a vast conspiracy. The academic communities need new systems for recognizing merit and rewarding productivity. Whichever direction scholarly publishing may go, it must preserve the concept of peer review. Although imperfect it is still the best mechanism we have to maintain the signal-to-noise ratio of science as useful to society as possible.

Thursday, April 6th, 2017
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Oral Presentations

MINERALIZED TISSUE BIOLOGY AND TISSUE ENGINEERING

9:00—9:15	**OP 1:** Fibrillin-1 directly regulates adipocyte differentiation and expansion. **MCKEE TJ**
9:15 —9:30	**OP 2:** Investigating the role of PHEX-FGF23 axis and γ-caroboxylation on vascular calcification caused by matrix Gla protein deficiency. **PARASHAR A**
9:30—9:45	**OP 3:** Induction of 3D printed vascularised synthetic free-flaps for reconstruction. **MAILLARD S**
9:45—10:00	**OP 4:** Metal-composite adhesion based on diazonium chemistry. **OWEIS Y**
10:00—10:15	**OP 5:** Tooth bleaching denaturalizes tooth enamel proteins. **CIOBANU O**
10:15—10:30	**OP 6:** Non-steroidal anti inflammatory drugs' chronotherapy could enhance bone healing after surgery. **AL-WAELI H**
10:30—10:45	**OP 7:** Chiral switching of calcium carbonate biomineral induced by a single chiral enantiomer of amino acid. **JIANG W**

ORAL HEALTH AND SOCIETY

13:00—13:15	**OP 8:** Effects of beta-blocker on prognosis and survival in head and neck cancer. **LI L**
13:15—13:30	**OP 9:** Temporal-interactions of HPV and tobacco-smoking may affect head-&-neck cancer latency. **MADATHIL S**
13:30—13:45	**OP 10**: The onset of oral sex, human papillomavirus and oropharyngeal cancers: Evidence for mediation. **LAPRISE C**
13:45—14:00	**OP 11**: What is preventing dentists from providing person-centred care? **APELIAN N**
14:00—14:15	**OP 12:** Toward person-centred care: Perspectives of free dental clinic users. **NOUSHI N**
14:15—14:30	**OP 13:** Developing and validating a questionnaire to measure determinants of oral health behavior among home caregivers. **SHANNA E**
14:30—14:45	**OP 14:** Are there barriers for professional development of women dentists? A qualitative study in Saudi Arabia. **RAJEH M**

PAIN AND NEUROSCIENCES

15:45—16:00	**OP 15:** Differential effects of the MC1R "red hair" SNPs on pain sensitivity and depression. **ZORINA-LICHTENWALTER K**
16:00—16:15	**OP 16:** Excessive temporomandibular joint overloading leads to neuropathic orofacial pain in mice. **WANG F**
16:15—16:30	**OP 17:** A mixed methods study of chronic non-malignant pain in Qatar. **ALANEZI S**

16:45—17:30 **PRESENTATION OF AWARDS**

Poster Presentations

BIOMEDICAL SCIENCES

P 1 PKC-regulated membrane resealing underlies a major mechanically-evoked ATP release pathway in murine osteoblasts. **MIKOLAJEWICZ N**

P 2 Transglutaminase activity regulates differentiation, migration and fusion of osteoclasts via affecting actin dynamics and RhoA activity. **SUN H**

P 3 Role of fibrillin-1 fragments in osteoclast regulation. **MUTHU ML**

P 4 Cell autonomous role of Phosphatase orphan 1 in skeletal tissue development. **ENAGRAT A**

P 5 Ablation of osteopontin in osteomalacic Hyp mice partially rescues the deficient mineralization without correcting hypophosphatemia. **HOAC B**

P 6 Establishment and characterization of a new human submandibular salivary gland cell line: Lich Cell Line (LCL-SV). **LIN L-C**

P 7 Subcellular characterization of bone marrow cell extract: A mitigator against irradiation injury to salivary glands. **WU DTS**

P 8 Injectable chitosan sponge for cellular encapsulation in bone repair applications. **JAHAN K**

P 9 Biocompatibility of diazonium adhesives for dental application. **MEZOUR MA**

P 10 Application prospect of needle-free device in dental anesthesia. **GAO Q**

P 11 Nanostructure of avian eggshell (*Gallus gallus*) and correlation with functional properties. **ATHANASIADOU D**

P 12 Chirality of biomineralization inhibitors determine nucleation and growth of brushite crystals. **MOUSSA H**

P 13 Anti-calculus properties of toothpaste made with cuttlefish bone powder. **BASIRI T**

P 14 From toothpaste to "Implant-paste": A new product for cleaning dental implants. **AL-HASHEDI AA**

P 15 Detection of delta opioid receptor isoforms resulting from alternative splicing in mouse spinal cords and brains. **XING S**

ORAL HEALTH AND SOCIETY

P 16 Living with temporomandibular disorders through a social relational lens: A qualitative phenomenological exploration. **ITALIA J**

P 17 What factors contribute to the transition from acute to chronic pain and its persistence? 3-month cohort study. **AMHMED M**

P 18 Risk factors related to acute and chronic pain after breast cancer surgery: A prospective 3-month cohort study – Preliminary results. **GILL G**

P 19 Establishing a novel database for head and neck cancers. **ALGHAMDI O**

P 20 Patient' experience of pain during implant prosthetic rehabilitation: A qualitative study protocol. **ABDULKADER E**

P 21 Patients-reported outcomes of acrylic and cast metal removable partial dentures: A systematic review. **ALMUFLEH B**

P 22 Impact of immediate loaded implant-supported dental prostheses on edentulous maxillae: A systematic review. **ABDUNABI A**

P 23 Oral premalignant lesions database. **BASSYONI L**

P 24 Between struggle and hope: Oral care experiences for children with Autism Spectrum Disorder (ASD), parent's prospective. **ABOMRIGA A**

P 25 Snacks intake and dental caries increment: A two-year longitudinal study. **DA SILVA M**

OP 1: Fibrillin-1 directly regulates adipocyte differentiation and expansion

MCKEE TJ [1], TIEDEMANN K [1], REINHARDT DP [1], KOMAROVA SV [1,2]

[1]Faculty of Dentistry, McGill University, Montreal
[2]Shriners Hospitals for Children - Canada, Montreal

Marfan syndrome (MFS) is a heritable disease that affects the cardiovascular, ocular, and skeletal systems. MFS is caused by mutations in fibrillin-1, an extracellular matrix protein with structural and signaling functions. Fibrillin-1 expression was shown to correlate with obesity and increased adipocyte size in women while MFS is associated with lipodystrophy. Our goal was to examine the effect of fibrillin-1 on adipocyte differentiation and expansion. Mouse bone marrow-derived mesenchymal stem cells were cultured for 12 days with an adipogenic cocktail (insulin, dexamethasone, isobutylmethylxanthine, and indomethacin) with or without recombinantly produced fibrillin-1 fragments. Adipocytes were identified with the lipophilic dye Oil Red O. We quantified adipocyte count, size, and lipid droplet count. We found that in the presence of fibrillin-1 adipocyte counts were significantly reduced. Maximum inhibition of adipogenesis was achieved when fibrillin was present during the first 3 days of differentiation. The size of individual adipocytes was significantly increased in the presence of fibrillin-1 fragments. This effect was apparent when fibrillin fragments were present during the expansion phase of adipogenesis: days 4-12. Using quantitative RT-PCR we examined the expression of adipose markers, peroxisome proliferator activator receptor-γ (Pparg), adiponectin (Adipoq), and lipoprotein lipase (Lpl). Fibrillin-1 decreased expression of Pparg and Adipoq, but not that of Lpl. Finally, we characterized the adipose phenotype of the C1039G murine model for MFS with a mutation in the gene coding for fibrillin-1. We assessed the weight of inguinal white fat, interscapular brown fat, and the whole mouse. C1039G mice tended to be lighter than their wild type counterparts, however had more interscapular and inguinal fat in proportion to their body weight. We identify the direct role of fibrillin-1 in regulating adipocyte differentiation and expansion. Our results have the potential to translate into improved therapeutic strategies for correcting obesity and the significant societal burden it imposes.

Oral Presentation

OP 2: Investigating the role of PHEX-FGF23 axis and γ-caroboxylation on vascular calcification caused by matrix Gla protein deficiency

PARASHAR A[1], MARULANDA J[1], BAI X[2], KARAPLIS A.[2], MURSHED M [1, 2]

[1] Faculty of Dentistry, McGill University, Montreal, Quebec, Canada
[2] Department of Medicine, McGill University

Background:

Mutations in the matrix Gla protein (MGP) gene in humans lead to Keutel syndrome, a rare autosomal recessive disorder hallmarked by cartilage and vascular calcification, midface hypoplasia and pulmonary stenosis. MGP is highly expressed in chondrocytes and vascular smooth muscle cells (VSMCs). Mgp 'knockout' (Mgp-/-) mice display most of the phenotypic traits of Keutel syndrome. Earlier, we demonstrated that the introduction of a mutation in Phex gene in Mgp-/- mice prevents vascular calcification. However, it was not clear whether fibroblast growth factor 23 (FGF23), a phosphate regulating hormone acting downstream of PHEX, is involved in the process. MGP carries 4 γ-carboxylated glutamic acid (Gla) residues. Although these residues are thought to be critical for MGP's anti-mineralization function, so far no genetic experiment has been performed to examine their role in the vascular tissues.

