THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

CREATE CHANGE

School of Dentistry

# Student Research Conference 2018

Auditorium, UQ Oral Health Centre | 15 November

**Abstract Booklet**

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## Message from the Head of School

# Professor Pauline Ford

**It is a pleasure to welcome you to the 2018 School of Dentistry Undergraduate Research Conference.**

The School has a strong tradition in student research. As soon to be graduates of this program, you will all continue to engage with research. The UQ BDSc(Hons) program ensures that students are supported in developing not only the academic and technical skills required to deliver the highest quality dental care to their patients and their community, but that they also develop the skills and attributes that will distinguish them as UQ graduates, enhancing employability across their career span. These skills and attributes are more difficult to define but they are critically important to our graduates' success in a world where change is constant – leadership, resilience, adaptability, integrity, reflexivity and curiosity.

An authentic research experience provides an opportunity for the development of many of these characteristics. Through this course, you have had the opportunity to gain hands-on experience in research practice under the guidance of an expert mentor, with the possibility of publication in the academic literature thereby contributing to the professional knowledge base.

To tackle the health issues of the future it is recognised that we must embed research into the way we practice. Health services are under increasing strain as demographics change, technology advances and demand for health care surges. There is no option of continuing to do things the way they are currently done. We simply won't have the resources. The health system and our profession must pursue new knowledge and ways of doing things and identify ways to improve health outcomes, minimise adverse events and build cost effectiveness. To achieve these goals it will be important that we work in partnership with all stakeholders including industry, to ensure research targets clinically important issues and translates to better health outcomes.

A great example of this is the generous support provided by Colgate in making today's event possible. I would like to express my warmest congratulations to the students and staff involved for their achievements in the projects presented today, and hope that you all enjoy learning about the undergraduate research that has been undertaken in 2018.

**Professor Pauline Ford**
Head of School

Message from the Course Coordinator

## Associate Professor Ratilal Lalloo

**As Course Coordinator I am extremely proud of the research carried out by all of the fifth year Dentistry students.**

For many, this was probably a first go at the full process of conducting research, from the initial idea to publishing their abstract in this booklet and presenting their poster at this research conference. All our students have made a massive effort.

This year we had 34 projects completed, across a diverse range of disciplines, ranging from dental education, dental public health, general dental practice, dental materials and endodontics, to the well-being of our students.

Students, we hope that you have learnt and appreciated the importance of research, of the ethical requirements of research, of the steps from taking your research idea to publicising your findings and seeing the application of research to evidence-based clinical practice and its broader public health good.

We hope you enjoy the experience and opportunity to present your research at the third School of Dentistry Student Research Conference.

Our sincerest thank you to all the supervisors who have mentored and supported our students to this important milestone of the research process.

Our thanks to the student administration team, School colleagues, assessors and judges who have all ensured that this course and all its components progressed smoothly and successfully.

Our gratitude to Colgate for their generous support for this research conference.

Wishing our graduating students all the very best for a successful and productive professional career.

**Associate Professor Ratilal Lalloo**
Course Coordinator



# STUDENT ABSTRACTS

## Characteristics of patients with endodontic treatment need in a public service dental clinic in Australia

**Researchers:** Luther Nguyen-Pham, Tung-Tsan Su, Naomi Mian Yu Tan
**Supervisor:** Dr Unni Pillai, Dr Irina Leonida

### Background

Endodontic therapy incurs high financial, emotional and time cost to patients and clinicians. Several international epidemiological studies have suggested associations between endodontic disease and various medical conditions. Due to limited research conducted domestically, the relevance of these studies to the Australian population remains unclear.

### Objective

This retrospective cohort study assessed the association between incidence of endodontic therapy and several patient factors including gender, age, indigenous status, smoking history and various medical factors in the Australian population.

### Method

Electronic records were obtained from a Queensland Health public dental clinic in Hervey Bay, Australia. Data was collected from all patients who visited the clinic during the period of May 2017 to May 2018. Incidence of ET was measured by item codes denoting endodontic treatment as per The Australian Schedule of Dental Services and Glossary. Patient factors included gender, indigenous status, age group, coagulation disorder, diabetes, hypertension, kidney disease, liver disease, mental illness, osteoporosis, smoking status and previous history of endodontic therapy. Descriptive and logistic regression analyses were performed.

### Results

Cigarette smoking and a history of endodontic therapy were associated with a higher incidence of endodontic therapy. Binary logistic regression indicated smokers were at 1.617 times higher odds of requiring endodontic therapy than non-smokers (P=0.041). The odds of requiring endodontic therapy was 1.926 times higher in patients who had a past history of endodontic therapy compared to patients who did not (P<0.001).

### Conclusion

The study showed that smoking usage and previous history of endodontic therapy were associated with an increased incidence of endodontic therapy. Due to the limitations and confounding factors of this study, further research would be prudent to confirm these results. Clinicians should be aware of these findings when considering endodontic therapy for these patients.



## Does social media presence of endodontic journal articles improve their citation?

**Researchers:** Yen-Chen Chang. Huang Huang. Mingna Zhou
**Supervisor:** Dr Unni Pillai

### Background

With most publishers making journals available online, the measurement of online attention of scientific publications has become a topic of interest and is widely adopted by the major publishing firms. Altmetric is the measurement of the online attention through the tallying of mentions articles receive from a multitude of sources such as Twitter or Mendeley. The potential benefits of the using these social media platforms for increasing the citations of publications are of interest to academics and universities.

### Objective

The Objective of this study was to investigate the relationship between online media attention surrounding endodontic publications and their citation count.

### Method

A comprehensive search for articles published between 2010 and 2015 in three endodontic journals (Journal of Endodontics, International Endodontic Journal, and Australian Endodontic Journal) were conducted using the Altmetric Explorer. The Altmetric database provides a weighted score, the Altmetric Attention Score (AAS) representing the online attention for a particular article and provides details of the number of mention received in different online platforms. The AAS was compared with the corresponding citation count as retrieved from Web of Science.

