

**IADR Irish Division Annual Conference 2017**

2<sup>nd</sup>-3<sup>rd</sup> November 2017  
Lagan Suite, Hilton Hotel Belfast



IADR

International Association  
for Dental Research

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## Conference Schedule

Thursday 2<sup>nd</sup> November 2017

**PM**

- |                    |   |
|--------------------|---|
| <b>12.30-13.30</b> | <b>Lunch &amp; Registration, Poster set up</b>  |
| <b>13.30-13.45</b> | <b>Welcome &amp; Introduction</b>   |
| <b>13.45-14.00</b> | <b>IADR Irish Division Postgraduate Award Oral Presentations:</b>   |
| <i>13.45-14.00</i> | <i>Amara Naseer - Oral health status of community dwelling adults aged 50 years and older in Ireland</i>  |
| <i>14.00-14.15</i> | <i>Marilena Karavyraki - A bioenergetic comparison of dysplastic and cancerous oral cells</i>   |
| <i>14.15-14.30</i> | <i>Keira Malone - An investigation of the temporal dynamics of Staphylococcus aureus nasal and oropharyngeal carriage amongst oral/dental healthcare workers</i>                  |
| <i>14.30-14.45</i> | <i>Paul Brady - Risk factors for hypoxaemia during intravenous sedation for oral surgery</i>  |
| <i>14.45-15.00</i> | <i>Abdrazak Amer - The microbiome of potentially malignant oral leukoplakia exhibits enrichment for Fusobacteria</i>  |
| <i>15.00-15.15</i> | <i>Khalid Elmaghrawy - The impact of Crohn's Disease on the Oral Microbiome</i>   |
| <i>15.15-15.30</i> | <i>Saleh Alkadi - A comparative study of the effect of one-suture and suture-less techniques on post-operative complications following third molar surgery (Double blind RCT)</i> |
| <i>15.30-15.45</i> | <i>Lina Khasawnih - Patient and Partner Experiences with Obstructive Sleep Apnoea and Mandibular Advancement Devices: A Qualitative Analysis</i>                                  |
| <b>15.45-16.15</b> | <b>Tea &amp; Coffee</b>   |
| <b>16.15-17.00</b> | <b>Seamus O'Hickey Lecture: Professor Helen Whelton</b>   |

- 17.00-17.30**                      **Annual General Meeting**
- 19.00**                                **Conference Dinner: Sonoma Restaurant, Hilton Hotel**

*Friday 3<sup>rd</sup> November 2017*

**AM**

- 09.00-09.30**                      **IADR Irish Division Undergraduate Award Oral Presentations:\***
- 09.00-09.15*                      *Stella Stasiak - Expression of Fusobacterium nucleatum in cancers of the aerodigestive tract*
- 09.15-09.30*                      *Marcia Domingos - Undergraduate Perceptions of Eating Disorders and Their Management*
- 09.30-10.15**                      **Dental Health Foundation Award Oral Presentations:**
- 09.30-09.45*                      *Alison Dougall - Identifying common factors of functioning, participation and environment amongst adults requiring special care dentistry using the International Classification of functioning, disability and health*
- 09.45-10.00*                      *Sinead Watson - The impact of dental status on food selection and nutrient intakes in older adults: UK National Diet and Nutrition Survey 2008-2014*
- 10.00-10.15*                      *William Maguire - Compliance of dental practice websites in Northern Ireland with the GDC document 'Principles of Ethical Advertising'*
- 10.15-10.45**                      **IADR / RCSI Clinical Research Award Oral Presentations:**
- 10.15-10.30*                      *Mary McClory - Prevalence of endodontic infections among 60-70 year-old men in Northern Ireland*
- 10.30-10.45*                      *Muhammed Kamil Hassan - Comparison of Three Internal Fixation Techniques in Mandibular Sagittal Split Osteotomy, A Finite Element Analysis*
- 10.45-11.15**                      **Tea & Coffee**

**11.15-13.00**

**Non-prize Oral Presentations:**

11.15-11.30

*Gerry Linden - Association between number of teeth and healthier food choice in older men*

11.30-11.45

*Frank Burke - Evaluation of a caries risk assessment tool for high-risk individuals for root caries*

11.45-12.00

*Brian O'Connell - Oral Health and Wellbeing in Older Irish Adults*

12.00-12.15

*Cristiane da Mata - Dental fear in older patients and their preference for less invasive dental treatment*

12.15-12.30

*Marina Pimentel - Applied Research Methods in Maxillofacial Prosthetics*

12.30-12.45

*\*Fariba Kianoush - Regulation of RAW264.7 macrophage polarization on smooth and rough surface topographies by galectin-3 (IADR Irish Division Undergraduate Award)*

12.45-13.15

*Paul Brocklehurst – Engaging with a Clinical Trials Unit*

**13.15**

**Lunch & Close**

## Conference Abstracts

### IADR Irish Division Postgraduate Award Oral Presentations

**Title:** Oral Health Status of Community Dwelling Adults Aged 50 Years and Older in Ireland

**Author(s):** Amara Naseer, Brian O'Connell, Jacinta Mcloughlin,

**Affiliation:** Trinity College Dublin

**Background:** The population of older people is growing worldwide especially in developed countries, in 2050, adults aged 65 years and over will be 17% of the world population. Oral health impacts on quality of life especially in older people, who may as a result eat a poor quality diet and avoid social interaction. The Irish longitudinal study on ageing (TILDA) provided an opportunity to carry out an oral health examination of a subset of TILDA participants of aged 50 years and older.

**Objectives:** The aim of this study was to objectively measure the oral health status of community dwelling adults aged 50 years and over in Ireland.

**Methods:** Respondents attending for health assessments at the TILDA centre in TCD were offered an oral health examination by a dentist. Examination criteria were as used in previous Irish surveys. The results reported here include prevalence of edentulism, mean number of teeth and the proportion of the sample with 10 or more tooth contacts.

**Results:** Of the 3111 people who were offered the oral health assessment 2504 were examined (80.4% response rate). The percentage edentate was 9.9% (249), of whom 11.5% (159) were female and 8% (90) were male. Of those aged 65-74 years, 11.7% (107) were edentate compared with 25.4% (94) edentate in the 75 and older age group. Of those aged 65 years and older, 15.6% were edentate compared with 40.9% in the 2000-02 national survey. The mean number of teeth in those aged 65 years or older was 14.9 for males and 14.2 for females. The 2000-02 figures for the same age group were 9.9 and 7.4 respectively. Approximately 56.8% of the dentate sample had 10 or more tooth contacts.

**Conclusion:** Compared with 2000-01, these results suggest a considerable improvement in retention of teeth in community dwelling adults in Ireland.

**Title:** A Bioenergetic Comparison of Dysplastic and Cancerous Oral Cells

**Author(s):** Marilena Karavyraki and Richard K. Porter

**Affiliation:** School of Biochemistry and Immunology, Trinity Biomedical Sciences Institute, Trinity College Dublin, Ireland

**Objectives:** Oral squamous cell carcinoma (OSCC) is the sixth most common type of cancer in the world and accounts for more than 90% of oral malignancies (1). The discovery of differential mitochondrial abundance, morphology and protein function involved in mitochondrial dynamics and metabolic differences in normal, dysplastic and oral cancer cells, could lead to the identification of novel therapeutic targets. As a starting point to this investigation, the bioenergetic profiles of dysplastic oral keratinocytes (DOK) cell lines were characterized and compared with the immortal squamous cell tongue carcinoma (SCC-4) cell lines.

**Methods:** Precancerous (DOK cells) and cancerous (SCC4) tongue cell lines were cultured in vitro. Seahorse XF Flux Analysis Technology and Oroboros High-Resolution Respirometry were used to determine the bioenergetics/metabolic profiles of these cell lines.

**Results:** The data demonstrated that there was no significant difference in basal cellular oxygen consumption rates in a comparison of these cells, nor was there any difference in extracellular acidification rate (an index of glycolytic flux). Interestingly, there was a significant difference in complex I associated activity (~2.5 fold greater in DOK compared to SCC4 cells). Measurements of mitochondrial abundance are in train. Estimates of growth rates demonstrate that SCC4 cells grow at twice the rate of DOK cells.

**Conclusion:** In conclusion, precancerous (DOK cells) and cancerous (SCC4) tongue cell lines appear to have equivalent overall mitochondrial function and glycolytic activity, yet different rates of cell proliferation and mitochondrial complex 1 associated activity.

**Title:** An Investigation of the Temporal Dynamics of Staphylococcus aureus Nasal and Oropharyngeal Carriage Amongst Oral/dental Healthcare Workers

**Author(s):** Keira M Malone, Peter M Kinnevey, Leo FA Stassen, David C Coleman

**Affiliation:** Microbiology Research Unit, Dublin Dental University Hospital, University of Dublin, Trinity College Dublin, Ireland. Department of Oral and Maxillofacial Surgery, Dental University Hospital, University of Dublin, Trinity College Dublin, Ireland.

**Objectives:** To investigate transient and persistent oro-nasal colonisation by Staphylococcus aureus among dental healthcare workers (HCWs) from (A) the Dublin Dental Hospital working at outreach multicentre facilities and (B) in general practices in four different locations, and to characterise S. aureus isolates recovered.

**Methods:** Volunteers were screened twice for S. aureus over three months. Nasal swabs and oral rinses were taken from 79 volunteers (group A n = 39, group B n =40). Presumptive S. aureus were recovered on SaSelect™ (Bio-Rad) agar and confirmed using the Pastorex™ Staph Plus kit (Bio-Rad). Fifty-nine isolates from separate participants were screened for antimicrobial resistance and virulence-associated genes by DNA microarray profiling (Alere GmbH).

**Results:** Only methicillin-susceptible S. aureus was identified. The nasal and oral carriage rate during the first and second screenings was 16.5% (13/79) and 17.7% (14/79) and 22.8% (18/79) and 21.5% (17/79), respectively. The first sampling identified 13 S. aureus nasal carriers, four of which were also oral carriers. The second screening identified 19 S. aureus nasal carriers, seven of which were nasal carriers during the first sampling. Confluent growth of S. aureus was recorded for 21.5% (17/79) and 13.92% (11/79) of S. aureus-positive samples during first and second samplings. The S. aureus density range from confluent nasal swabs was  $2 \times 10^4$  -  $2.8 \times 10^6$  colony forming units per swab. Isolates belonging to 13 clonal complexes (CCs) were identified, with CC30 predominating. The most prevalent antimicrobial resistance and virulence-associated genes detected were the beta-lactamase resistance gene blaZ (85.7%; 30/35) and the biofilm related icaA gene (100%; 35/35).