Aims:

To investigate the effects of PHEX-FGF23 axis on the vascular calcification phenotype in MGP-deficient mice.

To investigate the functional roles of the Gla residues in MGP.

Results:

We crossed Mgp+/- mice with the ApoE-Fgf23 transgenic mice to generate Mgp-/-;ApoE-Fgf23 mice. As is the case with the PHEX-deficient mice, these mice show high levels of circulating FGF23 and hypophosphatemia. Interestingly, Alizarin red staining and histological analyses showed that unlike Mgp-/- mice, at 4 weeks of age, these mice do not show any sign of vascular calcification. In a separate experiment, we generated Mgp-/-;SM22Glamut mice, which do not express the endogenous MGP, but express in the VSMCs a mutant form lacking the conserved Gla residues. Surprisingly, these mice never developed vascular calcification.

Conclusions:

PHEX-FGF23 axis is a major regulator of vascular calcification in Mgp-/- mice and the known Gla residues are dispensable for MGP's anti-mineralization function.

Funding Support: Canadian Institutes of Health Research (CIHR)

OP 3: Induction of 3D printed vascularised synthetic free-flaps for reconstruction.

MAILLARD S[1], MAKHOUL NI[1], BARRALET J[1,2]

[1] Division of Oral and Maxillofacial Surgery, Faculty of Dentistry, McGill University, Montréal
[2] Division of Orthopaedics, Department of Surgery, Faculty of Medicine, McGill University, Montréal

Introduction: The inability to induce transplantable new blood vessels in biomaterials is a major obstacle in reconstructive surgery for critical bone defects. In this study, we attempted to induce neovascularization within a 3D printed construct using both an arteriovenous loop (AV loop) model and a simpler vascular model . We compared these two models.

Materials and methods: Induction of vascularised synthetic free-flaps: Scaffolds , with a 1 mm central axial channel designed to accommodate blood vessels, were 3D printed from utilizing monetite as described previously. Scaffolds were implanted in the femoral region of a and fitted around vascularture in Wistar rat and allowed to mature for 4 weeks. Three eThree xperimental models were examinedstudied utilizing either a/an: arteriovenous loop mod, venous model fitted around femoral vein or nand negative control (subcutaneous implantation) within the central channel of the scaffold. Analysis: Prior to sacrifice, the vasculature was perfused with a CT contrast agent (MicrofilÒ) and the specimens were explanted and investigated by means of micro-CT followed by a 3D analysis, which was which was supplemented by immunohistochemistry.

Results: The micro-CT analysis clearly indicated no significant differences between the venous group and the AV loop group and the control group displayed statistically the lowest vascular density (3,5 ± 2,5 [AV loop group] and 3,7 ± 2,6 [Vein group] vs. 0,5 ± 0,54 [control group], p-value < 0,05).

Conclusion: This study demonstrated for the first time that vascularization can be equally induced utilizing a vein orvein and AV loop that is placed axially in a scaffold can induce vascular branching equally effectively. This implies that time consuming AV loop microsurgery are may not necessary to promote neovascularization in a large size biomaterial.

Oral Presentation

OP 4: Metal-composite adhesion based on diazonium chemistry

OWEIS Y[1] ALAGEEL O[1,2], KOZAK P [1], ABDALLAH MN[1], RETROUVEY JM[1], CERRUTI M[3], TAMIMI F[1]**

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[2] College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia
[3] Department of Mining and Materials Engineering, McGill University, Montreal, QC, Canada

Objectives. Composite resins do not adhere well to dental alloys. This weak bond can result in failure at the composite-metal interface in fixed dental prostheses and orthodontic brackets. The aim of this study was to develop a new adhesive, based on diazonium chemistry, to facilitate chemical bonding between dental alloys and composite resin.

Methods. Samples of two types of dental alloys, stainless steel and cobalt chromium were primed with a diazonium layer in order to create a surface coating favorable for composite adhesion. Untreated metal samples served as controls. The surface chemical composition of the treated and untreated samples was analyzed by X-ray photoelectron spectroscopy (XPS) and the tensile strength of the bond with composite resin was measured. The diazonium adhesive was also tested for shear bond strength between stainless steel orthodontic brackets and teeth.

Results. XPS confirmed the presence of a diazonium coating on the treated metals. The coating significantly increased the tensile and shear bond strengths by three and four folds respectively between the treated alloys and composite resin. Conclusion: Diazonium chemistry can be used to develop composite adhesives for dental alloys.

Significance. Diazonium adhesion can effectively achieve a strong chemical bond between dental alloys and composite resin. This technology can be used for composite repair of fractured crowns, for crown cementation with resin based cements, and for bracket bonding.

Oral Presentation

OP 5: Tooth Bleaching Denaturalizes Tooth Enamel Proteins

CIOBANU O[1], NELEA V [1,2], MANSOUR A[1], ABDALLAH MN[1], KAARTINEN M[1], TAMIMI F[1]*

[1] Faculty of Dentistry, McGill University, Montreal, QC, Canada
[2] Department of Anatomy and Cell Biology, Faculty of Medicine, McGill University, Montreal, QC, Canada

All the current tooth whitening methods performed either in office by the dental professionals or at home by consumers rely on various formulations of peroxides. However despite being among the most ubiquituous cosmetic dental procedures proposed by dental providers and requested by the public, the effects of peroxides on the structure and composition of the enamel protein is poorly understood.

We investigated the effects of peroxide on human tooth enamel proteins using Circular Dichroism (CD) and Dynamic Light Scattering (DLS). We also measured the long term effect of peroxide on surface optical properties using spectrophotometry and on surface hardness using microindentation.

CD and DLS shows that hydrogen peroxide treatment alters the secondary structure of the enamel proteins .

Surface microhardness measurements showed a decrease in hardness that persists at a month after exposure. This was consistent with the optical changes observed in the treatment.

We concluded that peroxide treatment denaturalizes tooth enamel proteins and decreases the enamel hardness.

Oral Presentation

OP 6: Non-steroidal anti inflammatory drugs' chronotherapy could enhance bone healing after surgery

Al-WAELI H[1], NICOLAU B[1], STONE L[2], ABU NADA L[2] , ABDULKADER E[1], MANSOUR A[2], AL-SUBAE A[2], ABDALLAH MN[2], TAMIMI F[2]

[1]Division of Oral Health and Society, Faculty of Dentistry, McGill University, Montreal
[2] Division of Biomedical Sciences, Faculty of Dentistry, McGill University, Montreal

Non-steroidal anti-inflammatory drugs (NSAIDs) inhibit experimental fracture-healing. We hypothesized that the timing of NSAIDs administration influences bone healing and post-operative recovery after fracture surgery. To address this hypothesis, we used a validated fracture-healing model in young female mice (C57BL/6j wild-type). After fracture surgery, one group (n=8) received an evening subcutaneous dosage of carprofen (an NSAID drug) for 3 days, whereas a second group (n=8) underwent the same treatment in the morning. Pain response behaviour tests were performed at 1, 3, 7 and 14 days after surgery. The animals were euthanized after 2 weeks and their tibia bones were harvested for further biomechanical and microcomputed tomography (micro CT) analysis. To evaluate the changes in cytokines and gene expression, Luminex cytokines analysis and microRNA array sequencing were performed 3 days after surgery.

Weight bearing and guarding tests showed significant differences between evening and morning groups at different time points ($p<0.05$) and indicated a better bone recovery in the evening group. Three-point bending test showed that maximum torque force to bone fracture was significantly higher in the evening group than the morning one ($p<0.05$). MicroCT analysis revealed that the bone healing callus had a higher bone volume to tissue volume (BV/TV) in the evening group than the morning group. NSAID administration in the evening increased serum levels of IL-13, VEGF and IL-4, while in the morning group there was a significant increase of IL-1b and IP-10 ($p<0.05$).

This study demonstrated that evening dosing of NSAIDs after bone surgery promotes bone recovery and bone healing than morning dosing. This study introduces a new approach that could lead to a paradigm shift in the field of musculoskeletal pain management and healing after bone and craniofacial surgery. Moreover, it paves the way for manufacturing drug delivery systems for bone healing that considers the timing of NSAID dosing.

OP 7: Chiral switching of calcium carbonate biomineral induced by a single chiral enantiomer of amino acid

JIANG W,[1] PACELLA MS,[2] VALI H,3 GRAY JJ,[4] and McKEE MD [1,3]

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[2]Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, USA.
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[4]Department of Chemical and Biomolecular Engineering, Johns Hopkins University, Baltimore, MD, USA.

Oral Presentation

Chirality − a fundamental handedness phenomenon of asymmetry – is one of the most striking features of the living world where an object or molecule is not identical to its mirror image (and thus cannot be superimposed onto it). Chirality exists at all levels in biological world, ranging from individual molecules to the long helical tooth of the narwhal. For biomineralization, calcium carbonate-producing organisms record Earth's transition from an inorganic to a biological world, and chiral switching is common in many hardened structures of invertebrate terrestrial and marine organisms. This occurs at both the micro-level (coccolith skeletons) and macro-level (helical gastropod snail shells), and indeed pathological chiral calcium carbonate vaterite otoconia have been found in the human inner ear. Until now, mechanistic knowledge of how this chirality (and chiral switching) occurs in these hierarchically organized, calcium carbonate suprastructures has remained elusive.