### Results

A total of 1023 articles were included in this study. The average AAS was 1.52 ± 2.6. Mendeley readers had a positive moderate association with citation score (r=0.680, P<0.01). No other platform had a notable association to citations, neither did the AAS. (P>0.05)

### Conclusion

Though the AAS does not seem to correlate with citation, this study suggests dissemination of articles through Mendeley appears to improve the citation. However, as other metric systems measuring online presence are available, further studies before definite conclusions can be drawn.

## Is the amalgam end-game upon us?

**Researchers:** Keishi O Barnes, Alister T Campbell
**Supervisor:** Dr Sandra March

### Background

Dental amalgam use in Australia had declined over the last three decades. Advances in adhesive resin technology, growing awareness of minimal intervention dentistry, and environmental concerns are among the reasons for the decline in amalgam usage. This trend suggests amalgam use may cease in the foreseeable future.

### Objective

This study aimed to analyse the restorative experiences of Year 5 University of Queensland dental students from 2010-2017, and for comparison, to analyse national trends of restorative services from 2009-2017. An additional Objective was to investigate current Year 5 University of Queensland dental students' clinical experiences and attitudes with using amalgam.

### Method

De-identified self-reported course assessment records were analysed by SPSS® to quantify the restorative experiences of Year 5 University of Queensland dental students from 2010-2017. National restorative service provision was analysed using Medicare data from 2009-2017. A questionnaire was distributed to investigate current Year 5 University of Queensland dental students' clinical experiences and attitudes towards amalgam use.

### Results

Year 5 University of Queensland dental students' amalgam use decreased from 17.4% of all direct restorations placed in 2010 to 0.6% in 2017. In the 0-24 years age group of the Medicare data, amalgam use declined from 3.6% in 2009 to 0.6% in 2017. Of current Year 5 University of Queensland dental students, most (95%) placed amalgam during clinical years, all agreed that amalgam use will decline over the next decade, and approximately half (52.5%) agreed that amalgam will be eliminated during their practising career.

### Conclusion

A declining trend in amalgam use was evident in Year 5 University of Queensland dental students and national data. Although most of the current Year 5 cohort had clinical experience with amalgam, there was unanimous sentiment that its use would continue to decline. Therefore, the 'end-game' of amalgam has not quite arrived but is foreseeable.



## Investigation of the uses, cleaning and cementation of zirconia-based tooth-supported restorations among a sample of dentists in Queensland: a pilot study

**Researchers:** Aryana R Sia, Andrea J Yew, Kenneth J Ng
**Supervisor:** Dr Bilal El Masoud, Associate Professor Ratilal Lalloo

### Background

Zirconia oxides are utilised for various tooth-supported restorations. While the most robust amongst dental ceramics, zirconia involves multiple procedures for effective application. No existing literature investigates the practices of Australian dentists when utilising zirconia restorations. This pilot study aimed to gain insight into zirconia manipulation trends in Queensland, including the uses, cleaning, conditioning and cementation procedures.

### Objective

This study assessed current trends in the manipulation of zirconia-based tooth-supported restorations and its applicability in everyday clinical dentistry in Queensland.

### Method

A 10-question open- and closed- format questionnaire was developed. All currently practicing Queensland general dental practitioners (GDPs) and specialist prosthodontists (SPs) listed on the Australian Dental Association (ADA) 2016 Directory were approached. A total of 62 surveys were returned. Data collected was processed with IBM SPSS Statistics for descriptive analysis.

### Results

All currently available zirconia types are utilised in all tooth-supported restorations except inlays. Majority of GDP respondents are aware of zirconia laboratory pre-treatment procedures (68.1%). Majority utilise evidence-based procedures for conditioning (61.0%) but not cleaning (43.5%). Respondents more frequently utilised resin-based than conventional cements. Layering ceramic fracture (29.0%) and aesthetic issues (19.4%) were the most reported failures.

### Conclusion

Majority of respondents apply evidence-based procedures in zirconia manipulation. However, the pilot study shows that the potential exists for continuing professional development (CPD) courses to increase awareness of practices deviating from current literature.

# Management of deep caries in Australia: attitudes and behaviours among dentists

**Researchers:** Bianca YY Chai, Bryant YX Tay, Catherine YT Chow
**Supervisor:** Dr Unni Pillai, Dr Janet Fuss

## Background

Deep carious lesion management is a common practice for dentists, and there has been much interest in how lesions of this nature are treated. Current scientific evidence and consensus recommendations support minimally invasive approaches. Numerous studies conducted in other parts of the world has revealed that the adoption of these knowledge into clinical practice seems to be slow. There are currently no published literature investigating preferred treatment approach for deep caries among dentists in Australia.

## Objective

This study aimed to gain insight into current practices of dentists in Australia in deep caries management. It seeks to determine the procedural and materials choices in, and attitudes towards the management of deep carious lesions.

## Method

A total of 1988 email invitations were sent across all states and territories of Australia. The questionnaire included 18 questions categorised into three sections: demographics, clinical scenario, and treatment preferences and beliefs. Descriptive statistics and chi-square analysis were performed.

## Results

Two hundred and twenty-five dentists in Australia participated in the study (response rate: 12.6%). 85% stated they would perform selective removal to soft dentine (SR) in a tooth with deep caries and 15% opted for non-selective removal to hard dentine (NSR) regardless of the likelihood of pulpal exposure. Males had greater odds of choosing SR compared to females. Those who chose to practise SR had greater odds of believing that incomplete caries removal alone would not affect pulp vitality, and that removal of all bacteria or carious dentine was not important before placing a restoration.

## Conclusion

Majority of dentists surveyed reported the contemporary practice of evidence-based carious tissue removal strategies and accepted the concept of leaving caries beneath a sealed restoration. Further studies could be conducted to investigate the incorporation of conservative management of deep caries in undergraduate dental curriculums and whether this acceptance has permeated globally.