**Conclusion:** Dental HCWs represent a significant reservoir of S. aureus including a subgroup that are heavily colonised. These latter individuals represent a significant health risk to patients because of the potential for transmission.



**Title:** Risk Factors For Hypoxaemia During Intravenous Sedation For Oral Surgery

**Author(s):** Paul Brady<sup>1</sup>, Ken D O' Halloran<sup>2</sup>, Christine Mc Creary<sup>1</sup>, Michael Cronin<sup>3</sup>, Duncan Sleeman<sup>1</sup>, Gabriella Iohom<sup>4</sup>

**Affiliation:** 1- Department of Dental Surgery, University College Cork  
2- Department of Physiology, University College Cork  
3- Department of Statistics, University College Cork  
4- Department of Anaesthesia, University College Cork

**Objectives:** Intravenous sedation with midazolam forms the mainstay of conscious sedation for adult ASA I & II dental patients in the U.K. and Ireland. The most important side effects of midazolam are respiratory depression and airway compromise, which, if untreated, can result in hypoxaemia. Reducing the incidence of hypoxaemia is essential for patient safety. Risk factors for hypoxaemia were analysed from data collected during a clinical trial.

**Methods:** A titrated dose of the single drug midazolam was used. In this setting, supplemental oxygen is not routinely administered unless indicated during the sedation. The primary outcome measure was any SpO<sub>2</sub> event  $\leq$  94%. A multivariate analysis was performed using a logistic regression model for hypoxaemia for pre-determined clinical variables.

**Results:** 70 of the 190 patients (37%) experienced a hypoxaemic event (SpO<sub>2</sub>  $\leq$  94%). Patients with higher BMI were more likely to have a hypoxaemic event ( $p = 0.0015$ ). For each unit increase in BMI, the odds of having a hypoxaemic event increased by 18.0% (95% CI: (6.5%, 30.7%)). Males were more likely to have a hypoxaemic event than females ( $p = 0.0325$ ). The odds were 143.8% higher for males (95% CI: (7.7%, 451.9%)). Patients aged in their twenties were less likely to have a hypoxaemic event than patients aged in their thirties ( $p = 0.0474$ ). The odds decreased by 63.2% (95% CI: (1.2%, 86.3%)). Patients aged 50 to 62 were more likely to have a hypoxaemic event than patients aged in their thirties ( $p = 0.0007$ ). The odds increased by 1039.4% (95% CI: (178.0%, 4569.4%)).

**Conclusion:** BMI, older age and male gender were found to be significant risk factors for hypoxaemia in ASA I & II adult patients during conscious sedation for oral surgery. It is recommended that patients with these risk factors should be closely monitored during sedation.

**Title:** The Microbiome of Potentially Malignant Oral Leukoplakia Exhibits Enrichment for Fusobacteria

**Author(s):** Abdrazak Amer, Shiela Galvin, Claire Healy and Gary P. Moran

**Affiliation:** Dublin Dental University Hospital, Lincoln Place, Dublin 2, Republic of Ireland

**Objectives:** Oral Leukoplakia presents as a white patch on the oral mucosa and is recognised as having high malignant potential. This study was carried out to examine the microbiota of these patches to identify microorganisms that could contribute to the malignant transformation of these patches.

**Methods:** In the current study we analysed the microbiome of oral leukoplakia disease in 36 patients compared to normal contralateral mucosal tissue from the same patient and 34 samples from healthy control subjects. Bacterial DNA was extracted and the V1-V2 region of the 16s rRNA gene was sequenced using the Illumina MiSeq. Sequences were assigned to operation taxonomy units (OTUs) using Mothur. Biodiversity was assessed using Simpson's index and community structure (Beta diversity) was assessed using the Bray-Curtis dissimilarity index and Jaccard's index (qualitative index). Linear discriminant analysis effect size (LEfSe) was used to identify specific bacterial enrichments.

**Results:** Bacterial communities from oral leukoplakia exhibited reduced biodiversity and altered community structure relative to contralateral healthy tissue. Oral leukoplakia exhibited enrichment for Fusobacteria and reduced levels of Firmicutes. Community structure of oral leukoplakia was highly variable and up to five distinct enrichment patterns were discerned. We identified co-occurrence of Fusobacterium, Leptotrichia and Campylobacter species, which is strikingly similar to the microbial co-occurrence patterns observed on colorectal cancers. Enrichment for the acetaldehydogenic microorganisms Rothia mucilaginosa and Candida species was also apparent on oral leukoplakias from lingual regions.

**Conclusions:** Oral leukoplakia exhibits an altered microbiota that exhibits similarities to the microbiome of colorectal cancer. Further studies are required to determine if this microbiota is risk factor for malignant transformation.

**Title:** The Impact of Crohn's Disease on The Oral Microbiome

**Author(s):** Khalid Elmaghrawy, Paddy Fleming, Kirsten Fitzgerald, Tara Raftery, Billy Bourke, Anne-Marie Broderick, Seamus Hussey & Gary Moran.

**Affiliation:** Dublin Dental University Hospital and Our Lady's Children Hospital Crumlin.

**Objectives:** To identify if the oral microbiome can be used as a diagnostic tool in the diagnosis of Crohn's disease. Specifically, we wish to identify marker organisms that could identify if a patient is suffering from Crohn's disease.

**Methods:** The oral microbiome was examined in a cohort of children diagnosed with Crohn's disease (n=24, CD) and ulcerative colitis (n=9,UC) and a healthy control group (n=28, HC). Children were treatment naïve at the time of sampling. Bacterial DNA was extracted from tongue and buccal swabs and the V1-V2 region of the 16s gene was amplified and sequenced using the MiSeq. Sequences were analysed with the Mothur pipeline.

**Results:** At the phyla level, the tongue of Crohn's patients was found to have significantly lower levels of Bacteroidetes, Proteobacteria and Fusobacteria. Reduced biodiversity of the tongue was reflected by differences in the inverse Simpson's index for both sites (CD=9.39;HC=12.87). Analysis of species richness by rarefaction showed a significant reduction in species richness in CD tongue samples compared to HC tongue samples, whereas species richness in CD buccal was almost as the same as HC buccal. Analysis of community structure and membership using AMOVA showed that the populations on HC and CD tongues were significantly different ( $P < 0.001$ ). Greatest difference in OTU structure between healthy and Crohn's patients were found in tongue samples of patients diagnosed with category L4 Crohn's (upper disease). LEfSe analysis identified 20 OTUs that were significantly enriched on the tongues of healthy children including *Haemophilus parainfluenzae*, *Neisseria flavescens*, *Fusobacterium periodonticum*, *Streptococcus* sp., *Porphyromonas* sp. and *Actinomyces* sp.

**Conclusion:** Children with Crohn's disease exhibit reduced oral biodiversity. This dysbiosis is most pronounced on the tongue of patients diagnosed with upper GI tract disease. These data may be a useful non-invasive diagnostic tests to characterise a child's gastrointestinal health.

**Title:** A Comparative Study of The Effect of One-suture and Suture-less Techniques on Post-operative Complications Following Third Molar Surgery (Double Blind RCT).

**Author(s):** Saleh Alkadi, Leo Stassen

**Affiliations:** Dublin Dental University Hospital, Trinity College Dublin

**Objectives:** Lower third molar surgery (LTMS) remains one of the most common oral surgical procedure. It has its own risks, and postoperative complications, that influence the recovery period, and affect a patient's quality of life. Wound closure technique is an operative factor that influences early post-operative complications. This is a comparative study that investigates two secondary closure techniques; partial closure using one suture and the suture-less technique, after using a modified buccal envelope flap for LTMS. This study aims to determine which of the two techniques assessed is superior in improving wound healing, and reducing post-operative complications, following LTMS.

**Methods:** and methods: We carried out a prospective, randomised, double-blind, split mouth controlled trial. Thirty- seven patients, who had bilateral impacted third molars of similar surgical difficulty, were recruited, with thirty-four successfully completed the study. We compared partial closure using one suture to the suture-less technique. Surgical sites were divided into two groups, Group A: one suture, and Group B: suture-less. Each patient received both treatments at the same time. During the first post-operative week, all patients were asked to daily assess pain, facial swelling, and bleeding, using self-assessment scales. All patients attended follow-up appointment at one week, to objectively assess facial swelling and wound healing, and at one month, to assess wound healing.

**Results:** The results showed a statistically significant difference between the two techniques in a) post-operative pain at day five ( $p = 0.046$ ), and six ( $p = 0.034$ ), b) socket healing at one week ( $p = 0.002$ ), and one month ( $p = 0.014$ ), and c) soft tissue healing at one week ( $p = 0.016$ ).

**Conclusion:** One-suture technique for LTMS is superior to the suture-less technique in reduction of post-operative pain, and improving wound healing during early post-operative period. There is no difference between the two techniques in reduction of post-operative swelling.

**Title:** Patient and Partner Experiences with Obstructive Sleep Apnoea and Mandibular Advancement Devices: A Qualitative Analysis

**Author(s):** Lina Khasawnih

**Affiliation:** Dublin Dental University Hospital, Trinity College Dublin

**Objectives:** To elucidate the experience of patients and partners who are living with Obstructive Sleep Apnoea (OSA) and undergoing Mandibular Advancement Device (MAD) therapy and examine the factors that influence adherence and acceptance of treatment. The influence of the partners' role and level of engagement in treatment was also explored.

**Methods:** Semi-structured in-depth interview qualitative research methodology was used. A total of fifteen participants were interviewed in this research. Five patients have worn MADs only, five patients who were using MADs following failure to adhere to CPAP therapy. And five partners of OSA patients were also interviewed.

**Results and Conclusion:**

OSA is a shared problem between patients and partners; it affects the quality of life of patients and is impairment to patients' work, social life, and the ability to perform daily functions. Patients diagnosed with OSA associated it with a number of psychological factors such as association with old age, depression, and impairment. Psychological factors such as locus of control, health attitudes and influence of significant others should be identified at the beginning of treatment to predict adherence to the prescribed treatment. OSA patients described that they would like to be actively involved in their own treatment. Partners' instigated the process for patients to seek medical advice, and the partner's role was not gender specific. They can have an active role in treatment of OSA. An array of roles were described; active sensitivity, passive adaptation, and direct confrontational approaches. For some partners cultural influences and classic gender roles influenced their perceived roles. OSA should be treated as a chronic condition that requires active intervention from patients paired with regular check visits and repeat sleep studies to assess patients' progress. Management of OSA should focus on a wholesome approach that involves incorporating healthy sleeping habits, getting patients and partners actively involved in treatment, adherence to prescribed treatment, and regular maintenance and follow up.