Here, we present a chiral switching mechanism for calcium carbonate vaterite suprastructures (called toroids) that involves only a single enantiomeric form of the acidic amino acid aspartic acid (Asp). This finding provides insight on fundamental biomineralization processes applicable to chiral architectures seen across different organisms in biology, and on how pathological chiral vaterite otoconia might form in the human ear. High-resolution scanning electron microscopy (SEM), transmission electron microscopy (TEM), focused-ion beam (FIB) sectioning, and RosettaSurface energy-minimization computational simulations revealed that the single enantiomer L-Asp induced chiral switching in vaterite toroids in a manner that can be separated into two formative stages involving the crystalline vaterite platelets that form the toroids: i) a platelet layer tilting stage towards an achiral vertical organization, and ii) a platelet layer rotation stage where successional chiral switching events occur at the surface of the vaterite toroids. In conclusion, this finding provides insight into how simple homochiral biomolecules can create hierarchically organized, chiral biomineralized suprastructures.

OP 8: Effects of Beta-Blocker on Prognosis and Survival in Head and Neck Cancer

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[2]Faculty of Dentistry, McGill University, Montreal, Quebec, CANADA
[3]Faculty of Dentistry, McGill University, Montreal, Quebec, CANADA

Background: β-blockers, drugs commonly prescribed for the management of cardiac arrhythmias and hypertension, seem to have an anti-proliferation effect in tumors and increase the survival of cancer patients. However, studies on head and neck cancer (H&NC) are lacking.

Objective: To estimate the extent to which beta-blocker intake is associated with increase in 2-year survival and improved prognosis among H&NC patients.

Method: Subjects were selected as a sub-cohort of the HeNCe Life Study-Canada (n=306). All subjects reside within a 50km range of Notre-Dame Hospital in Montreal, where they received treatments for H&NC confirmed by histology. A database was established using the HeNCe database combined with comprehensive data extracted from the hospital OACIS database, documenting disease details, diagnostic tests, comorbidities, family history, medications, treatments, and recovery information. H&NC prognosis was defined as recurrence and metastasis of primary cancer. For survival, living statuses of patients were retrieved from the death registry of the Quebec Government. Patients who had been taking beta-blockers before the date of diagnosis for cancer were considered as exposed subjects. Data analysis included descriptive statistics, Kaplan-Meier curves and binary logistic regression.

Results: The majority of beta-blocker users used selective beta-blockers (97%). Beta-blocker consumption was not associated with increase in 2-year survival rate (IRR=1.55 [0.59-3.50]). In addition, beta-blocker consumption was not associated with reduction in recurrence (OR=0.57 [0.18-1.79]) or metastasis (OR=2.39 [0.48-11.86]) of primary cancer.

Conclusion: Beta-blocker intake is not significantly associated with increase in survival and improvements in prognosis for H&NC.

Oral Presentation

OP 9: Temporal-interactions of HPV and Tobacco-smoking may affect head-&-neck cancer latency

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Objective: To estimate the latency of human papillomavirus(HPV) positive and negative head and neck cancer(HNC) in relation to tobacco smoking among a sample of Canadian population.

Method: We used the data from a hospital based case-control study– HeNCe Life Study−Canada, conducted at 4 major referral hospitals in Montreal, Quebec. The cases (n=460) were newly diagnosed histologically confirmed squamous cell carcinoma of head and neck region (oral cavity, larynx, and oropharynx). Controls (n=458) were recruited from same hospitals, frequency-matched with cases according to age and sex. Data were collected using a structured questionnaire with a life grid technique and included information on socio-demographic factors (e.g., age, education, material deprivation) and behavioural factors (e.g., tobacco smoking, alcohol consumption histories). The intensity of smoking at each year before the interview for each participant in the dataset were computed. Oral trans-epithelial cells were collected using brush biopsy used for HPV DNA detection and genotyping.

Average retrospective smoking trajectories were plotted as a function of years from interview, separately for cases and controls using regression B-Splines and generalized additive models. Bayesian weighted cumulative exposure model was fit using an unconditional logistic regression likelihood to estimate the latency function for tobacco smoking, adjusted for age, sex, years of education and alcohol consumption. All analyses were stratified by HPV infection status.

Results: HPV positive cases and controls had similar proportions of smokers and they had smoked similar cumulative exposure to smoking. Whereas HPV negative cases and controls differed in these parameters. Shapes of latency functions for HPV positive and negative HNC were substantially different. Temporal patterns of smoking characterized by higher exposure closer to interview were strongly associated with HNC HPV negative compared to HPV positive HNC.

Conclusion: HPV infection may interact with tobacco smoking resulting in change time-dependent vulnerability (latency) to HNC.

Oral Presentation

OP 10: The onset of oral sex, Human Papillomavirus and oropharyngeal cancers: Evidence for mediation

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Background: Human papillomaviruses (HPV) are a strong risk factor for a subset of head and neck cancers (HNC), specifically oropharyngeal cancers (OPC). Sexual behaviours have been suggested as determinants of HPV infections in the oral cavity. As the evidence is inconsistent, this study aimed to estimate the extent to which life course oral sex behaviour is associated with an increased risk of OPC, and how much of the association is mediated by oral HPV infection.

Methods: We used data from a hospital-based case-control study conducted in Canada. Patients with newly diagnosed primary squamous cell HNC and controls frequency-matched to cases according to age and sex from four hospitals in the Montreal area were recruited. Semi-structured interviews using a life-grid technique collected information on life-course oral sex behaviours. Oral rinse and oral brush specimens were analyzed for HPV positivity and genotyping. Mediation model using logistic regression estimated the odds ratios (OR) and 95% confidence intervals (CI) for the association between life course oral sex behaviors and OPC.

Results: A total of 188 OPC cases and 429 controls were included in this study. The majority were between 15 and 30 years old the first time having oral sex (63.8% and 55.2% for OPC and controls, respectively). HPV DNA was detected in 63.3% of cases and 14.2% of controls. Age at first oral sex practice was associated with OPC (OR=2.98; 95%CI 1.37-6.47) after adjusting for potential confounders. When stratifying by HPV status, in the HPV positive group only, this association decreased (OR=1.09; 95%CI 0.25-4.71).

Conclusions: Our results suggest that the association between oral sex and OPC may be attributed to oral HPV infection in a sample of Canadians.

OP 11: What is preventing dentists from providing person-centred care?

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Most healthcare professions have shifted the way they teach clinical approaches from a biomedical to a person-centred perspective. Yet, dentistry remains strongly anchored in a biomedical world.

The objective of this project was to understand the barriers practicing dentists face to provide what we consider person-centred care. We conducted a qualitative descriptive study that comprised semi-structured interviews with dentists in private practice in the Greater Montreal area. After the analysis, we identified the following barriers:

. Fear of interpersonal conflict: participants thought that engaging in genuine conversations with patients would lead to situations of disagreement and even conflicts.

. Fear of litigation: dentists considered that the legal and licensing infrastructure would judge the treatment they provide through a strict biomedical framework.

. Fear of loss of money: participants thought that providing person-centred care was more time consuming and thus financially penalizing.

. Pleasure to excel technically: some dentists did not consider offering interventions that provided less procedural pleasure than technical ones.

. Narrow interpretation of health: participants considered the biomedical dimension as the only important dimension.

. Lack of information: participants knew nothing or very little about person or patient-centred care.

These findings should help academic institutions to design their programs on person-centred care and respond to the fears expressed by professionals. Also, legal infrastructures must recognize the paradigm shift from the biomedical to the person-centred.

OP 12: Toward Person-Centred Care: Perspectives of Free Dental Clinic Users

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The dental care system has seen a slow trend toward person-centred care (PCC) relative to other health disciplines. Whereas scholars and clinicians have made this progression away from disease-centred care, the views of people suffering from oral problems have not been considered yet. This is especially true regarding people who have limited access to the private dental system, and need dental care the most in our society. Our objectives in this study are: (1) to describe the perspectives of adults using free dental clinics regarding dental care, and (2) to document their suggestions for improvements to the dental care system.

This qualitative descriptive study includes participants who are users of a dental clinic in Montreal, Canada that provides subsidized care to people in poverty. We have adopted a maximum variation sampling strategy regarding age, sex, marital status, education level and employment status (n=12). The privilege method for collecting data is an in-depth, semi- structured interview through which we are discussing of and focusing on participants' experiences of and perspectives about dental services. Verbatim transcripts are being analyzed using thematic content analysis strategy.

Participants have emphasized the desire for more quality time with the dentist. Providing such time allows the clinician to take an explorative approach during appointments, and grants the clinician the opportunity to expand on the care being provided. It also gives patients the chance to make a more informed and shared decision about their care. Furthermore, the participants want to feel like the clinic and the clinicians care for them as people and thus as more than their dental ailments.

Person-centred dental care for adults using free dental clinics suffering from dental problems asks clinicians to adopt a more comprehensive approach when providing information. This would then help sustain shared-decision making in clinical encounters and improve patients' experiences.

Oral Presentation

OP 13: Developing and Validating a Questionnaire to Measure Determinants of Oral Health Behavior Among Home Caregivers

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Background: Most countries have observed a drastic increase in the number of elders since the 20th century. This has led to a huge number of chronically ill seniors worldwide who are often confined to their own homes and unable to perform daily activities. These limitations lead to deficient oral care and lack of access to routine dental care services; consequently, homebound elders' oral health tends to be poor and characterized by high levels of dental caries and periodontal disease. Recent studies underscore the impact of these conditions beyond the mouth, with detrimental effects on quality of life and general health. To date, the role of home caregivers in providing oral care is an important, yet unexplored aspect of seniors' oral health. Better understanding this role (including barriers and facilitators linked to the provision of oral care) can lead to more effective practices for maintaining the oral health of elders and decreasing the burden on caregivers. Therefore, the purpose of this study is to develop a questionnaire to measure the determinants of oral health behavior among home caregivers (DOHB) and to investigate its reliability and validity according to a behavioral model.