# Factors influencing dental students perceived quality of periodontal education and its impact on referral patterns

**Researchers:** Troy D Blakeney, Erika S Green, Bridget E Wall
**Supervisor:** Dr Vincent O'Rourke

## Background

General dentists, including new graduates, need to have the knowledge and confidence to make appropriate treatment and referral decisions. Studies have found that general dentists perceptions of the quality of their dental school education in periodontics, influenced their treatment decisions and referral patterns. However, there is limited understanding of which specific factors impact a student's perception of their education in periodontics.

## Objective

This exploratory study aimed to investigate the factors that impact an Australian final year dentistry student's perceived quality of their periodontal education and how this may influence periodontal patient management, once they graduate.

## Method

A quantitative, cross sectional survey was sent to Dental Student Associations of all Australian Dental Schools, to distribute to final year dental students. The survey obtained data on the students' experience in relation to their periodontal education and included three case studies enquiring how they would manage a periodontal patient.

## Results

Ninety-five students participated in the study (n=95), giving a response rate of 15.4%. Factors that were found to be statistically significant in the improvement of the students' perceived quality of their education were the amount of lectures ($p=0.003$), and the way in which the content was delivered – as a core discipline or integrated into other courses/disciplines ($p=0.004$). The students' perception of their education had a statistically significant influence on their confidence in their ability to determine whether to self-manage or make timely referral of periodontal patients ($p<0.001$). Participants were also given three case-based questions of differing severities of periodontal disease, and asked how they would manage each case. Students that rated their periodontal education as Very good appeared to be more likely to refer.

## Conclusion

This research forms a good exploratory study, that may enhance our understanding of the wider factors shaping students and ultimately dentists' perceptions of their periodontal education.

## Current practices in the management of tongue-tie in infants and the effects of treatments

**Researchers:** Alyce W Chau, Jeremy P Chitty, Cheng Jiang
**Supervisor:** Professor Laurence Walsh

### Background

Within Australia, there has been a 420% increase in surgical tongue-tie releases (frenotomies) performed on children in the last decade, due to a growing focus on breastfeeding problems associated in infants with tongue-ties. Recent research has shown that tongue-tie severity may not affect breastfeeding; some studies demonstrated that about half of infants diagnosed with tongue-tie still fed adequately.

### Method

This study aimed to compare surgical (scissors and laser) and non-surgical tongue-tie management approaches. The first part involved interviewing two clinicians in Brisbane to understand the context and rationales behind practicing each technique. The second part compared the outcomes of the different interventions through retrospective data collection of infant-mother dyads (N=485) from two Brisbane clinics.

### Results

Clinicians relied heavily on symptoms in decision-making. Additionally, 48.32% of mothers reported complete resolution of symptoms regardless of technique, while 22.06% reported unchanged or worsened symptoms. Post-operative haemorrhaging was recognised throughout the study; 2.75% experienced moderate-to-severe bleeding. 12 infants were re-diagnosed with reattachment.

### Conclusion

The results question whether the benefits of frenotomies outweigh the risks, although further research is required. Low-risk non-surgical alternatives may be considered prior to frenotomies. To address overtreatment and post-operative complications, future development of Objective universal guidelines for tongue-tie assessment and management is required.



## A comparison of the prescribing habits of general and specialist practitioners for dental procedures

**Researchers:** Cheryl X Chen, Nicole Silajew
**Supervisor:** Professor Laurence Walsh

### Background

The findings of contemporary studies suggest that dentists are prescribing antibiotics in circumstances where they are not indicated. Research on clinicians' knowledge, attitudes and behaviours regarding antibiotic use is limited, and insight can be provided into the prescribing habits and decision-making of dental practitioners in Australia.

### Objective

This study compared the prescribing habits of general and specialist dental clinicians practicing within Australia for select dental procedures and patient circumstances. The factors and rationale behind practitioners' antibiotic prescribing decisions were also explored.

### Method

A case-based online questionnaire was developed for cross-sectional evaluation of the therapeutic and prophylactic antibiotic prescribing practices of a random sample of registered dental practitioners in Australia. Respondents were pooled into four categories – general dental practitioners, endodontists, periodontists, oral and maxillofacial surgeons. Statistical significance was based on probability values of $p<0.05$ and measured through comparative analysis using Chi-squared and Fisher's exact tests.

### Results

A total of 136 valid completed responses were received. For non-surgical root canal therapy, periodontal abscess and crown lengthening treatment in non-medically compromised patients, no significant difference was observed between practitioner groups. Prescribing practices were significantly different ($p<0.05$) between groups for surgical removal of third molars and for single implant placement. Significant differences were also found for the prescription of prophylactic antibiotics for medically compromised patients ($p<0.05$). Variations in practitioners' reliance on training and use of prescribing resources were observed.

### Conclusion

Disparities between practitioner groups for surgical prophylactic protocols and antibiotic cover for medically compromised patients highlight the need for practitioner education and clear evidence-based guidelines.

# An assessment of infection control in dental practices in South East Queensland

**Researchers:** Erin Leask, Laura Chen, Mariska Taverne, Hui Chin
**Supervisor:** Professor Laurence Walsh

## Background

Infection control is of vital importance in dental practices to prevent cross-contamination and infectious spread of disease between patients and practitioners. The aim of infection control is to prevent the transmission of pathogens from one person to another, and to maintain a safe working environment for staff and patients. Although infection control breaches in dental practices are very common, to this day, there is limited research exploring the infection control compliance rate of private dental practices in Australia.

## Objective

This study identified areas of poorest compliance regarding infection control and water quality to determine if further education, clinical training or more intensive auditing protocols are required to increase compliance.

## Method

A total of 349 dental practices were contacted through numerous approaches and a sample size of 25 was obtained. Infection control assessments were performed for 11 practices and water samples of DUWL, sterilisation and tap water were taken for all participating practices. These water samples were then tested off-site, while a check-list for infection control compliance was performed on-site.

## Results

DUWL microbial counts were highest in metropolitan districts and lowest in regional and rural areas. Microbial counts were also higher in practices using ICX tablets, external bottled water and A-dec chairs. Sterilisation water and tap water were within acceptable limits for most practices. Infection control compliance was lowest in change-over (9%) and sterilisation (18%) protocols, while it was highest in PPE use (90%) and sharps disposal (81%).