## IADR Irish Division Undergraduate Award Oral Presentations

**Title:** Expression of *Fusobacterium nucleatum* in cancers of the aerodigestive tract

**Author(s):** S Stasiak, Craig S, Bingham V, Crawford N, Fulton C, McQuaid S, Longley D, Lundy F, Irwin C, James JA.

**Affiliation:** Queens University, Belfast.

**Background:** In recent years, periodontal disease has been linked with a number of systemic conditions including coronary heart disease, stroke and type 2 diabetes. More recent studies have suggested that periodontal pathogens may also play a role in the development of certain cancers. Initial reports on a potential bacterial role in the initiation and progression of colorectal cancer (CRC) have suggested that organisation of bacterial communities into biofilms promotes pro-carcinogenic activities. One species which may play a role in biofilm development is the periodontal pathogen *Fusobacterium nucleatum*.

**Objectives:** The aim of this study was to determine the expression of *F. nucleatum* in colon cancer, and to investigate a potential relationship between expression levels, microsatellite instability (MSI) and patient survival. Additionally, levels of *F. nucleatum* detection in HPV positive and negative oropharyngeal cancers (OPSCCs) were investigated.

**Methods:** Quantitative PCR (qPCR) was conducted on DNA extracted from MSI (high) and MSI (low) CRC samples for detection of *F. nucleatum* Fad A gene expression. An association between *F. nucleatum* expression and both associated oncogenic mutations and patient survival was investigated. Levels of *F. nucleatum* expression in HPV positive and negative oral cancer samples were also determined.

**Results:** *F. nucleatum* DNA was detected in 7/15 MSI (high) CRC samples compared to 0/7 MSI (low) samples. None of the *F. nucleatum* positive tumours showed mutations in the TP53 oncogene. In contrast, 7/10 *F. nucleatum* negative samples did express a TP53 mutation. Survival was longer for patients expressing *F. nucleatum* in tumour samples. *F. nucleatum* expression was higher in HPV negative compared to HPV positive OPSCCs.

**Conclusion:** *F. nucleatum* infection was more prevalent in MSI (high) CRC samples compared to MSI (low) samples and may influence patient survival.

**Title:** Undergraduate Perceptions of Eating Disorders and Their Management.

**Author(s):** M. Domingos, A. Roberts, M. Hayes

**Affiliation:** Cork University Dental School and Hospital, University College Cork (UCC), Cork, Ireland.

**Background:** Pathological Tooth Surface Loss (TSL) is an increasing challenge for Dental Health Care Professionals (DHCPs). Eating Disorders (ED) patients may present with TSL and future DHCPs should be aware of the medical, dental and general management ED patients who may present with TSL.

**Objective:** To determine the perceptions of undergraduate students at Cork University Dental School and Hospital (CUDSH) towards their training and management of patients with ED.

**Methods:** Following ethical approval from the Social Research Ethics Committee of UCC (2017-035) an online questionnaire was developed and distributed to Final Year Dental (FYD; n=47) and Dental Hygiene (FYDH; n=14) students approaching the end of their studies (May 2017).

**Results:** There was a response rate for FYD (n=19; 40%) and FYDH (n=12; 86%) with no obvious trends differentiating the perceptions of FYDs and FYDHs. The perceived confidence of students in approaching ED patients about their condition varied widely. A small number of respondents perceived inadequate training in relation to oral manifestations (32%) and dental management (16%) of ED patients. In relation to the medical management (90%), personality traits (71%) and psychological needs (81%), students perceived a requirement for further training. A total of 4 FYDs and 1 FYDH reported personal management of an ED patient during their studies. Overall, 77% of respondents were unaware of dedicated local support services available to ED patients with 94% of respondents unaware of the Eating Disorder Centre in Cork.

**Conclusion:** The perception of FYDs and FYDHs at CUDSH in relation to their training in the oral and dental management of ED patients with TSL was positive however, both groups of undergraduates were largely unaware of the medical and psychological support services available to ED patients. Training institutes should ensure a holistic (general, medical and dental) approach to training and management of ED patients.

**Title:** Regulation of RAW264.7 macrophage polarization on smooth and rough surface topographies by galectin-3

**Author(s):** Fariba Kianoush, M. Nematollahi, J. D. Waterfield, D. M. Brunette

**Affiliation:** Department of Oral Biological and Medical Sciences, Faculty of Dentistry, University of British Columbia, Vancouver, British Columbia, Canada

**Objectives:** Two reference macrophage lineages have been used to determine where on the immunological spectrum activated macrophages exist in terms of their functional phenotype. These are classically activated macrophages (M1-polarized) and alternatively activated macrophages (M2-polarized). Given the importance of macrophages in wound healing and osseointegration, it is important to understand the mechanisms whereby surface characteristics produced macrophage polarization in order to design a new generation of biomaterials that are capable of directing the innate immune system.

**Methods:** Substrata and preparation of replica surfaces:

Four surface topographies were used in this study: surface polished (PO), sandblasted and acid etched (SLA), grooved 1 (G1) and grooved 2 (G2).

Cell culture and inhibitors:

For all the experiments in this study, the murine macrophage like cell line RAW 264.7 was obtained from American Type Culture Collection and cells were cultured in 75cm<sup>2</sup> tissue culture flasks in complete growth medium made of Dulbecco's Modified Eagle's Medium. Lactose and LY294002 were used as inhibitors.

Immunofluorescent staining:

To study the distribution of vinculin plaques and actin filaments

Immunofluorescent staining was used.

RT-qPCR:

RT-qPCR was used to measure the gene expression on different surface topographies in the presence and absence of lactose.

**Results:** Treating macrophages with the galectin-3 inhibitor (lactose) or PI3K inhibitor (LY294002) decreases gene expression of the M2 marker (mannose receptor) on both smooth and rough topographies. Cell morphology was also affected by surface topography. RAW264.7 cells had a larger surface area on the G2 topography. Lactose treatment significantly reduced the cell area on all topographies.

**Conclusion:** Skewing of phenotype suggests a role for galectin-3 in macrophage polarization toward M2. The PI3K inhibitor LY294002 down-regulated the M2 marker on both PO and G1 surfaces implicating PI3K in lineage determination as well as galectin-3. Lactose treatment significantly reduced the cell area on all topographies suggesting that galectin-3 is involved in the signaling pathways affecting rearrangement of the actin cytoskeleton. It thus appears likely that substratum surface topography in association with galectin-3 can influence cell signaling involved in the polarization of macrophage phenotype. This topography-directed macrophage polarization could aid in the design of implant surfaces that promote tissue healing and osseointegration.



## Dental Health Foundation Award Oral Presentations

**Title:** Identifying Common Factors of Functioning, Participation and Environment Amongst Adults Requiring Special Care Dentistry Using The International Classification of Functioning, Disability and Health.

**Author(s):** Alison Dougall<sup>1</sup>, Francisca Martinez Pereira<sup>2</sup>, Gustavo Molina<sup>3</sup>, Caroline Eschevins<sup>4</sup>, Blánaid Daly<sup>1</sup>, Denise Faulks<sup>4,5</sup>

**Affiliations:** 1- Dublin Dental Hospital, Trinity College Dublin  
2- University of Santiago de Compostela, Santiago de Compostela, Spain  
3- Escuela de Odontologia, Universidad Catolica de Cordoba, Argentina  
4- Université Clermont Auvergne, CROC EA4847, 63000 Clermont Ferrand, France  
5- CHU Clermont-Ferrand, Service d'Odontologie, 63100 Clermont Ferrand, France

**Objectives:** Persons unable to access oral health care in the conventional primary health care setting suffer from inequalities in oral health, particularly in terms of unmet dental need. The International Classification of functioning, disability and health (ICF) is designed to look beyond medical diagnosis and describes individuals or populations in terms of their ability to function and participate in a social environment. The objective of the study was to describe an adult population with complex needs using the ICF and to identify common factors of functioning, participation and environmental context within this population.

**Methods:** An ICF Checklist for Oral Health was completed for 246 participants referred to five specialist special care dental services in France, Spain, Ireland, Argentina and the UK.

**Results:** 33 ICF items were identified as affected by over 50% of participants in both groups. Impaired items in the body functions domain included 'ingestion functions', 'energy and drive functions' and 'emotional functions'. Participation was particularly restricted for "acquiring, keeping and terminating a job", "intimate relationships", "handling stress and psychological demands", "economic self-sufficiency", "carrying out a daily routine", "recreation and leisure", "community life" and "looking after one's health". In the environment domain, items relating to 'support and relationships' and to 'attitudes' were rated as facilitators. Items which were considered to be environmental barriers for over 25% of the whole group were related to 'services, systems and policies' including, health, social security, general support, transportation, and labour services systems and policies.

**Conclusion:** Common aspects of functioning, participation and environment were found amongst a heterogeneous population of attending adults, alongside a high prevalence of poor oral health and poor oral function. The ICF may be used to describe populations that suffer inequality in oral health in order to develop services that effectively target those in need of additional means.

**Title:** The Impact of Dental Status on Food Selection and Nutrient Intakes in Older Adults: UK National Diet and Nutrition Survey 2008-2014

**Author(s):** Sinead Watson<sup>1</sup>, Christopher Cardwell<sup>1</sup>, Jayne Woodside<sup>1,2</sup>, Gerry McKenna<sup>1,3</sup>

**Affiliation:** 1- Centre for Public Health, Queen's University Belfast  
2- Institute for Global Food Security, Queen's University Belfast  
3- Centre for Dentistry, Queen's University Belfast, Belfast

**Objective:** Loss of teeth can result in impaired masticatory function and avoidance of important foods that consequently may lead to suboptimal nutrient intakes. The aim is to examine how dental status affects perceived ability to eat to certain foods and nutrient intakes in UK older adults.

**Methods:** The analysis used data from the National Diet and Nutrition Survey, a cross-sectional survey of food and nutrient intakes of a representative sample of the UK population. Participants aged 65 years and over were included (n=1053). A 4-day food diary assessed dietary intake, while a Computer Assisted Personal Interview collected socio-demographic, health behaviour and oral health information. Participants were asked about their dental status, i.e. if they had any natural teeth (dentate) or not (edentate), and if they wore dentures. For analysis participants were classified into three groups: edentate with dentures (E-DEN, n=292), dentate with dentures (D-DEN, n=305) or dentate with no dentures (DEN, n=456). Logistic and multiple linear regression methods were performed to examine the relationship between dental status, food selection and nutrient intake.