Methods: The development of the DOHB followed multiple phases: a structured literature search identified existing questionnaires, and review by experts formed the foundation for the initial draft of our new questionnaire. The DOHB was pretested on a group of (6) home caregivers to evaluate the content validity to produce a final 44-item draft. A 'final' questionnaire will be tested on a convenience sample of 25-35 home caregivers, who will complete the questionnaire in two separate sessions, with approximately 7 days between each session. Reliability and validity testing will be performed. Cronbach's alpha will be used to test internal consistency, whereas kappa and intraclass correlation coefficients (ICC) will be used to test reproducibility.

Oral Presentation

OP 14: Are There Barriers for Professional Development of Women Dentists? A Qualitative Study in Saudi Arabia

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Abstract: Globally, there is an upward trend in the number of women applying to dental schools and entering the profession of dentistry. Women dentists aim to advance their careers; however, differences exist between men and women dentists regarding leadership positions and work titles. For example, in Saudi Arabia, women usually occupy lower ranked positions than men in the Saudi public sector, and they are, therefore, paid less than their male counterparts. This study aimed to explore the possible barriers to Saudi women dentists' professional advancement using a qualitative descriptive study design. Specifically, semistructured in-depth interviews were conducted with 13 women practicing dentistry in the Makkah region of Saudi Arabia. The interviews were audio-recorded and transcribed verbatim, and the data were interpreted using qualitative content analysis (NVivo 11; QRS International). The results revealed 4 challenges that might delay the participants' career development. These include family-related challenges,

sociocultural challenges, workplace challenges, and transportation issues. From this perspective, some perceived barriers to the professional development of women dentists were found that might not be unique

to Saudi Arabia, and the article's suggestions and recommendations aim to minimize the effects of these barriers impeding women's advancement in dentistry in Saudi Arabia.

Knowledge Transfer Statement: This study makes an important contribution to knowledge on this topic. These results will aid policy makers' efforts to create supportive work environments through gender-specific incentives that meet the current professional and family needs of women dentists, particularly those in Saudi Arabia.

OP 15: Differential effects of the MC1R "red hair" SNPs on pain sensitivity and depression

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Oral Presentation

BACKGROUND AND AIMS

Melanocortin-1 receptor, encoded by the gene MC1R, has an established role in skin and hair pigmentation. Curiously, it has also been linked to pain sensitivity. Nonsynonymous (amino acid-changing) single nucleotide polymorphisms (SNPs) have been reported as both risk-enhancing and protective in pain sensitivity, and one such SNP has been shown to be associated with the major depressive disorder. Here we attempt to reconcile these apparently contradicting results by investigating all common SNPs (nonsynonymous as well synonymous SNPs in the regulatory region) in MC1R.

METHODS

We genotyped all common MC1R SNPs in a TMD case-control cohort as part of the multi-centre OPPERA (Orofacial Pain: Prospective Evaluation and Risk Assessment) project. Participants underwent quantitative sensory testing to evaluate sensitivity to thermal stimuli as well as filled out psychological assessment questionnaires. We then analysed for association between the genotyped SNPs and collected phenotypes.

RESULTS AND CONCLUSIONS

Our findings show that regulatory region SNPs – rs3212357 and rs3212361 – have a strong effect on pain sensitivity. Out of six common nonsynonymous "red hair" SNPs two – rs1805008 and rs885479 -- have minor alleles correlated with the protective alleles of the regulatory region SNPs, and the other four have minor alleles correlated with the risk alleles of the regulatory region SNPs. Therefore, the discrepancy in previously published heat sensitivity associations may be attributable to the synonymous SNP background on which the associated nonsynonymous SNPs fall. Furthermore, the minor allele of rs1805008 is nominally associated with depression. Thus, the same genetic pattern that may be protective in heat pain sensitivity appears to be a risk in psychological distress.

OP 16: Excessive Temporomandibular Joint Overloading Leads to Neuropathic Orofacial Pain in Mice

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Temporomandibular joint disorder (TMD) is a set of degenerative musculoskeletal conditions characterized by pain in temporomandibular joints (TMJ) and/or masticatory muscles. It is one of the most common causes of chronic orofacial pain, affecting up to 25% of the population. However, the underlying mechanism is unknown. Here, we reported a novel mouse model of TMD. With excessive TMJ overloading, mice developed acute and chronic TMJ dysfunction and orofacial mechanical hypersensitivity. Mice also exhibited abnormal cellular changes in the mandibular condyle, and masseter muscle dystrophy with local inflammation. In addition, the trigeminal nervous system was affected. Mice showed neuronal damage in the trigeminal afferent, increased macrophages activation in the trigeminal ganglia, and increased microglia activation in the trigeminal nucleus caudalis. Treatment with CSF-1 receptor inhibitor PLX5622 attenuated macrophages and microglia activations and inhibited orofacial mechanical hypersensitivity. These results shed light on the potential relationship between neuroinflammation and TMD.

OP 17: A Mixed Methods Study of Chronic Non-Malignant Pain in Qatar

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Background: Chronic pain has negative impacts on health-related quality of life (HRQOL) depending on pain intensity, location and dysfunction, in which perception, belief and experience have an important influence on living with chronic pain. **Aim**: This study aims to identify the relationship between chronic pain intensity, location and dysfunction with HRQOL, as well as to understand the experience of living with chronic pain in Doha, Qatar. **Methods**: A sequential explanatory mixed methods design was used to measure chronic pain intensity, location and dysfunction and their impact on quality of life, in which some quantitative findings were explored in more depth qualitatively. **Setting**: Chronic pain clinic at Hamad General Hospital in Doha, Qatar with 142 chronic non-malignant pain patients. **Results**: Over the half reported pain in the back and pain in more than one site. Multiple linear regression analysis revealed that increasing chronic pain severity and location had a significant negative effect on daily functioning ($p < 0.0001$), with no differences between locations. Increasing pain intensity and location have no significant impact on four domains of quality of life (mental health - MH, social functioning - SF, vitality - VT and general health - GH, $p > 0.05$). In contrast, there was a significant impact on MH and SF ($P \leq 0.05$) with older age. Two key elements emerged to account for a person's ability to live and cope with chronic pain: (1) social context and (2) religious beliefs; thus, people with chronic pain were able to maintain or enhance some domains of their HRQOL. **Conclusion**: How sufferers perceive their pain and personal resources, based on their background, religion and culture, can influence how they cope and live with their condition. Exploring the chronic pain experience in other cultures might contribute to approaches that enhance or maintain some aspects of HRQOL.

Oral Presentation

P 1: PKC-regulated membrane resealing underlies a major mechanically-evoked ATP release pathway in murine osteoblasts

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ATP release is one of the first events to occur in response to mechanical stimulation of mammalian cells. However, there is ongoing debate about the dominant pathways involved in the release of this ubiquitous signalling molecule. We mechanically-stimulated compact bone-derived osteoblasts through direct membrane deformation or turbulent fluid shear. Using a luciferin/luciferase bioluminescence assay, we demonstrated that ATP was released in response to mechanical stimuli. We next examined the contribution of membrane rupture and vesicular exocytosis to mechanically-induced ATP release. By applying a membrane impermeable dye Trypan blue (960 Da) before and 5 min after the mechanical stimulation, we have found that the membrane integrity was consistently compromised immediately upon mechanical stimulation, however this effect was reversible within 5 min in 70-90% of cells, indicative of active membrane resealing. Mechanical stimulation of single osteoblast also evoked rapid, PKC-dependent exocytosis of quinacrine-positive vesicles. Pre-treatment with an activator of protein kinase C (PKC), phorbol-12-myristate 13-acetate (PMA), significantly and drastically reduced the immediate dye uptake, stimulated vesicular exocytosis and decreased ATP released. Conversely, inhibition of PKC with bisindolylmaleimide II significantly increased the proportion of cells exhibiting dye uptake 5 min after the mechanical stimulation, reduced vesicular exocytosis and increased ATP release. We conclude that mechanical stimuli compromise the integrity of the cellular membrane, allowing ATP to be released into the extracellular space. The data also suggest that membrane resealing process may be regulated by PKC-dependent vesicular exocytosis. Taken together, these data suggest that reversible cell injury is a critical component of mechanosensitivity and mechanotransduction.

Key Words: ATP release, osteoblasts, membrane repair, purinergic signalling, mechanotransduction

Poster Presentation

P 2: Transglutaminase activity regulates differentiation, migration and fusion of osteoclasts via affecting actin dynamics and RhoA activity

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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 crosslinking of proteins through introducing an isopeptide bond between a lysine and a 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. Immunofluoresence microscopic analysis showed all the three enzymes co-localized with podosomes 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 inhibited the differentiation, migration and fusion of pre-osteoclasts. 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 suggesting that TG activity regulated actin dynamics in osteoclast precursors. Finally, the levels of RhoA, regulator of actin dynamics and podosome belt/sealing zone formation, was found significantly elevated in NC9 group compared to control group and the inhibitory effect of NC9 on osteoclastogenesis was reversed by RhoA inhibitor. Taken together, our data suggests that TG activity regulates osteoclastogenesis via affecting cytoskeletal and actin dynamics and RhoA activity. Funded by CIHR.