## Conclusion

Further knowledge and training of dental professionals is required as well as more stringent infection control assessment protocols to obtain a positive infection control standard within general dental practices.



# Analysis of factors affecting patient satisfaction with dental fillings placed within two years

**Researchers:** Colin Sar, Adam Prove, Kaichen Qiu
**Supervisor:** Dr Sandra March

## Background

Patient satisfaction has always been an important factor affecting the long-term success of a dental practice. As fillings are one of the most common procedures performed by dental clinicians, it follows that dental practices should ensure patients have excellent filling experiences.

## Objective

This study assessed if certain factors about patients' dental filling experiences affected their overall satisfaction as well as what factors are considered by patients to be the most important towards filling satisfaction and dissatisfaction.

## Method

A total of 114 dental patients arriving for an appointment at the University of Queensland Oral Health Centre were surveyed on the circumstances surrounding their most recent filling experience (within the last 2 years). Various operator, patient, environmental and restorative elements formed the 11 factors investigated in this survey.

## Results

A total of 108 responses were included in the study. Satisfaction with the filling experience was reported by 90.7% of respondents. Of the satisfied respondents, 43% and 31% said the most significant factors in determining their overall satisfaction were 'trust and confidence in the operator' and 'relief of symptoms,' respectively. Conversely, of the dissatisfied patients, 57% and 42.9% said the most significant factors were repetition of the restoration and unaesthetic fillings, respectively.

## Conclusion

All examined factors, when considered by patients, significantly contributed towards dental filling satisfaction. Confidence and trust in the operator followed by relief of symptoms and concerns, lack of discomfort during the appointment and the clinic appearing clean contributed the most towards dental filling satisfaction. Dental fillings needing to be re-done and/or not looking good in the patients' smile may contribute considerably towards patient dissatisfaction. An inverse relationship between patient age and dental filling satisfaction was observed, whilst patient gender and the location of the filling were seen to have a negligible influence on the overall satisfaction.

# Risk indicators of complications within seven days following extractions of permanent tooth/teeth in West Moreton Hospital and Health Service

**Researchers:** Wing Yin Tse, Sze Yeen Vong
**Supervisor:** Dr Ellen Gielis

## Background

There was a significantly higher rate of return for complications within seven days following both routine and surgical extractions of permanent teeth in adults in West Moreton Health (WMH) in comparison with those of South East Queensland average and Queensland average as indicated in the Queensland Oral Health Indicators Report January 2018.

## Objective

This study aims to identify reasons for patients' return and potential risk factors associated with post-operative complications for both routine and surgical extractions.

## Method

Raw data was sourced from WMH Information System of Oral Health (ISOH) database and a desktop audit was conducted to investigate potential risk factors associated to returns within seven days following routine or surgical extractions in 64 patients. Clinical details, procedural notes and available radiographs were reviewed in detail, followed by data tabulation and analysis.

## Results

Nearly half (48%) of patients who returned following routine extractions aged between 20-39 years, with surgical extraction of molars having the highest return rate when compared to that of other tooth types. Most patients (83%) who returned were found to have more than one cartridge of lidocaine- or articaine-containing local anaesthetic. The most common diagnosis for patients' return was dry socket (39% in routine extraction and 30% in surgical extraction), with the incidence of dry socket being 1.04% and 1.27% respectively. Majority of returns were unplanned in both routine (almost 90%) and surgical extractions (70%). Limited data access available in regards to patients who did not return hindered comprehensive statistical analyses of other potential risk factors. No significant relationship was found between tooth type, provider type, indigenous status and post-extraction complications.

## Conclusion

Findings of this study suggested that age, tooth type and local anesthetic might have an influence on post-operative complications. Statistical testings showed that tooth type, provider type and indigenous status have no significant correlation to post-extraction complications.



# Factors influencing restoration failure resulting in the need for retreatment within six months

**Researchers:** John Woo, Evan Gai, Ryan Samimi
**Supervisor:** Dr Ellen Gielis

## Background

Failure of restoration is a major problem in dental practice. Replacing restorations consumes a significant amount of time, resources and financial costs for healthcare systems. Our study aims to explore the factors that influence restoration failure which result in the need for replacement within 6 months.

## Objective

This study explored and described factors behind retreatment within six months.

## Method

The study included 331 restorations that required retreatment within six months as outlined by the Clinical Indicator Report. A desktop audit was performed by accessing the treatment providers' notes and reasons for retreatment were recorded. analyses were performed.

## Results

The main reasons for restoration failure were lost fillings (24%) and fracture (24%). Other reasons included persisting pain (17%), caries remaining (7%), unsatisfactory contouring (6%), failed pulp capping (3%) and other less frequently observed factors. Increasing surfaces involved and anterior restorations are also seen to be more prevalent in failed restorations.

## Conclusion

Lost and fractured restorations are the most commonly reported reason for restoration failure within six months, many variables are out of the clinicians' control. It is however beneficial for clinicians to be aware of the different factors influencing the need for replacement.

## Barriers and motivations in seeking dental treatment

**Researchers:** Nick Lim, Tze M Tay, Bryan K J Ong
**Supervisor:** Associate Professor Ratilal Lalloo, Dr Bruce Kidd

### Background

Oral health is defined as a state being free from orofacial pain, discomfort and diseases that limit an individual's oral function. Unfavourable dental attendance has negative impacts on oral health and overall life quality. This study aimed to determine the barriers and motivations that can affect dental attendance pattern in adults, explore reasons adults seek dental treatment and investigate the factors that attract adults to visit the dentist.

### Method

263 adults in the Roma Street Transit Centre, Brisbane, Queensland were recruited. Adults were categorised into favourable and unfavourable attendance pattern based on the number of dental visits over the last two years. Frequency and percentage distribution by demographic status, reasons and factors affecting dental attendance was analysed. A logistic regression analysis was performed to determine the participants' rationale behind their dental visit patterns.