**Results:** Compared with the DEN group, both D-DEN and E-DEN groups were more likely to report having difficulty eating five out of 12 selected foods, including apples, raw carrots, nuts, well-done steak and crusty bread. The E-DEN group compared with the DEN group had lower mean daily intakes of protein (65.5±0.9 vs. 68.8±0.8 g/d; P=0.006), non-starch polysaccharides (11.7±0.3 vs. 13.6±0.3 g/d; P<0.001), folate (229.9±6.2 vs. 252.5±5.6 µg/d; P=0.005), vitamin C (64.8±3.6 vs. 75.4±3.1 mg/d; P=0.033), iron (9.5±0.2 vs. 10.2±0.2 mg/d; P=0.008), magnesium (217.0±3.8 vs. 242.6±3.4 mg/d; P<0.001) and potassium (2555.4±42.4 vs. 2772.0±35.8 mg/d; P<0.001) after adjusting for socio-demographic and behavioural factors. No differences were observed between DEN and D-DEN groups.

**Conclusion:** Within this sample of older adults impaired dental status appears to influence food selection and intake of important nutrients.

**Title:** Compliance of Dental Practice Websites in Northern Ireland with the GDC document '*Principles of Ethical Advertising*'

**Author(s):** William Maguire<sup>1</sup>, David Hussey<sup>2</sup>

**Affiliation:** 1- Oral and Maxillofacial Facial Surgery Department, RVI Newcastle  
2- Centre for Dentistry, Queen's University Belfast

**Objectives:** To evaluate the compliance of dental practice websites in Northern Ireland with the GDC document "Principles of Ethical Advertising"

**Methods:** A list of dental practices in Northern Ireland was compiled using the Business Services Organisation (BSO) and the Regulation and Quality Improvement Authority (RQIA) databases. A Google search was then used to identify the individual websites. All identified practice websites were viewed in June 2017, and their pages scrutinised against the principles listed in the 2012 GDC document "Principles of Ethical Advertising".

**Results:** 269 (70.8%) of the 380 practices had a website. 268 (99.6) practices with websites displayed the practice name, address (98.9%), phone number (99.3%) and email address (87%), as would be expected from any business website. A very small number of the practices (2.6%) compared the qualifications or skills of its practitioners to others, therefore 97.4% fulfilled this requirement. Displaying the professional qualification of the practitioner was observed in 36.1% and this was not always supplemented with the country in which this qualification had been awarded (30.5%). Compliance with displaying practitioners' GDC registration numbers was 42.4%. The GDC website link was included in 21.2% of practices and 14% included the GDC address. The practice complaints procedure was displayed 24.2%, with the health service complaints procedure explained in 19.7% of websites. Around a quarter of the practice websites did not state when the website was last updated (25.7%).

**Conclusion:** In 2017, no dental practice website was fully compliant with all the principles outlined in the 2012 GDC document "Principles of Ethical Advertising". This study demonstrates that dental practices are still failing to comply with the GDC's compulsory rules on advertising despite their introduction over 5 years ago. Dental registrants are urged to check the content of their practice website against the GDC document and to ensure that all necessary information is present.

## IADR / RCSI Clinical Research Award Oral Presentations

**Title:** Prevalence of Endodontic Infections Among 60-70 Year-old Men in Northern Ireland

**Author(s):** McClory M, Linden GJ, Fong W, Heidarifar O, Goh T, Lundy FT, El Karim IA.

**Affiliation:** Centre for Experimental Medicine, School of Medicine Dentistry and Biomedical Sciences, Queen's University Belfast

**Background:** The prevalence of endodontic involvement resulting in apical periodontitis (AP) or the provision of root canal treatment in the Northern Ireland (NI) population is not known.

**Objectives:**

- (1) Determine the prevalence of AP in PRIME subjects
- (2) Determine an overall endodontic burden (EB) including the number of root filled teeth and those with AP
- (3) Relate the prevalence of AP and EB to socioeconomic status and number of teeth

**Methods:** Orthopantomograms (OPT) were taken for a representative sample of 60-70 year-old dentate men in NI. The OPTs were examined to identify teeth that were root filled (RF). The periapical index (PAI) was used to assess radiographic evidence of AP which was defined as the presence of at least one tooth with a PAI score of 4 or 5. Endodontic burden (EB) was defined by the presence of AP and or RF.

**Results:** In total 642 men, aged on average 64.0 (SD 2.95) years, provided the basis for the study. There were 341 (53.1%) with AP. The number of teeth with AP was small with 284 men with 1 or 2 affected teeth and 57 men with 3 or more affected teeth. The maximum number of affected teeth was 7. There were 298 (46.4%) men who had at least one RF tooth. Evidence of EB was found in 454 (70.3%) of the men. Men with EB had a significantly higher number of teeth 20.02 (SD 5.2) vs 18.7 (SD 6.0),  $p=0.0066$ ; were more likely to be in the high socioeconomic status group 66.4% vs 46.0%,  $p<0.0001$ ; and to have spent more years in education 12.3 (SD 3.2) vs 11.1 (SD2.7),  $p=0.0001$ .

**Conclusion:** The prevalence of endodontic infections as evidenced by apical periodontitis and root treated teeth was high in 60-70 year-old men in Northern Ireland.

**Title:** Comparison of Three Internal Fixation Techniques in Mandibular Sagittal Split Osteotomy, A Finite Element Analysis

**Author(s):** Muhammad Kamil Hassan, Leo F A Stassen, Michael Ring

**Affiliations:** Dublin Dental Hospital, Trinity College Dublin; Dublin Institute of Technology

**Objectives:** Various internal fixation techniques are used in orthognathic surgery. The aim of this study was to analyse and compare the biomechanical properties of three internal fixation techniques (2.0mm bi-cortical screws, 2.0mm miniplate and 1.7mm miniplate) in mandibular sagittal split osteotomy.

**Methods:** A peri-operative CT of patient's skull was used to develop a dentate hemi-mandible using computer software. The hemi-mandible model underwent sagittal split osteotomy virtually, and was reproduced. A total of 9 models consisting of the 3 fixation techniques with mandibular movements of 3mm setback, 3mm advancement and 7mm advancement were developed. Bite forces applied were 50,75, and 100N for incisors, and 100, 200 and 300N for molars. The finite element analyses were carried out in Simulation Solidworks®. Stresses and displacement readings in fixations and bone were recorded.

**Results:** The bi-cortical screws with an inverted-L orientation was the most rigid fixation technique in all mandibular movements. It had the least displacement and stress in the models. Stress is mostly concentrated in the inferior-distal screw for the bi-cortical screws fixation, whereas the stresses in miniplates are generally dissipated in the connector region of the plate. Not surprisingly, the 1.7mm miniplate was the least rigid fixation. The stresses in surrounding bone of the fixations were variable for each technique. Miniplate fixations had higher bone stresses in the setback movement and lower with mandibular advancements, whilst bi-cortical screws showed higher stress in bone with mandibular advancements.

**Conclusion:** The application of bi-cortical screws has shown to be the most rigid fixation, although with increased stresses in surrounding bone in mandibular advancements. The 1.7mm and 2.0mm miniplates are less rigid than the bi-cortical screws but importantly handled stresses within the ultimate yield strength. The amount of displacement of the mandible segment in the 1.7mm miniplate group is less than 1mm for all mandibular movements. The 1.7mm miniplate can be considered as an alternative fixation technique for setbacks and advancements of 3 mm, and although probably satisfactory, we need more clinical follow up for advancements of 7mm or more.

## Non-prize Oral Presentations

**Title:** Association Between Number of Teeth and Healthier Food Choice in Older Men

**Author(s):** Linden G J, McEvoy CT, Winning L, Kee F, Woodside JV.

**Affiliation:** Centre for Public Health, Queen's University, Belfast.

**Objectives:** To investigate whether the number of teeth was associated with healthier food choices made by older men in Northern Ireland.

**Methods:** A representative sample of 60-70 year-old dentate men in Northern Ireland underwent a dental examination between 2001-2003. Food choice was assessed in 2015 using a food frequency questionnaire. Logistic regression models were used to investigate associations between number of teeth and frequency of food choice of healthier foods (olive oil, fruit, vegetables, fish, wholegrain and nuts). Models were adjusted for possible confounders including age, BMI, diabetes, smoking, education, socio-economic status and periodontitis.

**Results:** A total of 1012 men provided valid dietary information 13.1 years (SD0.6) after their baseline dental examination (91% response rate). The average age of the men was 77.0 years (SD 2.9). Men with twenty or more teeth were significantly more likely to eat fruit on a daily basis than those with fewer teeth, 68.4% compared with 59.5%,  $p<0.01$ ; to eat vegetables on a daily basis, 53.0% compared with 42.2%,  $p<0.001$ ; and to eat wholegrain daily, 76.3% compared with 67.3%,  $p<0.01$ . Men with twenty or more teeth were significantly more likely to ever eat nuts than those with fewer teeth, 63.3% compared with 36.5%,  $p<0.0001$ ; adjusted OR=2.58 (1.93-3.45),  $p<0.0001$ ; to ever use olive oil, 53.0% compared with 38.3%,  $p<0.0001$ ; adjusted OR= 1.63 (95% confidence interval 1.22-2.18),  $p<0.01$ ; and to ever eat fish, 88.2% compared with 78.2%,  $p<0.0001$ ; adjusted OR= 1.87 (1.29-2.70),  $p<0.001$ .

**Conclusion:** Diet quality is critically important for healthy ageing and prevention of chronic disease. In this representative sample of older men, greater number of teeth was independently associated with quality of food choice over a decade later.

*Supported by the British Heart Foundation and Northern Ireland HSC R&D.*

**Title:** Evaluation of a Chairside Testing Kit for Root Caries Risk.

**Author(s):** Hayes M, da Mata C, Burke F M

**Affiliation:** University College Cork.

**Objectives:** Evaluation of a caries risk assessment tool for high-risk individuals for root caries.

**Methods:** A two-year prospective study recording root caries incidence was carried out on 334 older adults. Saliva samples were collected to measure stimulated salivary flow rate, buffer capacity and estimate bacterial counts. The CRT® Caries Risk Test (Ivoclar-Vivadent, Schaan, Liechtenstein) recorded the salivary buffer capacity, Mutans streptococci (MS) and Lactobacilli (LB) counts. The buffer capacity of stimulated saliva was determined using CRT Buffer® (Ivoclar-Vivadent). The MS and LB counts per millilitre saliva were recorded using CRT Bacteria® (Ivoclar-Vivadent). Clinical examination was completed to record exposed, filled and decayed root surfaces (RDFS). This was repeated after 12 and 24 months. Root caries increment for each adult was calculated as the number of root surfaces which had developed a new active lesion in that time. Non parametric tests (Mann-Whitney U and Kruskal-Wallis tests) were employed to evaluate the statistical significance of differences in median root caries increment across categories of different baseline prediction groups.