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.

Poster Presentation

P 3: Role of fibrillin-1 fragments in osteoclast regulation

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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. 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 (JCS (2013) 126: 4187). In order to identify the sub-fragment of fibrillin-1 that inhibits the osteoclast activity, we produced half fragments of rF31 and four different fibrillin-1 fragments spanning around rF31 in the HEK293 mammalian recombinant system. The purified proteins were tested for their effect on osteoclastogenesis using primary osteoclasts. We observed reduced number, different size and shape of the differentiated osteoclasts. To examine if fibrillin-1 fragments exhibit sufficient anti-resorptive activity in disease associated with osteoclast activation, we used Fbn1mgR/mgR mice as a model of Marfan syndrome. These mice display an osteopenic phenotype at 3 months (PNAS (1999) 96:3819). To understand the baseline bone parameters in this mouse model, we analyzed bones of these mice at different stages (4, 8, 12 and 15 weeks after birth). Fbn1mgR/mgR mice has increased length of long bones and increased body lengths at all time points compared to their controls. With DEXA we found a trend of decreased BMD compared to wildtypes. CT will be performed on both the tibia and vertebra for a detailed analysis. Primary osteoclast cultures were derived and differentiated from the bone marrow cells. We found no significant difference in osteoclast number between the wild-type and the Fbn1mgR/mgR mice. Given the osteopenic phenotype of Fbn1mgR/mgR mice we aim to evaluate the role of osteoblasts by performing co-cultures with osteoclasts. Additionally, gene expression studies are currently performed to better understand mechanistic aspects of osteoclastogenesis.

P 4: Cell autonomous role of Phosphatase orphan 1 in skeletal tissue development

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Introduction. Phosphatase orphan 1 (PHOSPHO1), is a member of the haloacid dehalogenase (HAD) superfamily of Mg+2-dependent hydrolases, which shows high affinity to phosphocholine, and phosphoethanolamine. This intracellular enzyme is expressed highly in the mineralized tissues. Global deficiency of PHOSPHO1 in Phospho1-/- mice leads to skeletal abnormalities, osteomalacia, scoliosis, and spontaneous fractures.

Objective. To investigate whether osteoblast-specific restoration of Phospho1 expression in Phospho1-/- mice will prevent the skeletal abnormalities and improve the mechanical properties of their bones.

Methods. We constructed a Col1a1-Phospho1 transgene in which a 2.3 kb proximal Col1a1 promoter drives the osteoblast-specific transgene expression. A total of 5 transgenic lines were generated. Transgene expression was confirmed by semi-quantitative PCR. Phospho1-/-; Col1a1-Phospho1 mice were generated to examine the bone mineralization status, bone volume over tissue volume and osteoblast and osteoclast numbers by histomorphometry. Finally, bone mechanical properties were examined by 3-point bending tests.

Results. Semi-quantitative PCR analyses showed that out of five founders, only one expresses Phospho1 specifically in osteoblasts. Histological analyses showed normal osteoid volume in Phospho1-/-; Col1a1-Phospho1 mice. This reduction of osteoid volume improves the biomechanical properties of Phospho1-/-; Col1a1-Phospho1 mice as shown by 3-point bending test. Overall, there was an improvement of skeletal deformities as all the bone histomorphometric parameters became comparable to that of wild type mice.

Conclusion. PHOSPHO1 regulates bone mineralization locally and osteoblast-specific restoration of Phospho1 is sufficient to prevent skeletal anomalies caused by PHOSPHO1 deficiency.

Poster Presentation

P 5: Ablation of osteopontin in osteomalacic Hyp mice partially rescues the deficient mineralization without correcting hypophosphatemia

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Hereditary mutations in the PHEX gene (phosphate-regulating gene with homologies to endopeptidases on the X chromosome) cause the osteomalacic disease X-linked hypophosphatemia (XLH). PHEX is predominately expressed by osteocytes, osteoblasts and odontoblasts, and inactivating mutations lead to renal phosphate wasting, severe hypomineralization of bones and teeth, and the accumulation of mineralization-inhibiting peptides and proteins – including osteopontin (OPN). We have previously identified full-length OPN to be a physiologically relevant substrate for PHEX, and found increased OPN and OPN fragments in certain extracts from human XLH and Hyp (mouse model for XLH) bone. These findings suggest that the accumulation of OPN (and its fragments) may contribute to the mineralization defects observed in XLH/Hyp bone. To investigate the effect of OPN ablation in Hyp mice, Hyp;Opn-/- mice were generated and histomorphometric analysis showed significantly increased total mineralized bone volume, as compared to the Hyp mouse. XLH/Hyp bone has characteristic hypomineralized periosteocytic lesions that persist despite stable correction of serum phosphate. Recently, we showed that XLH human bone had a localized abundance of OPN in the pericellular hypomineralized area around osteocytes – an observation confirmed in this study in Hyp mice. To investigate the role of OPN in osteocyte perilacunar mineralization, we measured osteocyte lacunar area in Hyp;Opn-/- bone, but no significant improvement was observed. Of particular note, serum phosphate levels were even lower in Hyp;Opn-/- mice than in Hyp mice, suggesting that this increased hypophosphatemia may hinder correction of the hypomineralized phenotype in Hyp mice in the absence of OPN. Further studies are required to determine if both serum phosphate normalization and ablation of OPN can improve osteocyte lacunae mineralization. In conclusion, this study shows that OPN accumulation contributes to the osteomalacic bone observed in XLH/Hyp, and removal of mineralization-inhibiting OPN, in addition to current phosphate therapies, may further correct these mineralization defects.

Poster Presentation

P 6: Establishment and characterization of a new human submandibular salivary gland cell line: Lich Cell Line (LCL-SV)

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Research on salivary gland hypofunction requires access to cell samples. However, as fresh human salivary glands are scarcely available, researchers often rely on the use of immortalized cells for their work. Recently, one of the two existing human salivary gland cell line, HSG, was found to be contaminated by HeLa. The other, NS-SV-AC, has been established in 1994. Consequently, it was exposed to significant stress after years of expansion, bringing to question its reliability. In light of this problem, a new human submandibular salivary gland cell line was established.

As part of the project, human salivary glands are collected from collaborating hospitals. After mincing, the tissue is digested with Accumax. Following digestion, cells are filtered, washed and suspended in KGM-2 supplemented media and cultured in a 6-well plate. Data on the viability and proliferation rate will be measured using a hemocytometer and Trypan Blue. In addition, immunocytochemistry will be used to confirm the presence of the cells of interest: salivary acinar (AQP5) and ductal cells (Wide Spectrum Cytokeratin and CFTR). Early passage of our cell line candidate will be transfected with SV40 lentivirus to establish a new immortalized salivary gland cell line. PCR will be conducted to study the expression of genes of interest (AQP5, CK5, CFTR), as well as to verify the insertion of SV40 into the genome. Western Blot will be performed to verify the translation of these transcripts of interest (AQP5, CK5, CFTR and SV40). Lastly, amylase tests will be performed to demonstrate that the cell line is comparable to primary cells in terms of functionality.

P 7: Subcellular Characterization of Bone Marrow Cell Extract: A Mitigator Against Irradiation Injury to Salivary Glands

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One of the main treatment methods for head and neck cancer is radiotherapy, which leads to salivary gland (SG) hypofunction, and consequently xerostomia. As a result, patients develop a multitude of morbidities and experience significant decrease in their quality of life despite current palliative treatments. Previously, studies reported that whole bone marrow cell extract (BMCE), containing soluble intracellular contents, restored salivary function following irradiation (IR) injury. In fact, soluble proteins were shown to be the active ingredients. However, the identity and function of BMCE subcellular structures remain elusive. This study aims to determine the composition of BMCE subcellular structures and elucidate their role in the repair of SG post-IR injury. Subcellular structures were isolated and characterized, both morphologically and molecularly, via transmission electron microscopy (TEM) and immungold study. In addition, their interaction with human SG acinar cells was studied in vitro. TEM results showed that exosomes and microsomes were the main components. Immungold labelling with CD81, an exosome specific biomarker, confirmed the presence of exosomes in BMCE. Co-culture of these vesicles, labeled with PKH26 lipophilic membrane dye, with human SG acinar cells showed increase in uptake and internalization from 10-24 hours. In conclusion, BMCE contains extracellular vesicles, which are uptaken and internalized by human SG acinar cells in a time-dependent manner. Among these vesicles are exosomes, involved in intercellular communication and macromolecule delivery. Hypothetically, exosomes have the potential to deliver active ingredients to injured SG acinar cells. Future studies will determine whether IR-injury increases vesicles uptake, whether exosomes are preferentially uptaken, whether these vesicles deliver active ingredients to the injured cells, and the cellular mechanisms involved. This BMCE-based molecular approach has clinical potential because it is theoretically less tumorigenic and immunogenic than stem cell therapies. In addition, it can be applied to repair tissues damaged by other pathological causes including myocardial infarction, cartilage degeneration and osteoarthritis.