### Results

Fifty-five per cent of adults had favourable dental attendance pattern. Dental neglect was the most significant barrier in seeking dental care (48%). Adults with favourable dental attendance pattern had a better preventive-oriented visit. Pain relief was the most common reason for a dental visit among adults with unfavourable dental attendance pattern (35%). Quality of dental work was the most significant factor for a dental visit.

### Conclusion

Education on the importance of regular dental care and positive health-seeking and problem-preventive mindset should be taught. Positive attitude and responsiveness towards patients should be practised among dentists. It was suggested for the ADA to consider looking into the monetary aspect of dental care and treatments.



## Comparison of the effects of five per cent sodium hypochlorite and 17 per cent ethylenediaminetetraacetic acid on the microhardness of Mineral Trioxide Aggregate and TotalFill Bioceramic Putty

**Researchers:** Yimin K Chia, Jacklyn HR Chu, Alexander L Qui
**Supervisor:** Associate Professor Alexander Moule, Dr William Ha

### Background

Irrigants affect the microhardness on perforation repair materials such as Mineral Trioxide Aggregate (MTA) and Bioceramics, but no comparisons between the effects of irrigants on the two materials have been made.

### Objective

This study aimed to evaluate and compare the effects of 5% sodium hypochlorite (NaOCl) and 17% ethylenediaminetetraacetic acid (EDTA) on the microhardness of MTA-Angelus White (MTAA) and TotalFill Bioceramic Putty (BCP) after 24 hours (h) and 8 days.

### Method

Twelve cylindrically-shaped samples each of MTAA and BCP were tested for baseline microhardness at 24h. They were divided into four subgroups and Vickers microhardness were evaluated at different time-points after 10 minutes of irrigation (5% NaOCl or 17% EDTA at 24h, 5% NaOCl or 17% EDTA at day 8). Results were recorded and analyzed statistically via one-way ANOVA Kruskal-Wallis test and post hoc uncorrected Dunn's multiple comparison test.

### Results

MTAA had a statistically significant higher baseline hardness than BCP. NaOCl reduced the microhardness of MTAA but increased that of BCP at both 24h and day 8. EDTA reduced the microhardness for both materials at 24h. At day 8, EDTA reduced the microhardness of MTAA, while BCP exhibited an increase in microhardness when compared with baseline measurements.

### Conclusion

Changes in microhardness of MTAA and BCP were associated with the irrigating agent used as well as the time in which the materials were allowed to set. MTAA and BCP's final hardness after exposure to EDTA or NaOCl both improved if exposed after 8 days of setting instead of 1 day of setting. Clinicians should consider copious saline or distilled water irrigation to remove residual irrigant prior to placing MTAA or BCP or otherwise wait over a week prior to irrigating around the respective set products.

## Assessing the cutting efficiency of different burs on Zirconia Substrate

**Researchers:** Daniel Du, Rick Chu, Mei Ying Ho
**Supervisor:** Associate Professor Alex Moule, Professor Ove Peters

### Background

Drilling dental zirconia to remove prostheses or for endodontic access preparation is clinically difficult. This study aimed to determine the cutting efficiency of tungsten carbide versus diamond burs when cutting this material.

### Objective

This study aimed to compare the cutting efficiency of a newly designed zirconia-cutting tungsten carbide bur compared to zirconia diamond burs and normal diamond burs that are currently on the market.

### Method

An air turbine handpiece was used in a customized test rig to cut sintered zirconia specimens, using a conventional blue-band diamond bur, two different zirconia cutting diamond burs, and a zirconia cutting tungsten carbide bur. The position and speed of the bur was continuously determined using wireless connection and data logging software over two successive standardized five-minute runs. Differences in cutting efficiency were statistically analysed. Burs were examined using both light and scanning electron microscopy (SEM).

### Results

All diamond burs cut zirconia more efficiently than the tungsten carbide bur. Overall, all burs showed decreased cutting efficiency over time. SEM images showed discernible wear and damage to the cutting portion of each bur head.

### Conclusion

There was no statistical difference in cutting efficiency of the three diamond burs. The tungsten carbide bur was consistently inferior in cutting zirconia. The blue-band diamond bur performed better than the zirconia-cutting burs initially but had an increased wear rate over time compared to the zirconia burs.



## The effect of different sealer removal protocols on the bond strength of AH-Plus Contaminated Dentine to etch and rinse adhesives

**Researchers:** Ashley SW Foo, Justin MV Ooi, Mark RX Teo
**Supervisor:** Professor Ove Peters, Associate Professor Alex Moule

### Background

The integrity of composite bonding for post-endodontic restorations may be compromised by sealer contamination. This study assessed the effect of different sealer removal regimes on the bond strength of dentine to composite resin.

### Objective

The aim of this study was to compare the efficacy of AH Plus cleaner with other commonly used sealer removal agents and mechanical preparation.

### Method

Molars were sectioned horizontally directly below the level of enamel and further cut vertically into two sections; this allowed testing of two cleaning methods per sample. Dentine surfaces were contaminated with AH Plus sealer (Dentsply DeTrey, Konstanz, Germany), followed by removal with either dry cotton pellets; cotton pellets saturated with either 95% ethanol or with AH Plus cleaner; or external surface preparation with a high speed bur. In a positive control group, dentine surfaces were not contaminated. A bulk-fill composite (SDR, Dentsply) was bonded with Prime-and-Bond active universal adhesive (Dentsply) onto the prepared surface. The restored teeth were then sectioned to produce composite resin-dentine beams. Tensile bond strengths were determined using a universal testing machine.

### Results

Using an etch-and rinse-adhesive and bulk-fill composite, bond strengths varied from 21.34, to 29.11 mPa with no significant differences among different removal protocols.

### Conclusion

There appears to be no difference between different removal protocols of cotton pellet, ethanol, AH Plus cleaner and mechanical preparation.