**Results:** 307 participants attended for re-examination after 12 months and 280 after 24 months. Fifty-six (18.2%) of those who were examined at 12 months and 70 (25.0%) at 24 months had developed at least one new root caries lesion. The mean root caries increment was 0.43 surfaces at 12 months and 0.70 surfaces at 24 months. The mean attack rate at 12 months was 1.15 (SD 3.98) surfaces per 100 surfaces at risk and at 24 months was 1.92 (SD 5.88). Of the parameters evaluated there was a significantly higher Root Caries Index in those patients with xerostomia ( $p < 0.001$ ), there was no significant relationship with buffering capacity, MS or LB counts.

**Conclusion:** Of the salivary parameters examined only a significant relationship existed between xerostomia and the development of new root caries lesions.

**Title:** Oral Health and Wellbeing in Older Irish Adults.

**Author(s):** Aideen Sheehan<sup>1</sup>, Christine McGarrigle<sup>1</sup>, Rose Anne Kenny<sup>1</sup>, Jacinta McLoughlin<sup>2</sup>, Brian O'Connell<sup>2</sup>

**Affiliation:** 1- The Irish Longitudinal Study on Ageing, Trinity College Dublin.  
2- Dublin Dental University Hospital, Trinity College Dublin

**Objectives:** To describe the self-reported oral health of older adults in Ireland and to investigate whether oral health is associated with social participation, general health, mental health and wellbeing.

**Methods:** Data was collected using a computer assisted personal interview of 6425 community-dwelling adults aged 54 years and older, as part of TILDA Wave 3 (March 2014-October 2015). Estimates were weighted to account for age, sex, and educational attainment in the 2011 census, so the results are representative of the population in Ireland.

**Results:** 7% of Irish adults aged 54 to 64 years were edentate, increasing to 40% of those aged 75 years and over. Older adults living in rural areas were twice as likely as those living in Dublin to be edentate (22% vs 10%). Edentate adults were more likely to be smokers than those who retained teeth, and the difference is particularly notable in those ages 54 to 64 years (40% vs 15%). Older adults with no teeth or dentures reported less active social participation, lower quality of life, increased depressive symptoms and increased loneliness compared to adults with natural teeth. Most adults (66%) accessed dental care from a private practitioner, though 15% of edentate people would attend a dental technician. Use and awareness of state dental services is low, particularly among those with no teeth.

**Conclusion:** Loss of natural teeth among older adults in Ireland is associated not only with ageing, but also with a range of indicators of poor health and general wellbeing. However, the oral health status of older adults appears to be improving compared to previous surveys in Ireland. Strategies should be put in place to increase awareness and use of dental services.



**Title:** Dental Fear in Older Patients and Their Preference For Less Invasive Dental Treatment

**Author(s):** Cristiane da Mata<sup>1</sup>, Gerry McKenna<sup>2</sup>

**Affiliation:** 1- University College Cork, 2- Centre for Public Health, Queens University Belfast

**Background:** Fear and anxiety related to dental treatment seem to be very common and affect individuals of all ages. Dental fear is mainly related to highly invasive procedures which involve the use of anaesthesia and drilling and although usually underestimated among older individuals, dental fear has been shown to be a barrier to dental utilization by this group.

**Objectives:** To assess self-reported dental attendance and dental fear among older individuals and investigate their preference for less invasive dental treatment techniques.

**Methods:** In this randomized controlled clinical trial, 99 independently living adults (65-90 yrs) were randomly allocated to receive either the Atraumatic Restorative Treatment (ART) or a Conventional technique (CT) to restore carious lesions. They answered a questionnaire at baseline on dental habits, dental utilisation and reasons for not accessing dental services more often. They were then examined by two calibrated dentists and data such as DMFT, plaque scores, number of occluding pairs of teeth were recorded.

**Results:** 46 males and 52 males participated in the study, with a mean age of 73 years. The majority of patients reported they were not regular dental attenders (59.8%), with 25.8% of patients saying it had been more than 2 years since they had last seen a dentist. The fear of the drill and fear of dental anaesthesia were mentioned by 38.2% of patients as some of the reasons for not going to the dentist more regularly. Overall, 71.1% of patients stated they would have a preference for a technique that would not involve the use of rotary instruments, and 64.5% would prefer a dental technique without the use of local anaesthesia.

**Conclusions:** Dental fear seems to play a role on the low dental attendance by older patients. Treatment approaches which do not involve the use of drilling or local anaesthesia may be preferred by elderly individuals.

**Title:** Applied Research Methods in Maxillofacial Prosthetics

**Author(s):** Marina Leite Pimentel<sup>1</sup>, Reinaldo Brito e Dias<sup>2</sup>, Neide Pena Coto<sup>3</sup>, Hugh James Byrne<sup>4</sup>

**Affiliations:** 1- School of Dental Science, Dublin Dental University Hospital, Trinity College Dublin, the University of Dublin

2- Department of Maxillofacial Surgery, Prosthetics and Traumatology, School of Dentistry, Sao Paulo, Brazil

3- Department of Maxillofacial Surgery, Prosthetics and Traumatology, School of Dentistry, Sao Paulo, Brazil

4- FOCAS Research Institute of Dublin Institute of Technology

**Objectives:** Maxillofacial Prosthetics is a dental specialty which can provide better quality of life for oral and maxillofacial mutilated subjects. This presentation outlines some of the current research trends in Maxillofacial Prosthetics.

**Methods:** The concepts of clinical success and challenges of the internal and external maxillofacial prostheses are discussed, to introduce topics of research interest.

**Results:** The research methods are categorised in three branches: Epidemiology, Materials Science and Quality of Life. From Epidemiology, there is data on treatment provided in some centres, although lacking enough information to establish a percentage of treatment needs. Materials Science techniques have promising clinical applications, regarding prostheses design, colour matching and stability, bone-implants interactions prediction. For prostheses subject perception and treatment compliance, existing Quality of Life questionnaires have applied and still need to be adapted to maxillofacial prostheses recipients.

**Conclusion:** Beyond all dental care related concepts, the trio of Epidemiology, Materials Science and Quality of Life studies are equally important in Maxillofacial Prosthetics. Broader based and more detailed worldwide Epidemiological research is much needed to establish treatment policies. From Materials Science developments, additive impression and spectroscopy are resources which offer a gain of chairside time. Due to individual subject perception and adaptation of prosthesis usage, assessing and quantifying Quality of Life impact is a measure for assessing treatment success from the most important point of view: the mutilated subject.

## Poster Presentations:

**Title:** The Association Between Oral Health And Gastrointestinal Cancer Risk In The UK Biobank: A Large Prospective Cohort Study

**Author(s):** Jordão H, Mc Kenna G, McMenamin Ú, Kunzmann A, Murray L, Coleman H.

**Affiliation:** Centre for Public Health, Queen's University Belfast.

**Background:** Poor oral health, and specifically periodontitis, has been identified in patients with digestive cancers and many systemic diseases. Despite several studies, controversy remains as to whether oral health status is independently associated with these outcomes, due to confounding by smoking, alcohol and poor nutrition, and therefore further research is required.

**Objectives:** To investigate the association between oral health status and gastrointestinal cancer risk.

**Methods:** Data from the large, prospective UK Biobank, which includes n=475,766 participants, were analysed. Oral health problems (defined as painful gums, bleeding gums, and/or having loose teeth) were self-reported by questionnaire. Linkage to cancer registries enabled identification of gastrointestinal cancer cases. Cox proportional hazard models were applied to estimate the relationship between gastrointestinal cancer risk and oral health problems, adjusting for confounders.

**Results:** During an average 6 years of follow-up, n=4,069 gastrointestinal cancer cases were detected, of which 13% reported oral health problems. Overall, there was no association between self-reported oral health problems and risk of gastrointestinal cancer (HR 0.97, 95%CI 0.88-1.07). In site-specific analysis, no associations were identified between oral health problems and risk of oesophageal, gastric, pancreatic, small intestine or colorectal cancers. However, an increased risk of hepatobiliary cancers was observed in those with self-reported oral health problems (HR 1.31, 95%CI 0.95-1.80), which became a significant 50% increased risk in analysis restricted to ever smokers, overweight individuals, and those consuming <5 fruit and vegetables portions per day.

**Conclusion:** Overall there was no association between poor oral health and gastrointestinal cancer risk, however there were suggestions of an increased risk of hepatobiliary cancer. Unfortunately very limited oral health data has been collected as part of the UK Biobank despite the availability of a number of validated tools for assessment of oral health.

**Title:** Biomarkers of nutritional well-being in older people

**Author(s):** D.E. Logan, J.V. Woodside, G. McKenna

**Affiliation:** Centre for Public Health, Queen's University Belfast

**Objectives:** It is vitally important to identify older adults who are failing to meet nutritional intake guidelines. However, conducting a full nutritional assessment is currently a complex and invasive process. Hence, there is a necessity within the healthcare system for a non-invasive, timely and cost-effective screening method (Yoshizawa et al., 2013). Biomarker analysis may aid nutritional assessment and saliva has been suggested as a potential non-invasive biological fluid which could be used for the assessment of nutritional biomarkers. The project aim is to identify potential nutritional biomarkers in the oral environment of older adults. To help achieve this aim a key objective is: To undertake a systematic review of nutritional biomarkers available within the saliva of older adults.

**Methods:** A scoping exercise has been conducted, following an initial literature review about the use of saliva in determining oral and systemic diseases and nutritional status. The scoping exercise was conducted between May and October 2017 using MEDLINE. An example of search terms used included: exp Albumin AND (exp Nutrition Assessment or exp Nutrition Disorder OR exp Protein-Energy Malnutrition or exp Malnutrition or exp Severe Acute Malnutrition). The search was not limited to particular years or age groups.