P 8: Injectable Chitosan Sponge for Cellular Encapsulation in Bone Repair Applications

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Bone defects result from injuries that do not repair without medical intervention. Autologous bone graft, the gold standard for treating bone defects, is challenging due to (a) donor scarcity and (b) donor site morbidity that follows the procedure. Regenerative medicine has shown potential as an alternative intervention; it is based on the use of scaffolds which mimic the structure of the tissue that requires repair and simultaneously supports, reinforces and organizes the regenerating tissue. An injectable chitosan sponge with rapid gelation time has been previously developed in our lab and shown to be a biocompatible, biodegradable, and potentially osteoconductive scaffold. Based on these results, the current project is focused on the encapsulation of cells (pre-osteoblasts and other bone cell precursors) within the scaffold. The physico-chemical and in vitro characterization of the cell-laden sponge was done through scanning electron microscopy and micro computed-tomography, showing the internal structure of the scaffold. Degradation of the scaffold was also studied via lysozyme incubation. Moreover, proliferative quantification was assessed through Alamar Blue assay. A live/dead analysis was performed to determine the viability of the cells inside the sponges. Furthermore, an alkaline phosphatase assay will be performed on the encapsulated cells to determine their extent of mineralization which can also be confirmed by an alizarin red assay. Western blotting will be performed to determine the expression of some key proteins in bone formation. Subsequently, the loaded scaffold can then be implanted in a mouse fracture model to study its bone repair potential. Ultimately, this sponge may be a clinical alternative to bone graft by decreasing the burden of complications associated with graft donor sites while simultaneously encapsulating cells able to deliver therapeutic agents at the site of injury.

Poster Presentation

P 9: Biocompatibility of Diazonium Adhesives for Dental Application

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We have recently developed a new type of dental adhesives based on aryl diazonium chemistry. Herein, we assess the biocompatibility and endurance of these adhesives when used to bind poly methyl methacrylate (PMMA) to dental alloys. Indeed, titanium (Ti), stainless steel (SS) and cobalt chromium (CoCr) were coated with a para-phenylenediamine (PPD) adhesive layer. X-ray photoelectron spectroscopy (XPS) shows the presence of PPD coating on top of the three alloys along the grafting process. The immobilization was first due to electrostatic interaction with the three alloys and then likely to the formation of aryl-oxide-metal bond on SS and Ti and carbide bond on CoCr. The diazonium coatings were generally biocompatible with human fibroblasts and did not release toxic chemicals. Exposing the three coated alloys to autoclaving and thermocycling shows a higher endurance in the case of CoCr compared to SS and Ti. These results open the door for future developments of aryl diazonium adhesive for dental application.

P 10: Application prospect of Needle-free device in dental anesthesia

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Many patients experience pain and anxiety from traditional dental anesthesia with needles and thus may avoid necessary dental treatments. Needle-free device can provide better local anesthesia treatment with many advantages like eliminating needle phobia and needle disposal, reducing drug volume and higher dispersion pattern which would benefit both the patient and the clinician. It delivers drug solutions by creating a micro-thin pressure liquid jet to penetrate through the skin and disperse in the soft tissue.

Currently we have done a set of animal, cadaver and lab studies with needle-free device. Normal saline mixed with 1% methylene blue and 0.1% borax was used to simulate anesthetics and provide a visible result as indicator. Fresh pig jaws were injected by the needle-free device. An immediate spread of the indicator showed in the extraction sockets, meaning that the needle-free injection could reach the tooth through cortical bone. Cadavers were used to assess the soft tissue penetration of the needle-free device by traditional inferior alveolar nerve block pathway. The mandibular alveolar nerve bond was successfully approached. These experiments show a strong potential of needle-free device applied in dentistry field.

From the literatures, the bad taste caused by anesthetic leakage is the biggest limitation for needle-free device to be widely used in dental field. Gelatin gel and petri dish were used to simulate the condition of oral mucosa and bone. A set of experiments were done to find an optimal solution of injection set up with least drug leakage volume and enough spread area. The spread area of injection and volume of anesthetic leakage were assessed by computer software and electronic scale. Three optimised performance of injection in different injection volume was found: 0.1ml 60psi, 0.2ml120psi and 0.3ml 120psi. A further study with cadavers and patients is in progress.

P 11: Nanostructure of avian eggshell (Gallus gallus) and correlation with functional properties

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The functional properties of biomineralized structures found in Nature are based not only on the interactions between their hybrid components – both organic (mostly proteins) and inorganic (mineral) phases – but also on their hierarchical organization across different length scales. Here, we present a detailed nanostructural analysis of avian eggshell (chicken, Gallus gallus), and relate its variable nanostructure to differences in shell hardness. Furthermore, we describe changes in this nanostructure following eggshell dissolution, a shell-thinning and weakening process which occurs after fertilization and incubation of the egg (as required for chick skeletal growth, and hatching). The eggshell of the chicken has calcite as the predominant mineral phase, with abundant proteins (e.g. osteopontin) interspersed throughout its entire thickness. Electron backscatter diffraction and 2D X-ray diffraction showed that the eggshell consists of large columnar calcite units with significant (2.7°) internal misalignments. Here we show by atomic force microscopy (AFM) that these calcite crystal units have a fine nanostructure, ranging from approximately 30 nm to 75 nm depending on the region of the eggshell examined. The outermost region of the eggshell termed the vertical crystal layer had the highest nanoindentation hardness values associated with smaller nanostructure, whereas hardness values decreased towards the interior of the shell where nanostructure was larger. Transmission electron microscopy and electron tomography of focused-ion beam-cut sections of nonincubated eggs revealed fine mineral nanodomains (5-7 nm in diameter) in the outermost palisades region. Egg incubation resulted in decreases in nanodomain size in the innermost shell regions. In vitro analyses of synthetic calcite grown from solution in the presence of osteopontin revealed that occlusion of this one protein into calcite induced similar nanostructure, consistent with OPN's mineral-binding and inhibitory role. In conclusion, these observations provide details on the nanostructure of avian eggshell, and on protein-mineral relationships related to eggshell hardness. *Funded by CIHR*.

Poster Presentation

P 12: Chirality of Biomineralization Inhibitors Determine Nucleation and Growth of Brushite Crystals

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Background: Acidic matrix biomacromolecules are intimately involved in biomineralization. Research has shown that chirality of certain biomolecules such as aspartic acid triggers the formation of chiral enantiomorphs of calcite. A currently we hypothesize that chiral biomolecules could influence calcium phosphates crystallization, crystals size, and morphology.

Method: The crystals of dicalcium phosphate dihydrate (brushite) were precipitated by mixing aqueous solutions of CaCl2 and Na2HPO4 at Ca/P molar ratio 1.00, ph. 5.6 and in the presence of L- (+)-tartaric acid, D- (-)-tartaric acid or DL-tartaric acid. After 7 days, the crystals have been filtered, quantified and characterized using X-ray diffraction, total organic carbon analyzer, inductively coupled plasma and scanning electron microscopy techniques.

Result: The presence of D and L-Tartaric acid resulted in less crystallization percentage and larger crystals size that were poor in carbon content. Crystals grown in the absence of tartaric acid exhibited the characteristic rhombohedral morphology of brushite. In contrast, crystals grew from a solution containing the D and L-tartaric acid exhibit a triangular morphology. The addition of the DL-tartaric acid resulted in the growth of needles and rhombohedral brushite crystals.

Conclusion: In comparison with DL-Tartaric acid and Tartaric acid-free groups, the enantiomerically pure tartaric acid inhibits the precipitation and growth of specific brushite crystal face which affects the overall morphology. We anticipate that will help to understand the role of chirality in calcium phosphate biominerals.

Poster Presentation

P 13: Anti-calculus properties of toothpaste made with cuttlefish bone powder

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Dental calculus removal is critical for maintaining adequate periodontal health. The most effective mean to control dental calculus is mechanical removal by dentists or dental hygienists. This requires frequent visits to the dental clinic which poses burden to patients in terms of costs and access to dental professionals. Therefore, there has been substantial interest in the development and implementation of approaches that will ease the calculus removal process. In this regard, a new line of toothpastes has been produced to soften and dissolve the mineralized deposits using chemical abrasives. However, these products are associated with a high risk of damaging the tooth structure due to abrasion and are highly inefficient in removing calculus. Other dentifrices contain mineralization inhibitors that can only prevent the calculus formation.

Recently a new product has been introduced to overcome the limitation of previous agents; Bio-descaling Dr. D-Tart toothpaste (developed by Visionaturolab Inc., QC) contains a natural bio-descaling powder of cuttlefish bone. This project aims to test the efficacy and approval of this novel and newly invented anti-calculus toothpaste. Our preliminary in vitro results showed that Dr. D-Tart is a descaling dentifrice that effectively removes calculus attached on tooth surfaces after one month of brushing without causing damage to tooth surface. Moreover, Dr. D-Tart removed 5 times more calculus than Colgate Total toothpaste. Also, in an attempt of optimizing the formulation, different sizes of cuttlefish bone powder were tested for calculus removal and 60 μm showed to be the optimal size for the bone powder. In conclusion, based on the in vitro result, Dr. D-Tart proved to be a flawless toothpaste for calculus dislodgement. However, this result will be confirmed in a clinical trial, in which this toothpaste will be compared to a commonly used toothpaste made for the purpose of removing calculus.

P 14: From Toothpaste to "Implant-paste": A New Product for Cleaning Dental Implants

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Introduction: Peri-implant infections caused by oral biofilm compromise dental implant survival. Available prophylaxis and toothpastes are made of organic thickeners, surfactants and abrasives that contaminate titanium surfaces; these products, optimized for cleaning teeth, present limitations in cleaning implants. We hypothesized that pastes free of organic thickeners and surfactants could be more effective in cleaning dental implants than organic-based toothpastes.

Objectives: This study aimed at developing an organic-free paste for cleaning dental implants (implant-paste) using a new inorganic thickening agent.