# Identifying the sources of stress among undergraduate dental students and their opinion about current education practices

**Researchers:** Clinton Choy, Edward Kuswanto, Joshua KB Lau
**Supervisor:** Dr Emma Bartle

## Background

Dental students experience more stress compared to other individuals. Stress has been linked to depression and anxiety, poorer student performance and lowered attention spans. The sources of stress on undergraduate dental students remain under-investigated, and existing studies lack qualitative data regarding students' own perspectives.

## Objective

This study identified and explored the major sources of stress in third, fourth and fifth year dental students, to raise awareness and identify target areas of the BDSc course that could be changed to improve students' psychological health.

## Method

One hundred and thirty questionnaires were distributed to Year 3, 4 and 5 undergraduate dental students, out of which 80 participated. The most stressful items were ranked by mean. Areas of significant difference in stress between year groups were located using a non-parametric Kruskal-Wallis H test. Spearman's correlation was used to analyse the relationship between stress and satisfaction. 46 out of the 80 participants provided written comments. Qualitative data was analysed via in-vivo coding and correlated with quantitative data. tic regression analyses were performed.

## Results

Students were most stressed by examinations (mean = 3.45), followed by managing complex treatment plans (mean = 3.21) and fear of making mistakes on patients (mean = 3.12). Students were most dissatisfied with the availability of supervisors. Stress and satisfaction were negatively correlated ($\rho$ = -0.26). 4th year students were the most stressed year group. Students who felt overwhelmed and anxious about their future career were more stressed (P = 0.0003, 0.0030).

## Conclusion

Undergraduate dental students are chiefly stressed by examinations and clinical practice. Areas to target for future pedagogies include increasing supervisor availability and improving the quality of clinical teaching.



# Does participation in Simulation Peer Clinics better prepare dental students to begin clinical practice?

**Researchers:** Daniel Makary, Ka Wai Kenneth Ho, Henry Yang
**Supervisor:** Dr Sandra March

## Background

Integration of students into the clinical environment differs in specifics and methods by each Dental School. The University of Queensland School of Dentistry (UQ SoD) currently implements a Simulation Peer Clinic (SPC) program. This involves students familiarising themselves with the clinical environment practising a variety of clinical skills whilst alternating through the roles of operator, assistant and patient.

## Objective

This study aimed to investigate whether the SPC program better prepares students to transition into clinical practice. It also sought to inform the UQ SoD academic staff whether the program is achieving desired goals.

## Method

Students of the Year 3, 4 and 5 cohorts of the University of Queensland Bachelor of Dental Science (Honours) degree were invited to participate in an online survey. Students were grouped into the test group (SPC) and the control group (immersion program). Data indicating student perception of their confidence in performance of 12 different clinical skills were collected and analysed with frequency and chi-square tests.

## Results

Increased confidence in local anaesthetic administration and patient communication was statistically significant for the SPC group. Increased confidence was also identified for preparation for a clinical session, oral examination, clinical note-taking, colleague communication, and infection control standards.

## Conclusion

The SPC program better prepared students to commence clinical practice. It appears beneficial for the UQ SoD to continue the SPC program, but further high-quality studies are recommended to investigate the effect and improve the SPC for transition into clinical practice. Future studies should follow a protocol that collects contemporaneous retrospective data to reduce the impact of recall bias and recruits a larger sample size.

# The influence of dental students' knowledge and belief systems on the practice of smoking cessation

**Researchers:** Denice Loo Sze Shan, Annie Zhang, Max N Lee
**Supervisor:** Professor Pauline Ford, Dr Kelsey Pateman

## Background

Tobacco smoking remains one of the biggest preventable causes of morbidity and mortality in Australia. Smoking also poses a significant health and economic burden which highlights the importance of smoking cessation (SC). Despite sound evidence supporting the effectiveness of SC interventions, it remains inconsistently delivered among dental students.

## Objective

This study was conducted to investigate dental students' knowledge, attitude, behaviour, perceived effectiveness and perceived barriers towards SC interventions and to determine if any association exists amongst these factors.

## Method

Two hundred and twenty-four surveys were provided to dental students in third, fourth and fifth year. Bivariate analysis was undertaken to identify variations between cohorts. Two groups of six participants were recruited for focus group discussions. The qualitative data obtained was independently and cooperatively analysed via in-vivo coding and framework analysis.

## Results

Dental students correctly identified 73.3% of conditions associated with smoking. 67.8% of students believed it was their role to deliver SC. Less than a third believed SC was effective, which was similarly reflected in focus group discussions. The Queensland Health Smoking Cessation Pathway (QHSCP) was utilised for 39% of smokers. This low utilisation rate was attributed to its perceived ineffectiveness and student prioritisation of clinical treatment.

## Conclusion

The oral health impacts of smoking are reasonably well understood by dental students. However, the process of SC delivery and resources within Metro-North clinics are poorly understood. Dental students' inadequate grasp on SC delivery and the QHSCP emphasizes a need for the implementation of an effective training module to enable consistent delivery of SC at the primary care level.



# Relationship of emotion regulation and social cognitive function with overall mental health of dental students

**Researchers:** Aarushi Gumber, Twinkle Gulwani
**Supervisor:** Dr Matthew Nangle, Professor Julie Henry, Julia Riches

## Background

Being of sound mental health is considered as an imperative attribute for individuals planning to enter the dental workforce, however, many previously conducted studies have reported poor mental health levels and overall well-being in dental professionals and students. Mental health is a multifactorial phenomenon, which is dependent on and regulated by a number of parameters. The present study focuses on two such factors, namely, emotion regulation and social cognitive function and their relationship with the overall mental health of dental students.

## Objective

The Objective of this research was to explore the manner in which emotion regulation and social cognitive function relate to the overall mental health status of undergraduate dental students.

## Method

The study was conducted as an online questionnaire and undergraduate Dental and Psychology students from The University of Queensland were invited to participate. The survey design included various psychosocial parameters to assess the emotion regulation and social cognitive function of participants. The resulting data was analysed and correlations between the parameters were noted.