**Results:** The scoping exercise has identified eleven potential salivary biomarkers of nutritional status. These include albumin, prealbumin, transferrin, ferritin, amylase, calcium, phosphorus, potassium, vitamin D, vitamin C and total antioxidant capacity. Once completed, the outcomes of the scoping review will form the basis of a systematic review.

**Conclusion:** The current results identified eleven potential nutritional biomarkers in saliva which need to be investigated in a systematic review. Further research will be conducted to see whether salivary biomarkers can be used to assess nutritional status in older people.

**Title:** Masticatory Performance in Partially Dentate Older Patients: The Impact of Prosthodontic Rehabilitation and Its Use as a Predictor of Nutritional Status.

**Author(s):** SM Wallace<sup>1</sup>, S Samietz<sup>2</sup>, G McKenna<sup>1</sup>, J Woodside<sup>1</sup>, M Schimmel<sup>3,4</sup>

**Affiliation:** 1- Centre for Public Health, Queen's University Belfast

2- University of Greifswald, Germany

3- Division of Gerodontology, University of Bern, Bern, Switzerland.

4- Division of Gerodontology and Removable Prosthodontics, University of Geneva, Geneva, Switzerland.

**Objectives:** As natural teeth are lost there can be significant negative consequences for oral function 1 . With a decreased number of teeth, a reduction in chewing function can result in modifications to food choices and subsequently nutritional state 2,3 . This study compared the impact of two tooth replacement strategies for partially dentate older patients on masticatory performance and nutritional status.

The two treatment strategies compared were removable partial dental prostheses (RPDPs) and functionally orientated treatment based on the shortened dental arch (SDA) concept.

**Methods:** Patients aged 65 years and older were randomly allocated to two different treatment groups. For the RPDP-group each participant was restored to complete arches with cobalt-chromium RPDPs to replace missing teeth. For the SDA group, participants were restored to a premolar occlusion of 10 occluding pairs of natural and replacement teeth (OU) using bridgework. Masticatory performance was assessed with a previously validated colour-mixing ability (bolus-kneading) test. Each patient provided haematological samples that were screened for biochemical markers of nutritional status. Each sample was tested for serum Albumin, serum Cholesterol, Ferritin, Folate, Vitamin B12 and Vitamin D. Patients were also assessed using the Mini Nutritional Assessment (MNA). Data was collected and analysed using t-tests and regression models.

**Results:** Eighty-nine patients completed the test for masticatory performance and provided blood samples and MNA scores at baseline (BL) and after 12 months. Masticatory performance increased significantly in both groups ( $p < 0.0001$ ), but no statistically significant between group differences were noted. Statistical testing did not demonstrate that masticatory performance was independently associated with nutritional status.

**Conclusion:** These results indicate that prosthodontic rehabilitation according to the principles of the SDA is equivalent to RPDPs in terms of restoration of chewing capacity for partially dentate older patients. However, enhanced masticatory performance alone did not signify improved nutritional status for this patient group.

**Title:** Is Silver Diamine Fluoride Effective in Preventing and Arresting Caries in Elderly Adults? – A systematic Review

**Author(s):** Gireesh Kumar Subbiah, Gerry McKenna

**Affiliation:** Centre for Public Health, Queen`s University Belfast

**Background:** With shifting demographics towards an aging population in countries such as the United States and the United Kingdom there is a need to address the oral health demands of elderly adults. With increasing numbers of elderly patients retaining their natural teeth the incidence of dental caries is on the rise and the need of this population is largely unmet due to limited resources. Silver Diamine Fluoride (SDF) has invoked interest in recent times due to its cost effectiveness and noninvasive application procedure. This systematic review is aimed at finding the scientific evidence available on the effectiveness of SDF in managing caries in the elderly adults.

**Objectives:** The primary objective of this review was to evaluate the effectiveness of SDF on caries prevention and arrest in elderly adults.

**Methods:** Multiple databases were searched with pre-defined inclusion and exclusion criteria. The extracted data was subjected to quantitative and qualitative synthesis.

**Results:** The review found three well conducted randomized controlled trials evaluating the effectiveness of SDF on root caries in community dwelling elders. None of the studies addressed coronal caries. The prevention and arresting effect of SDF was significantly better than other interventions and control. In one 3-year study SDF had a prevention fraction of 71% compared to a placebo. Another 2-year study found it reduced caries incidence by 25% and this increased to 47% when the treatment was combined with structured oral health education. No adverse effects were reported in the short term and long-term use of SDF in elderly adults.

**Conclusion:** The limited evidence on SDF shows that it is effective in arresting and preventing root caries in the elderly. More high-quality studies need to be done to verify the effectiveness on coronal caries and long-term effects of SDF in the elderly with varying levels of dependency.

**Title:** Exploring the Role of Oral Health Status on Food Choice among Older Adults.

**Author(s):** Leigh-Ann McCrum<sup>1</sup>, Sinead Watson<sup>2</sup>, Ciaran Moore<sup>1,2</sup>, Laura McGowan<sup>1</sup>, Jayne Woodside<sup>1</sup>, Gerry McKenna<sup>1,2</sup>

**Affiliation:** 1- Centre for Public Health, Queen's University Belfast. 2- Centre for Dentistry, Queen's University Belfast.

**Objectives:** It is recognised that older adults (65 years and over) who have a poor oral health status are also more likely to have a reduced nutritional status. This may be because there is an increased risk of nutritionally-dense foods including fruit, vegetables or fibre-based foods being avoided due to the reduced biting and chewing performance that is associated with a reduced dentition status amongst this population. Qualitative research exploring the impact of oral health/dentition status on food choice and consuming a healthy balanced diet is severely lacking amongst older adults. Consequently, this study investigated the role of oral health as well as other factors that influence food choice amongst the older adult population.

**Methods:** Participants over the age of 65 years took part in four focus group discussions on food choice. They also completed a background questionnaire which collected demographic and information on diet related behaviours. Focus group discussions were recorded, transcribed, and analysed using thematic analysis.

**Results:** Focus groups (n=4) with the target audience were conducted with 8 men and 13 women with a mean age of 72 (ranging between 65-84 years). Oral health was 1 of 7 key themes that was seen to be a major factor influencing food choice. Discussions on the issue of oral health were primarily based around their experiences with the dental practice, avoidance of certain foods and coping mechanisms for avoided foods such as chopping food and taking smaller bites.

**Discussion:** This qualitative research demonstrates that poor dentition status may be considered a barrier for food choice and consuming a healthy balanced diet within this sample of older adults. Further research is needed to explore if these findings are consistent with the wider older adult population.

**Title:** Dentistry in Care Homes in Northern Ireland – Is There an Unmet Need?

**Author(s):** Caroline Lappin, Gerry McKenna

**Affiliation:** Community Dental Service, South Eastern H&SC Trust; Centre for Public Health, Queen's University Belfast

**Objectives:** To determine the current state of oral care provision for residents of residential and care homes within the South Eastern HSC Trust area, through analysis of screening activity from the Community Dental Service.

**Methods:** Using a sample of five homes in the Lisburn City area, the information gathered through annual patient screening by staff of the Community Dental Service, was analysed to determine the gender and age profile of residents, oral health status and level of treatment need as per their dental tooth charting. Oral health status was also analysed along with the level of residents' co-operation for a simple dental examination.

**Results:** Data relating to a total of 132 residents was analysed. 73% of the residents were female, with the average age being 83.5 years. 54.55% had some natural teeth present, with over 80% of residents aged 65 -74 years having some or all of their natural teeth. 42% of assessments did not have a complete dental charting. Level of denture wearing amongst residents was low. The comments recorded by the community dentist were related to poor oral and denture hygiene. There was no evidence that dental staff had engaged with residents or carers to improve oral care at patient level aside from making recommendations to improve tooth brushing and/ or clean dentures.

**Conclusion:** There is an urgent need to radically change the management of dental care for older people in care homes in Northern Ireland. There is also need to address the oral care assessment data currently collected by the Community Dental Service to ensure consistency across the Trust areas and accuracy for use in planning future funding and service needs for this rapidly growing population. Consideration should be given to greater partnership working between the CDS and General Dental Service in Northern Ireland.



**Title:** The Impact of a Tailored Habit-based Dietary Intervention Coupled With Oral Rehabilitation on The Nutritional Status of Older Patients: Study Protocol For a Randomised Controlled Trial (RCT).

**Authors:** Laura McGowan<sup>1</sup>, Leigh-Ann McCrum<sup>1</sup>, Sinead Watson<sup>1</sup>, Ciaran Moore<sup>1,2</sup>, Bernadette McGuinness<sup>1</sup>, Christopher Cardwell<sup>1</sup>, Jayne Woodside<sup>1</sup>, Gerry McKenna<sup>1,2</sup>.

**Affiliations:** 1- Centre for Public Health, Queen's University Belfast. 2- Centre for Dentistry, Queen's University Belfast.

**Objectives:** Links between diet and health are well-established, with low intake of fruit, vegetables (FV) and fibre associated with increased chronic disease risk. As natural teeth are lost, older adults choose softer, more manageable foods lacking in essential micronutrients and fibre, yet replacing missing teeth does not positively influence diet. Providing tailored dietary intervention in combination with treatment to replace missing teeth has shown promise, though evidence is limited to edentate patients, with no such interventions in partially-dentate adults. One novel approach to dietary change is that of habit-formation; where 'habits' are considered behaviours that have, through repetition, become "automatic," i.e., fruit with breakfast every day. This RCT will test a novel dietary intervention on habit-formation amongst partially-dentate older adults who have received treatment to replace missing teeth. Secondary aims are to assess the impact of the intervention upon self-reported food choices; food-related well-being; nutritional status and biomarkers of healthy a diet.

**Methods:** Participants will be randomised to control or intervention following baseline assessments. The intervention-group receive a habit-based tailored dietary intervention which involves four meetings with a trained researcher, discussing a different area of the diet each time - FV, wholegrains and proteins. All participants complete measures of self-reported automaticity for healthy food choices (primary outcome); food intake; food related well-being; knowledge of diet-disease relationships; oral health-related Quality of Life; markers of nutritional status (blood/saliva samples) and the Mini Nutritional Assessment at baseline, 6-weeks, 4- and 8-months.

**Results:** Data will be analysed from n=50 adults. The influence of the intervention on primary and secondary endpoints will be assessed by comparing the means of changes in measurements from baseline to 4-and 8-months between intervention and control groups.

**Conclusion:** This research will provide evidence of the utility of a habit- based approach in positively influencing the dietary behaviour of partially-dentate older adults.