Materials and Methods: The implant-paste was made of an inorganic thickening agent (nanocrystalline magnesium phosphate) and polishing nanoparticles (hydrated colloidal silica). The implant-paste formula was optimized to decontaminate titanium surfaces coated with oral biofilm, and compared to regular toothpaste and implant toothpaste. Surface morphology, bacterial load and chemical properties of titanium surfaces were analyzed, and comparisons between different products were performed using one-way ANOVA and independent samples t-tests.

Results: The optimized inorganic implant-paste made of nanocrystalline magnesium phosphate gel (10% w/w) and (30% w/w) hydrated silica was superior to both commercial toothpastes in removing titanium surfaces contaminants without inducing a change in the surface roughness. The thixotropic and inorganic nature of the implant-paste is ideal for cleaning implant surfaces because unlike commercial toothpastes it does not contain organic-based thickeners that adhere tightly to titanium surfaces and change their surface chemistry.

Conclusion: An implant-paste based on an inorganic thickening agent is more efficient in decontaminating implant surfaces than commercial toothpaste with organic thickening agents.

Poster Presentation

P 15: Detection of delta opioid receptor isoforms resulting from alternative splicing in mouse spinal cords and brains.

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The opioid receptor (OR) family comprises the mu, delta and kappa subtypes (MOR, DOR and KOR respectively), which are all G protein-coupled receptors with 7 transmembrane domains (TM). In the nervous system, ORs are important drug targets for pain management and mood disorders. Each receptor is encoded by a single gene and isoforms arise from alternative splicing. We characterized an alternative DOR transcript in mice in which a new exon is inserted between the two first exons of the typical three-exon transcript. This incorporates a stop codon after the first transmembrane (TM) domain, and adds a putative second downstream translational start site, producing a truncated 6TM-DOR isoform instead of a 7TM-DOR isoform. The 6TM-DOR has the structural features of a functional receptor and potential drug target. In light of these findings, this study aimed to detect native protein products resulting from expression of DOR splice variants in mice. When artificially expressed in HEK 293 cells, 6TM-DOR mRNA and protein product were less abundant than those from 7TM-DOR. To assess 6TM-DOR expression in native tissues, we performed western blot analysis on spinal cord and brain extracts from wild-type mice, exon1 knockout, which only express 6TM-DOR, and exon 2 knockout mice, which express neither the 7TM- nor 6TM- DOR isoforms. Using an antibody raised against a unique sequence in 6TM-DOR that we validated in transfected cells, we were unable to detect a 6TM-DOR-specific immunoreactive band. Ribosome profiling data showed that 1TM-DOR rather than 6TM-DOR isoform is probably translated, but was not detected with western blotting. Western blotting refinement or alternative detection methods are necessary in order to confirm the presence of these or other DOR splice isoforms in mouse tissues. Moreover, a multitude of DOR splice isoforms and their regulation remains to be investigated in human tissues.

P 16: Living with Temporomandibular Disorders Through a Social Relational Lens: A Qualitative Phenomenological Exploration

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Temporomandibular Disorder (TMD) is a common orofacial pain, with a prevalence ranging from 5% to 12%. TMD is characterized by pain and dysfunction in the muscles of mastication. Individuals with TMD often must alter all aspects of their food preparation and whole diet to avoid exacerbating their pain, which can elicit feelings of embarrassment, shame and stigma in those who suffer from TMD-related pain. Since food is so pervasive in our lives, from a qualitative perspective, we are interested in understanding the relationship between chronic pain and emotional well-being mediated by food. More specifically, we want to understand why and how this forced change in diet can lead to a change in personal identity and its influence on creating the right circumstances for increased social isolation. Research has yet to study this relationship from a social context using interpretive phenomenology.

The methodology I will use for this study is known as phenomenology- a qualitative research approach in the human sciences. It is deeply rooted in philosophy, involving an analysis of the lived experience of a specific phenomenon or occurrence, in this case, the experience of living with TMD-related pain. The research process involves interviewing 6-10 TMD adult participants, transcribing, listening to audio recordings, and grouping similar interview excerpts to develop descriptions of the phenomenon in question. I will use a combination of three approaches, suggested by Van Manen to uncover relevant findings from this phenomenological research: a) Attend to each participant's interview as part of the collective whole, b) Read each text multiple times, highlighting sections that appear significant in describing the phenomenon in question, and c) Interpret the meaning of each participant's text in terms of its description of the phenomenon in question.

Based on the lack of information about the social-relational consequences of this common condition, health professionals are not yet able to help these individuals live full and socially- healthy lives. Understanding their experience is the first step in changing the TMD pain trajectory from isolation to social engagement. Using this methodology allows for studying the full breadth of human inquiry in a human manner to be able to learn about the patients' lived experiences of what it is like to live with TMD. However, as with all research, the more narratives we gather, the more we can understand the complex experience of living with pain. Ongoing research on this topic will contribute more to understanding this painful condition.

P 17: What factors contribute to the transition from acute to chronic pain and its persistence? 3-month cohort study.

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Objective:

This study is designed to assess risk factors that contribute to the transition from acute to chronic painful Temporomandibular Disorders (TMD) and its persistence.

Methods:

In this cohort study, painful TMD participants were recruited from; the dental clinic at the Jewish General Hospital, the oral diagnosis clinic at the Faculty of Dentistry of McGill University, Montreal General Hospital, and Ottawa Dental Specialists Group. The recruitment involved, signing the consent form; performing a clinical examination according to the Research Diagnostic Criteria/TMD; and completing a questionnaire assessing the TMD symptoms, comorbidities and demographics. Patients were interviewed at 3-month follow-up to assess the study outcomes: transition and persistence. Multivariable logistic analyses were used to identify predictors for the study outcomes.

Results:

This study included 120 TMD patients, 50 presented TMD for less than 3 months (acute cohort, 70% females) and 70, for 3 months or more (chronic cohort, 81% females). The results showed that disability (OR = 1.04; 95% CI: 1.0-1.03) increases transition risk. Females did not present a significant risk for the transition ($p > 5\%$). Pain intensity (OR = 1.03; 95% CI: 1.0-1.06), number of comorbidities (OR = 1.79; 95% CI: 1.15-2.78), and females (OR = 4.1; 95% CI: 1.0-17.0) contributed to painful TMD persistence.

Conclusion:

Our preliminary study demonstrate that different factors are associated with the transition and persistence of painful TMD. Our results for chronic painful TMD persistence are consistent with current literature review. We do not have a clear explanation for disability. We hypothesize that sudden trauma or accidents contributes to disability which may contribute to the onset of painful TMD. The definition of acute and chronic pain based on the 3-month follow-up is a limitation of this study. We are continuously recruiting new patients and extending our follow-up to 6 months to better define chronic pain.

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P 18: Risk factors related to acute and chronic pain after breast cancer surgery - A prospective 3-month cohort study

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Aim: To identify the predictors implicated in the risk of chronic pain after breast cancer surgery(CPBCS).

Methods: In this cohort study, female participants (above 18 years of age) with breast cancer who underwent breast cancer surgery were recruited from Segal Cancer center, Jewish General hospital, Montreal. The putative individual risk factors (i.e. pre-operative pain, age and painful comorbidities) were assessed one week before surgery. Type and duration of surgery, Adjunctive therapy and acute post-operative pain were assessed from patient's medical charts. The study outcome i.e. chronic pain and its intensity [0-10 numerical rating scale (NRS)] was assessed by telephonic interview using the Brief Pain Inventory scale, 3 months after breast cancer surgery. Linear and logistic analysis were used to assess the predictors of CPBCS.

Results: One hundred seventy participants accepted to participate in this study and 159 patients participated in the 3 months follow up. In the first analysis, adjusted ordinal regression analysis showed that participants who received mastectomy had on average two times greater risk of acute pain at rest and during movement than those who received mastectomy segmental [OR= 2.94, standard error (SE) = 1.71, P<0.05]. Moreover, participants having preoperative pain had greater risk of acute pain on rest and during movement than those who had no preoperative pain [OR= 1.04, standard error (SE) = 0.02, P<0.05]. Adjusted Linear regression showed that preoperative pain [$\beta = 0.51$, standard error (SE) = 0.12, $P < 0.05$] and mastectomy [$\beta = 12.05$, standard error (SE) = 5.62, $P < 0.05$] increase the acute pain intensity. In the second analysis, adjusted ordinal regression analysis showed that participants who received axillary lymph node dissection had on average four times greater risk of chronic pain at rest and during movement than those who received sentinel lymph node biopsy [OR= 3.82, standard error (SE) = 2.52, P<0.05]. Adjusted linear regression showed that acute pain intensity [$\beta = 0.26$, standard error (SE) = 0.11, $P < 0.05$] and radiotherapy [$\beta = 8.47$, standard error (SE) = 4.23, $P < 0.05$] increase the chronic pain intensity.

Conclusion: Mastectomy and preoperative pain contributed to increased risk of acute pain at rest and during movement as well as its intensity. Radiotherapy and acute pain intensity increase the severity of chronic pain. Axillary lymph node is one of the predictors for chronic pain at rest and during movement.