## Results

50 students responded to the survey. Students who scored higher in the Total Emotion Recognition scale or the Interpersonal Reactivity Index Fantasy scale, reported experiencing higher levels of personal distress, while students who scored higher on the Interpersonal Reactivity Index Empathic Concern scale reported experiencing lower levels of personal distress. Other correlations were also noted, however, these were insignificant.

## Conclusion

Students that are more proficient at recognising emotions or have a higher tendency to fantasize are more likely to experience personal distress, while students that show greater empathic concern are less likely to experience personal distress. Further research is needed, however, to explore the influence of personal distress on overall mental health.

## Understanding the rheological properties of dental composite resins

**Researchers:** Malak Fouda
**Supervisor:** Dr Sowmya Shetty

### Background

Conventional hybrid and packable composites are viscous at room temperature. The ability to adapt well, especially in deeper preparations are a concern, as it could increase the formation of gaps. Consequently, microleakage at the restoration tooth interface could result.

### Objective

The purpose of this study was to evaluate the effect of temperature on the flow characteristics of four types of composite resins and the effect of increased load at room temperature for two conventional hybrid composites.

### Method

Discs were created by condensing composite resin between two standard glass slides, into standard brass rings (n=15) for the flowable composite (PermaFlo) at 25°C (room temperature) and three composite resins (Universal TPH Spectra, Universal Filtek Z250 and Filtek One Bulk-Filled) at 25°C, 37°C, 54°C and 68°C (n=15 each group). Additional discs to examine effect of increased load, with two different weights, for each of the two conventional hybrid composites (n=15) were created. Data was collected by measuring the disc thicknesses, and statistically analysed using a 1 and 2-way analysis of variance followed by the Bonferroni correction and the Dunnett post hoc t test ($\alpha$=.05).

### Results

2-way ANOVA test indicated temperature (P<0.001) and different composite types (P<0.001) had significant effects on film thickness. Load applied significantly (P<0.001) influenced the film thickness at room temperature for the conventional hybrid composites. A Dunnett post hoc t test revealed that both preheated conventional hybrid resins had significantly (P<0.001) thicker films compared to the control flowable composite at room temperature.

### Conclusion

Pre-heating of the hybrid and packable composite resins demonstrated a significant film thickness reduction compared to their behaviour at room temperature. However, flowable composites at room temperature demonstrated the thinnest film thickness compared to all other groups. Application of pressure while placing hybrid composites may improve the adaptability to the walls of the preparation.



## Evaluation of online training in aged care for dental students

**Researchers:** Juri Heo, Myungji Kim, Hongseok Lee
**Supervisor:** Dr Archana Pradhan

### Background

Providing oral health care for older people is complicated by underlying genetic and medical conditions, as well as physiological effects of ageing. Recognition and understanding of frailty, prevalent medical conditions, implications of prescribed medications and ability to delineate differing levels of functionality are essential for competent management of the geriatric population.

### Objective

This study aimed to evaluate changes in dental students' knowledge and perspectives regarding dental management in Aged Care prior to and following provision of an in-class discussion and online training module.

### Method

One hundred and fifty-seven students undertaking the Bachelor of Dental Science (Honours) degree at the University of Queensland in 2018 (Year 4 and Year 5) were invited to complete a pre-training survey, two-hour online training and a post-training questionnaire. Fourth year students attended an additional in-class discussion.

### Results

Approximately half (52%) of students invited to participate in the study completed the pre-training survey. There was a significant decline to the follow-up post-training survey, with less than a third (31%) of students responding. Comparison of participant responses to pre- and post-training questionnaires indicated an increase in theoretical knowledge and clinical skills to provide holistic dental care for aged care residents both independently and in cooperation with other health professionals.

### Conclusion

Results from the study suggest the online training module and in-class discussion can be effective modes to equip students with sound knowledge to manage oral health care for the elderly. Poor response rates to both surveys may reflect the disinterest amongst students in regard to the topic of oral health care for the elderly population. Thus, further exploration of methods to increase interest on this topic is warranted, in hopes of assisting the transition of all students to become proficient dental professionals.

## Evaluation of the pre- and post- training of dental practitioners in aged care

**Researchers:** Ha Nguyen, So Young Park, Danica Zhan
**Supervisor:** Dr Archana Pradhan

### Background

The ageing demographic revolution poses the challenge of an increased number of elderly patients with special oral health needs relative to that of the general population. A well-trained dental workforce is needed to address these demands.

### Objective

This project aimed to evaluate the effectiveness of online training in improving dental practitioner knowledge, skills and confidence in providing care for aged care residents. The study also assessed if face-to-face training was of added learning value, if the training would translate to clinical practice, and how the training could be improved.

### Method

Registered dental practitioners were requested to complete a survey pre-online training, post-online training, and after face-to-face training on providing care for aged care residents. The responses from each stage of training were compared and assessed to evaluate the effectiveness of online and face-to-face training in improving clinician competence, and if the training translated into clinical practice.

### Results

There were 64 respondents. Post-online training, all surveyed aspects of clinician knowledge, skills and confidence improved by 7.7-16.3%, except the ability to provide a thorough oral examination and holistic care, which decreased by 1.7-6.3%. Following face-to-face training, all surveyed aspects of clinician competence improved by 3.6-46.4%. Respondents who treated aged care residents decreased by 18.4% post-online training. Participants requested more face-to-face training and greater applicability of the training to non-dentist dental practitioners.

### Conclusion

Online training combined with face-to-face training successfully advanced dental practitioners' knowledge, skills and confidence in providing care for Aged Care residents, and offered superior performance compared to online training alone. Further investigation, with a greater face-to-face component and inclusivity of non-dentist dental practitioners, is required to assess if training will translate into clinical practice.



## Dental and ear problems in Australian Special Olympic athletes

**Researchers:** Darien Vi Sen Koh, Pei Shan Tabitha Tan, Zhi Ying Tan
**Supervisor:** Dr Archana Pradhan

### Background

There is a high prevalence of both oral and ear health problems in people with intellectual disabilities, which significantly reduces their quality of life. While previous studies have suggested a relationship between dental caries and acute otitis media among children, similar research has yet to be conducted on adults or individuals with intellectual disabilities.