**Title:** Effectiveness of prosthodontic interventions and survival of remaining teeth in adult patients with shortened dental arches – a systematic review

**Author(s):** McLister C<sup>1</sup>, Donnelly M<sup>1</sup>, Cardwell C<sup>1</sup>, Moore C<sup>1</sup>, O'Neill C<sup>1</sup>, Brocklehurst P<sup>2</sup>, Allen PF<sup>3</sup>, McKenna G

**Affiliation:** 1- Centre for Public Health, Queen's University Belfast  
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**Objective:** To evaluate studies of the effectiveness of different tooth replacement strategies in adult patients with reduced dentitions.

**Methods:** A protocol was registered with PROSPERO (CRD42017064851), and the systematic review was conducted in accordance with PRISMA guidelines. Eligibility criteria included randomized and non-randomized studies investigating partially dentate adult patients with 10 or less functional maxillary and / or mandibular teeth. Eligible interventions included RPDs, bridgework, implant supported prostheses, and the comparator was no intervention or different interventions ('head-to-head'). Primary outcomes included survival of interventions, survival of remaining teeth and change in OHRQoL using validated self-reported measures. Secondary outcomes included any biological or technical complications. Electronic databases of MEDLINE, CENTRAL, Embase and OpenSIGLE were searched up to and including 12<sup>th</sup> January 2017. CDSR, DARE, ICTRP, ClinicalTrials.gov and reference lists of included studies were also searched. All searches were restricted to articles published in the English language. Cochrane risk of bias assessments were undertaken for each randomized controlled trial (RCT) report, and quality of observational studies was assessed using the NOS.

**Results:** The search strategy identified 67 non-duplicate citations, and after screening by two reviewers independently, 10 studies were included. Of these 7 were RCTs and 3 were observational studies. There was considerable heterogeneity in study populations, interventions and outcome measures, therefore meta-analysis was not possible. Included studies followed patients attending Dental schools or hospitals in Denmark, Germany, Netherlands, United Kingdom and the Republic of Ireland. Interventions evaluated included RPDs, resin bonded and conventional bridges, but not implant supported prostheses. Outcomes investigated included survival of interventions (2 studies), survival of remaining teeth (4 studies), and changes in OHRQoL (3 studies). Several studies reported different secondary outcomes.

**Conclusions:** There is currently insufficient evidence to recommend one tooth replacement strategy over another in adult patients with reduced dentitions. Limited evidence suggests that RPDs are associated with more maintenance and impact less on OHRQoL, in comparison with restoration to a shortened dental arch using resin bonded bridges. However, there is a need for further RCTs, adhering to CONSORT guidelines, with standardised core outcomes that can facilitate future meta-analysis.

**Title:** Bleaching Young People's Teeth- Are We Fully Informed and Consented?

**Author(s):** H. Morison, MF.M Skene, N. O'Murchu, A. Cairns

**Affiliation:** Glasgow Dental Hospital and School, Glasgow, UK

**Background:** Tooth whitening/bleaching using hydrogen peroxide realising products above 0.1% up to 6% is limited for use on persons aged 18years and over. 1 Locally this called into question our department consent process when offering tooth whitening/bleaching as a treatment option.

**Aim:** To introduce a standardised informed consent process for tooth whitening/bleaching for people under 18years of age.

**Objectives:**

- 1) Improve the delivery of information regarding bleaching treatment
- 2) Improve the level of treatment expectations set by patients and staff
- 3) Ensure the consent process is fully transparent and informed

**Methods:** All clinical staff were involved in contributing to the detail of the following documents for bleaching treatments; 1) Information leaflets 2) A folder displaying pre and post-treatment photographs of previously treated patients 3) Consent forms outlining the legalities and risks. Quality improvement (QI) run cycles, with patient and clinician feedback questionnaires, were then carried out.

**Results:** Both parents and staff reported an improvement in the quality of treatment provided and gave insight/feedback that allowed for further adaptations to the documents. Liaison with the local health board QI team allowed for official approval for health board publication of all documents.

**Action plan:** Currently an audit is now being undertaken to ensure standardisation of the consent process. Following this QI success it was proposed that other dental aesthetic treatments could similarly be improved and this is now planned.

**Conclusion:** All objectives of the project were met. To ensure holistic care, information is still verbally tailored to meet individual patient needs.

**Title:** Oral Hygiene Among Independent Older Adults Wearing RPDs: A Pilot Study

**Author(s):** Tada S, Fujiwara S, Ogawa H, Ono T, Kurashima H, Miyazaki H

**Affiliation:** University of Niigata, Japan

**Objective:** Partially dentate patients who experienced mainly dental caries and periodontitis have poor oral hygiene history, and wearing removable partial denture (RPDs) itself is possibly at higher risk for further dental problems under poor control. Therefore, they need to be paid more attention to their oral hygiene, though it tends to be disregarded after prosthetic treatment completion. The aim of this study is to investigate the oral hygiene practices and status among independent older adults wearing RPDs.

**Methods:** Independent older adults who were delivered new RPDs at a department of removable prosthesis of University Dental Hospital and a private dental clinic were recruited to participate in this study. Oral hygiene practices were assessed with a self-administered questionnaire and oral examinations were performed.

**Results:** 24 patients agreed to participate in this pilot study. The median age was 72.0 (IQR: 66.5-76.0) year-old. All of them reported they had received dental hygiene instruction, and had the tooth-brushing practice at least once a day. However, they found difficult in self-brushing, especially “gum-line” and “back/inside surface”. 70% (n=15/23) failed to control proper dental hygiene (PCR under 20%), and 75% (n=18/24) had at least one teeth with periodontal pocket over 4mm. Of all, 29% (n=7/24) disagreed to visit the regular professional preventive care, and the PCR was 43.1% (IQR: 31.0-51.0). In contrast, among 70% (n= 17/24) who were compliant with the preventive care (2-6monthly), the PCR was 22.5% (IQR: 16.5-29.1), which were fairly controlled.

**Conclusion:** Although independent older adults wearing RPDs had a good oral hygiene practice, many of them failed to manage it under poor conditions due to limitation of self-plaque- control. As the regular intervention of professional preventive care is absolutely necessary for them after RPDs treatment, the effective supporting approach of those who are less compliant need to be established.

**Title:** Pre-Clinical Evaluation of Targeting Autophagy For The Treatment of Oral Squamous Cell Carcinoma

**Author(s):** Stefania Magnano<sup>1</sup>, Jeffrey O'Sullivan<sup>2</sup>, Daniela M. Zisterer<sup>1</sup>

**Affiliation:** 1- School of Biochemistry and Immunology, Trinity Biomedical Sciences Building, Trinity College Dublin, Ireland.  
2- School of Dental Science, Trinity College Dublin, Ireland.

**Background:** Oral squamous cell carcinoma (OSCC) is the sixth most common form of cancer worldwide. The 5-year survival rate in oral cancer is only 50% mostly due to chemoresistance and late diagnosis (1). There is a compelling demand for improved therapeutic options for OSCC. It has been demonstrated that a cell survival pathway known as autophagy is frequently activated in tumour cells treated with chemotherapeutics (2). The role of autophagy in OSCC remains poorly understood and further study is required to clarify whether it plays a role in chemoresistance and in tumour progression.

**Objectives:** To investigate cell death mechanisms induced in oral cancer cells in response to standard OSCC chemotherapeutics (e.g. cisplatin) and to examine the role of autophagy in chemoresistance. The long term goal of this pre-clinical study is to develop selective treatment strategies to bypass drug resistance and improve clinical outcome in OSCC patients.

**Methods:** The effect of cisplatin on the viability of the SCC4 cell line was evaluated by the Alamar Blue assay and IC 50 values were determined using GraphPad Prism software. Apoptosis was examined through flow cytometric analysis of Annexin V/PI stained cells and by immunoblotting of caspase-3 cleavage products. Autophagy was investigated by the Cyto-ID Autophagy Detection Kit and immunoblotting of LC3b and p62 proteins.

**Results:** Cisplatin potently reduced the viability of SCC4 cells and induced apoptosis in a dose- and time-dependent manner resulting in caspase-3 activation. Additionally, cisplatin induced autophagy in SCC4 cells in a dose-dependent manner.

**Conclusions:** Cisplatin induces both apoptosis and autophagy in OSCC cells. Cisplatin-induced autophagy may play an important role in tumour resistance to chemotherapy. Combining cisplatin with autophagy inhibitors may represent a valuable treatment strategy to promote OSCC cytotoxicity and diminish resistance in OSCC patients.

**Title:** Immunomagnetic Isolation of Neural Progenitors from Human Dental Pulp Stem Cells (hDPSCs)

**Author(s):** Hayley McMillan, Fionnuala Lundy, Tim Curtis, Ikhlas El Karim

**Affiliation:** Centre of Experimental Medicine, Wellcome-Wolfson Centre for Experimental Medicine, Queens University Belfast

**Background:** Cellular heterogeneity exists as a major obstacle when differentiating dental pulp stem cells (DPSCs) to specific sensory neuronal subtypes and thus weakens our understanding of new pain pathways. Several protocols have been published that rely on adhesive proteins or neurosphere cultures to expand the stem/progenitor cell pool. However, this has often led to the production of a variety of cellular phenotypes.

**Objectives:** To magnetically isolate PSA-NCAM positive neural progenitors from DPSCs and maintain and propagate them as adherent monolayers, which will be used to generate more specific cell populations after differentiation.

**Methods:** DPSC-derived PSA-NCAM positive cells were characterised by flow cytometry. These cells were then cultured under different serum free conditions to decipher which environment best promoted their proliferation potentials.

**Results:** Flow cytometry revealed that magnetic sorting significantly enriched PSA-NCAM positive cells in comparison to negative control groups. In addition, media containing DMEM: F12, with the addition of growth factors- basic fibroblast factor (bFGF) and epidermal growth factor (EGF) as well as the supplement B27 appeared to be the most suitable for the proliferation of PSA-NCAM positive neural progenitors.

**Conclusions:** We have shown that neural progenitors can be isolated and expanded from DPSCs. Furthermore, although more observations are needed, we suggest that this protocol will greatly reduce cellular diversity and provide more efficient differentiation, especially when looking at one specific cell population.

**Title:** Ultrashort peptide hydrogels as novel antimicrobial scaffolds for adult stem cell culture

**Author(s):** Marina Ellie Afami<sup>1</sup>, Ikhlas El. Karim<sup>1</sup>, Garry Laverty<sup>2</sup>, Fionnuala T. Lundy<sup>1</sup>

**Affiliation:** 1- Centre for Experimental Medicine, The Wellcome-Wolfson Building, Queen's University Belfast. 2- School of Pharmacy, Queen's University Belfast.