Poster Presentation

P 19: Establishing Novel Database for Head and Neck cancers

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Objective:

To establish a Maxillofacial Oncology and Reconstruction Surgery (MORS) database that collects a comprehensive data on demographic, risk factors, family history as well as data on medical history, diagnosis, treatment and outcomes at our institution and use it as a model to spread it nationwide

Methods:

After getting McGill institutional review board approval, we started developing MORS Database at Oral and Maxillofacial Surgery department, McGill University, Montreal, Canada using REDCap (Research Electronic Data Capture) application with collaboration with Research Institute at McGill University Research Centre (RI-MUHC). The database is divided into four sections of datasets: 1- Patient registration details. 2- Referral tumor event details, 3- Surgery and post surgery pathology details, 4- Follow up status (table 1).

After completing the structure of the database software, data extraction and entry was done by designated person who is authorized by database manager and using clinical medical records, hospital electronic system records (Oacis) and imaging records held at software used to process imaging at our institution (Intelviewer, PACS). Eligible patients were those seen at the MORS clinic and diagnosed with Carcinoma In Situ of head and neck region and patients diagnosed with head and neck cancers between July 2008 and July 2014.

Results:

There were 222 cases entered to MORS. (Table 2. Describe cases in Retrospective arm).

Conclusions:

We have created MORS database as a novel model to collect valid and complete data on cancers of head and neck region comprising data on demographic, risk factors, cancer characteristics and treatment outcomes. Adopting this model to most of the current head and neck cancers practices is feasible and will assists researchers and clinicians to answer important questions regarding overall outcomes, treatment delays, treatment pathway outcomes and data on quality of life.

P 20: Patient' Experience of Pain During Implant Prosthetic Rehabilitation: A Qualitative Study Protocol

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Dental implants have been widely accepted as a feasible option for replacement of missing natural dentition, especially for the elderly. The number of elderly people is rapidly increasing throughout the world resulting in an increase of age-related diseases such as tooth loss. Canada is facing this issue and the rate of tooth loss among Canadians is approximately 35%. Prosthetic rehabilitation with dental implants helps to restore oral tissues health, function, esthetic and phonetic capacity, thereby improving patient's quality of life.

Although, quantitative researchers have shown positive results for implant prosthetic rehabilitation as an alternative option to conventional methods to treat tooth loss. The patient's experience of pain during implant rehabilitation process has not been researched.

Our objective in this study is to explore patients' experiences with implant prosthetic rehabilitation. Specifically, we intend to understand in-depth their lived experiences of pain during implant placement surgery, the post-surgical healing stage and the immediate post-surgical transitional implant prosthesis (fixed and removable).

In this qualitative inquiry we will adopt an interpretive phenomenology research design. This approach will help to explicitly understand patients' experiences of pain during all phases of the implant process.

Participants for this study will be recruited from McGill University Dental Clinics in Montreal, Quebec. Methods of data collection will incorporate engagement of in-depth semi-structured interviews, which will be audio-recorded, transcribed verbatim and interpretively analyzed.

The intention is to take what we learn from this research to inform dental clinicians and students through development and implementations of workshops and continuing education programs to help patients through this process. In addition, we anticipate that our results will be presented at a relevant national conference and submitted to peer reviewed journals.

P 21: Patients-reported outcomes of acrylic and cast metal removable partial dentures: a systematic review

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Statement of problem: Evidence in studies of patients-reported outcomes of acrylic and metal removable partial dentures has not been evaluated yet.

Objectives: To systematically evaluate the evidence on the comparison between acrylic and cast metal removable partial dentures regarding patients-reported outcomes (patient satisfaction, oral health-related quality of life).

Methods: Four databases (MEDLINE, EMBASE, CENTRAL, Web of Science) were systematically searched for all observational studies as well randomized controlled trials comparing acrylic and metal removable partial dentures in patient satisfaction or oral health-related quality of life. The quality of studies was evaluated using Cochrane risk of bias in non-randomized studies of interventions tool. Results were qualitatively reviewed and areas of deficiencies in the literature were identified.

Results: Out of the 4056 studies screened, a total of 8 studies were included (4 for patient satisfaction and 4 for oral health-related quality of life). Studies were cross -sectional studies except one prospective cohort. They showed no significant difference between acrylic and metal removable partial denture wearers both in satisfaction and oral health-related quality of life. However, great heterogeneity in measurement tools in addition to confounding by indications and inadequate considerations of other known confounders were identified in all the studies.

Conclusions: In general, the reviewed studies showed no significant difference between acrylic or metal RPD wearers in patient satisfaction or oral health-related quality of life. However, with the low quality of the included studies, this conclusion should be taken cautiously. High-quality randomized controlled trials remain needed to conclusively address this issue.

P 22: Impact of Immediate Loaded Implants Supported Dental Prostheses on Edentate Patients: A Systematic Review

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Background: It has been stated that the masticatory function of edentate patients wearing dentures is about one fifth to one fourth the masticatory function of dentate patients. However, when patients with previous negative denture experience were treated by implant supported fixed prosthesis, they perceived their artificial teeth as their own natural teeth. As a result, their self-esteem and physical and social well-being had been improved. Hence, it would be beneficial if clinicians could minimize the treatment time for placing implant supported fixed dental restorations without jeopardizing the treatment long-term success. Here, we decided to conduct a systematic review of clinical trials that compared the clinical effectiveness of three implant loading protocols.

Objectives: To systematically examine the data published on clinical effectiveness of immediate (within 1week) compared to early (between 1week and 2 months) and delayed (after two months) implant loading in terms of: patients' satisfaction, oral and general health-related quality of life, prosthetic complications, and implant outcomes (implant success and radiographic marginal bone level changes).

Methods: Controlled clinical trials published in English up to July 14th, 2016 were included from Cochrane Oral Health Group's Trial register, Cochrane Central Register of controlled trials (CENTRAl), (Cochrane library 2016, issue), MEDLINE, PubMed, BIOSIS and EMBASE, CINAHL, Web of science, and DARE were electronically searched and complemented with hand searching. And authors of identified trials were contacted to find unpublished clinical trials. Two independent reviewers screened titles and abstracts. Data extraction and quality assessment will be done independently in duplicate. Random effect models will be used to pool the effect size (ES) of all included studies.

Results: 674 studies were identified and, from which, only three trials were included in the analysis. At the time of submitting this abstract the quality assessment and data extraction of these trials have not been finished yet.

Poster Presentation

P 23: Oral Premalignant lesions database

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Background: Oral and oropharyngeal cancers (OPC), including the oral cavity and oropharynx, are among the 10 most common malignancies worldwide. Stage at diagnosis is an important prognostic indicator for survival; while OPC survival rates are approximately 83% for early stage, they drop significantly to 36% for advanced stages. Approximately 50% of oral premalignant lesions (OPL) will undergo malignant transformation. Thus, having an early diagnosis is of utmost importance. Some clinical and demographic parameters predisposing patients to a higher risk of malignant transformation have been identified. However, further histopathologic features and molecular biomarkers are likely to exist. and may help to stratify patients according to risk. Identifying OPL, their risk factors, and providing timely treatment may avoid OPC or detect cancer at an early stage.

Aim: to implement a registry for OPL at the Department of Oral and Maxillofacial Surgery (OMFS) of the McGill University Health Center (MUHC), to assist clinicians in the treatment and management of patients with these lesions. In addition, we will use this infrastructure to monitor the prevalence and incidence of this disease and to study OPL aetiology and its progression to cancer.

Methodology: The study will include all patients diagnosed with OPL between July 2008 and March 2017 who are being treated and followed at the OMFS Department of the MUHC. Patients will be identified through the hospital pathology database and through a retrospective OMFS chart review. All gathered information would be entered into REDCap software; which is a secure web application for building and managing online databases and surveys. A data collection form (questionnaire) will be generated to aid in customizing the REDCap software for the purpose of the project.

Conclusion: This is an effective and efficient way to pool data to carry out epidemiological and clinical research including randomized clinical trials.

P 24: Between Struggle and Hope: Oral Care Experiences 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, the unmet dental needs, and oral care experience of children with ASD worldwide.(1, 2) However, very little is known about the oral health of children with ASD in Canada(3). 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. 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.(4) The researchers adopted Interpretive Phenomenology (IPA) approach which explicitly illuminated in depth the parent's experience and concerns toward oral health. Six participants have been interviewed. The findings yielded two main connected themes "Oral care as a Struggle" and "Oral care as a Hope". along with other subordinate themes:

The experience of parents or care providers raising a child with ASD can offer valuable insight into the ways they have learned to manage the oral health needs of their children 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

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P 25: Snacks intake and dental caries increment: a two-year longitudinal study

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Diet is a major risk factor for dental caries. The disease, if left untreated, may cause pain and impair the quality of life in children. Objective: To estimate the extent to which number of snacks per day is associated with 2-year-incidence of dental caries. Methods: We used data from first and second visit of an ongoing prospective study - the QUALITY (QUebec Adipose Lifestyle Investigation in Youth) cohort. A total of 519 Caucasian children, aged 8 to 10 years at baseline, and their biological parents, at least one of whom being obese, were recruited in Montreal and in Quebec City region. The outcome measured was a 2-year dental caries incidence based on dental clinical exams and was summarized by the Decayed, Missing Surfaces Index (DMFS). Socio-demographic and oral health behaviors were collected using structured questionnaires. Dietary information was collected using 24-hour recall information. Descriptive and ordinal logistic regression analysis was performed.

Results: Adjusting for sex, age, socio-economic status, tooth brushing frequency, fluoride exposure and last dental visit, children who consumed higher number of snacks per day had an increased 2-year incidence of dental caries risk (OR= 1.11 CI=1.02-1.21) compared to those who did not.

Conclusion: Snack intake was associated with 2-year dental caries increment in Quebec.

Poster Presentation

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