**Background:** The development of suitable biological scaffolds to recruit and retain stem cells is an important aspect of tissue engineering. The ideal biological scaffold should mimic the natural environment of the cells. Natural proteins provide excellent scaffolds as they are components of the natural extracellular matrix but they require extensive purification and display batch to batch variation. Synthetic polymers have previously been tested as biological scaffolds but they fail to mimic the natural cellular environment. Neither scaffold type has been designed for use in infected tissue.

**Objectives:** The aim of this project is to design and test novel semi-synthetic scaffolds that exhibit anti-microbial and/or anti-inflammatory properties and are biocompatible with adult stem cells.

**Methods:** Two ultrashort peptide variants of the naphthalene lysine conjugated peptide, with the sequences NapFFKK and NapFFK'K', were synthesized using Fmoc chemistry. The antimicrobial activity of the derived peptide hydrogels was tested against the endodontic pathogen *Enterococcus faecalis* in both biofilm prevention and biofilm inhibition assays.

**Results:** The synthesized peptides differ in the size of the lysine R-group methylene chain; reducing the chain size resulted in reduction of antibiofilm activity. The 0.5% w/v NapFFK'K' hydrogel was superior in antibiofilm activity but both 0.5% and 2% w/v NapFFKK hydrogels were effective. Comparing the two hydrogels, NapFFKK appeared to be superior in antibiofilm activity at all the concentrations tested.

**Conclusions:** Self-assembling peptide hydrogels with inherent antimicrobial activity have huge potential as scaffolds for 3D culture of adult stem cells particularly in environments in which biofilms may be present.

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**Title:** Exploring the Role of the Innate Immune System in Pulpal Repair and Regeneration

**Author(s):** Al Natour. B<sup>1</sup>, Chong, Shing Yin<sup>1</sup>, Lundy, FT<sup>1</sup>, Dombrowski, Y<sup>2</sup>, El Karim IA<sup>1</sup>

**Affiliation:** 1-Centre for Experiential Medicine, Queen's University Belfast  
2- Faculté d'Odontologie, Université d'Aix-Marseille

**Background:** Acute inflammatory response is crucial for initiating healing and repair. Inflammasomes are essential component of an innate immune response that drive acute inflammation. We hypothesise that inflammasomes activation facilitate repair and regeneration.

**Objectives:** Investigating how the innate immune response, through activated inflammasomes, can be harnessed for tooth repair and dentine regeneration through recruitment and differentiation of dental pulp stem cells (DPSCs).

**Methods:** Cellular localisation of different inflammasomes, (AIM2, NLRP3), in human dental pulp of intact and carious teeth will be determined by IHC. The effect of danger associated molecular patterns (DAMPs) released from injured odontoblast on inflammasomes activation will be detected by western blot for detection of cleaved caspase 1) and cytokine release in immune and pulp cells (by ELISA). We will further investigate the effects of DAMPs and subsequent inflammasomes activation on dental pulp stem cells recruitment and migration by utilising trans well cell migration assays. The osteogenic differentiation of the cells will be assessed by measuring osteogenic markers with PCR and alkaline phosphatase assays.

**Results:** IHC analysis confirmed expression and cellular localisation of NLRP3 and AIM2 inflammasomes in the dental pulp of both health and carious teeth with more expression in carious teeth. We confirmed also their expression in dental pulp cells and neurons. These results will inform our future experiments outlined above.

**Conclusion:** We demonstrated here that dental pulp express key inflammasomes components namely NLRP3 and Aim2. These findings will underpin our future experiments to investigate the potential contribution of inflammasomes signalling in pulp repair and regeneration of carious teeth.



**Title:** Connectivity-Mapping predicted Ticlopidine could induce osteogenic/odontogenic differentiation

**Author(s):** Robby Rankin<sup>1</sup>, Fionnuala Lundy<sup>1</sup>, Bettina Schock<sup>1</sup>, Shu-Dong Zhang<sup>1</sup>, Imad About<sup>2</sup>, Gerry Linden<sup>1</sup>, Chris Irwin<sup>1</sup>, Ikhlas El Karim<sup>1</sup>

**Affiliations:** 1- School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast  
2- Faculté d'Odontologie, Université d'Aix-Marseille

**Objectives:** This study aimed to use a connectivity mapping-based approach to identify novel compounds that could identify osteogenic/odontogenic differentiation of bone marrow mesenchymal stem cells (BMMSCs).

**Methods:** A manual search of the GEO Database for microarray data was performed using the terms 'bone marrow,' 'BMMSC,' 'BMSC,' 'mesenchymal stem cell,' 'MSC,' 'stem cell,' 'DPSCs,' 'differentiation,' 'lineage,' 'osteogenesis,' 'odontogenesis,' 'osteogenic' and 'osteo.' Differential expression analysis was performed in Excel to create a query signature of significantly upregulated and downregulated genes. This query was fed to sscMap to carry out connectivity-mapping using default settings and a false connection tolerance of 1.0. As BMMSCs were not available, we used DPSCs for lab analysis. One compound was selected and cytotoxicity was assessed via 3 day MTT assay. Osteogenesis was assessed by 7 and 14 day qPCR using the primers ALPL, RUNX2, COL1A1 and DSPP.

**Results:** 2 relevant datasets were found on GEO Database, namely GSE28074 and GSE36970. Differential expression analysis generated queries of 66 and 45 genes respectively. A combination of the two lists was used to create a further gene signature. sscMap identified several potential inducers of osteogenesis: 13.4 $\mu$ M ticlopidine from the GSE28074 signature; and 12.2 $\mu$ M dyclonine, 23.3 $\mu$ M pralidoxime, 16 $\mu$ M sulfapyridine and 17.8 $\mu$ M aciclovir from the GSE36970 signature. No compounds were found with the combined signature. Due to time and financial restraints we selected ticlopidine for further lab analysis. Ticlopidine was found to be non-cytotoxic from 0.01-1.00 $\mu$ M. 0.10 $\mu$ M Ticlopidine was found to significantly upregulate ALPL, RUNX2, COL1A1 and DSPP after 7 days and ALPL after 14 days.

**Conclusions:** Ticlopidine can induce osteogenic/odontogenic differentiation in DPSCs. Dyclonine, pralidoxime, sulfapyridine and aciclovir are other potential candidates. Connectivity mapping using sscMap and publically-available data may also be a valid method for identifying compounds that can induce stem cell differentiation.

**Title:** Mesoporous Bioactive Glass Functionalised Scaffolds – Potential for Dental Pulp Regeneration?

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3- Networking Research Center on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN)

4- Centre for Experimental Medicine, Wellcome-Wolfson Institute, Queen's University Belfast.

**Background:** Synthetic engineered biomaterials acting as scaffolds for dental pulp cells are of great interest for regenerative endodontic approaches. Mesoporous bioactive glass (MBG) are ordered nanopore solids with very high pore volume and surface area which have emerged as promising materials for use in dentin-pulp regeneration. An important challenge is MBG processing into functional structures (scaffolds) required to guide the formation of a three-dimensional (3D) tissue structure. Incorporation of MBG microparticles embodied into a nanofibrillar biopolymer matrix is a possible strategy.

**Objectives:** The objective of the current study was to determine the biocompatibility of two novel scaffolds consisting of MBG microparticles embodied in a collagen meshwork for potential future application in regenerative endodontics. Zinc incorporation into the MBG microparticles composition was also evaluated.

**Methods:** Two types of scaffolds consisting of collagen sponge incorporating 15 % (w/w) of MBG with Zn (S-15MBG- Zn) or without Zn (S-15MBG) were manufactured. Conditioned medium from both scaffolds was prepared by incubating scaffolds in alpha-Minimum Essential Medium Eagle (alpha-MEM) for 24 and 72 hours. The conditioned medium was then used to treat dental pulp cells for 24 hours. Cell proliferation was determined by the MTT (3-(4, 5 dimethylthiazolyl-2)-2,5-diphenyltetrazolium bromide) assay. Experiments were performed on 3 independent occasions.

**Results:** The MMT assay results showed that neither of the conditioned media preparations from the scaffolds were cytotoxic to the dental pulp cells. Indeed, treatment of cells for 72 hours with the conditioned medium from the S-15MBG scaffold showed significant proliferative effects.

**Conclusion:** This is the first study to demonstrate the biocompatibility of novel MBG-collagen scaffolds for dental pulp cell culture. Future work will focus on whether these scaffolds can induce an osteogenic gene signature in these cells.

**Title:** Use of an electronic database to tailor undergraduate teaching in endodontic procedures

**Author(s):** Gibson K, Good J, Lappin MJ.

**Affiliation:** Department of Restorative Dentistry, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, UK.

**Objectives:** The use of electronic databases to record student performance is commonplace in a number of undergraduate clinical courses. Such databases not only provide substantial feedback on student performance but can also be employed to highlight areas of student learning need. Our principal aim was to analyse the data obtained from 3rd, 4th and final year dental undergraduates during endodontic procedures and to identify areas within the course where students would benefit from additional teaching.

**Methods:** Data collected on the Liftupp database on endodontic procedures undertaken by undergraduate students was evaluated. This system collates information on a broad range of components of each clinical treatment modality using a scoring system from 1 to 6. Scores ranging between 1-3 indicate areas of student performance requiring development. All scores ranging between 1-3 were identified for each clinical student providing an overview of areas where students required further instruction.

**Results:** The majority of students performed well in their clinical procedures, with higher scores being achieved by the more experienced students. A number of areas were identified where supplemental teaching would be beneficial namely in:

Ability to identify canals

Ability to gain appropriate access

Appropriate moisture control

Ability to take and interpret working length radiograph

**Conclusions:** In general the students performed endodontic procedures to a suitable standard. Evaluation of the data illustrated areas where certain students required further teaching. The data obtained was subsequently discussed at departmental teaching forums with clinical teaching staff. The areas where students commonly encountered problems were highlighted so that clinical teaching could be tailored to address these issues.



## **2018 IADR/PER** **CALL FOR ABSTRACTS**

### **Important Dates and Deadlines:**

- August 23, 2017 – Abstract Submission Site Opens
- February 2, 2018 – Abstract Submission Site Closes
- March 28, 2018 – Abstract Notifications Emailed to Presenters
- May 1, 2018 – Presenter Pre-registration Deadline
- Mid-May 2018 – Final Presentation Numbers Emailed to Presenters