### Objective

This study aimed to gain insight into the oral health and ear health status of Special Olympic athletes with intellectual disabilities and explore the presence of any associations between poor oral health and ear problems in this population.

### Method

Data from Special Smiles and Healthy Hearing screenings were obtained from two Special Olympics events in 2013 and 2014. Descriptive statistics were used to analyse the characteristics, oral health and ear health of the athletes. Chi-square statistical hypothesis test was used to analyse the relationship between the oral health and ear health variables obtained from the health screenings.

### Results

The results of this present study found that the Special Olympics athletes had a poor oral health status, especially in the areas of gingival health and the need for dental treatment. Also, a high prevalence of hearing loss and occluding ear wax was present among Special Olympics athletes. Cross-tabulations between the oral health and ear health variables revealed one statistically significant association, where athletes who failed the tympanometry screening had a higher frequency of gingival signs (69.2%) than those who passed (43.8%), $p=0.05$.

### Conclusion

This study indicated the need for future research on the association between gingivitis and middle ear problems.

## Use of the Dental Activities Test to explore dentally related function in an aged care setting - a feasibility study

**Researchers:** An Ting Fan, Yung-Wen Hsiao, Amanda Lin, Xin Yu Koh, Dr Nithin M. Gopinathan, Dr Sarah Grainger
**Supervisor:** Professor Julie Henry, Dr Matthew Nangle, Dr Archana Pradhan

### Background

Age-related decline in cognitive function has been linked to decline in oral health due to a decline in dentally related function (DRF). The Dental Activities Test (DAT) is a recently developed tool which measures DRF. It has been argued that the DAT might represent a useful way of detecting older adults who are likely to require assistance with their oral health.

### Objective

The present study sought to determine the feasibility of administering the DAT to older adults residing in aged care facilities; and to provide a preliminary assessment of any relationship between DAT performance, and measures of oral health and cognitive function.

### Method

Twenty-seven participants were initially screened for abnormal cognitive decline, and a total of 14 eligible participants were invited to participate in the study. Measures of oral health, oral hygiene and cognitive assessments were collected in two separate sessions.

### Results

Six participants completed all measures of oral health and cognitive function. Eight participants did not attend the second session for further cognitive assessments. No statistically significant associations were found between any of the measures.

### Conclusion

It is feasible to administer the DAT to older adults in an aged care setting. This study did not identify any significant relationships between DAT scores, oral health status and cognitive function. However, this is likely due to the small sample size. Further larger-scale studies are required to explore these potential relationships.



## Inhibition of biofilm formation of oral microorganisms by Perilla Leaf Extract

**Researchers:** Chia Yun Lee
**Supervisor:** Dr Chris Wang

### Background

Oral biofilms precipitate into oral diseases such as caries and candidiasis. Synergistic interactions between Streptococcus mutans and Candida albicans in mixed-species biofilms have been demonstrated. Current treatment modalities for candidiasis include limited anti-fungals which are associated with significant toxicities. Therefore it is of interest to investigate natural compounds as potential novel treatments.

### Objective

To investigate the effect of perilla leaf extract (PLE) on four oral bacteria (Streptococci) and five strains of oral candida (Candida albicans) with respect to their colonization (attachment and biofilm formation) of an abiotic surface (titanium); and to determine the potential mechanism behind the effects by measuring the effects of the PLE on cell surface hydrophobicity and visualizing the PLE treated cells and biofilms.

### Method

Attachment, biofilm formation and cell surface hydrophobicity of the microorganisms on titanium surfaces were evaluated by direct counting under a microscope, XTT assays and bacterial attachment to hydrocarbon method respectively.

### Results

PLE increased the hydrophobicity of three candida strains by 4.5±2.9%, 3.9±1.4% and 5.6±2.5% ($p<0.05$), respectively. PLE inhibited the attachment of S. mutans by 0.42±0.18 log CFU/cm2 ($p<0.05$) but not other strains ($p>0.05$). PLE reduced the biofilm formation by S. sanguinis and all of the candida strains by 3±1.6 to 32±6.5 % ($p<0.05$) but enhanced the biofilm formation by S. mutans and S. salivarius by 4±0.5 and 4±0.2 % ($p<0.05$).

### Conclusion

PLE inhibited biofilm formation of two candida strains and one bacterial strain tested. This is potentially due to inhibition of pathogenic phenotypic switching of the fungi into its filamentous form and interference with cell to cell interactions.

## Effect of crude tea extracts on Single Species Oral Biofilms

**Researchers:** Anthony Lim
**Supervisor:** Dr Chris Wang

### Background

The presence of a mature dental biofilm is a major factor which causes common dental diseases such as dental caries and gingivitis. Epigallocatechin gallate, the signature flavonoid in tea, has been shown to have antimicrobial properties. However, knowledge on the potential mechanisms of biofilm inhibition is limited.

### Objective

To test the efficacy of the crude extracts of green, oolong and black tea on the cell hydrophobicity, autoaggregation, attachment and biofilms of several Candida and bacterial species.

### Method

Cell hydrophobicity, autoaggregation, attachment and biofilm formation of 5 oral fungi and 4 oral bacteria was quantified using a spectrophotometer or microscopic counting. Regression plots were used to analyse possible correlations between cell surface properties, cell behaviour and biofilm formation.

### Results

The results indicated that crude tea extracts do not significantly inhibit the biofilms of the tested oral microbes, and in some cases enhanced them. The biofilms of candida does not appear to be significantly correlated ($p<0.05$) with cell surface hydrophobicity, adhesion or autoaggregation behaviour. Bacterial biofilms are positively correlated with autoaggregation.

### Conclusion

This study shows that crude tea extracts may change the cell surface properties and cell behaviour of oral fungi and bacteria, however, there is not enough evidence to show that crude tea extracts are effective in reducing the single species oral biofilms on titanium surfaces in vitro.



## Determining the stainability of composite resin and the superficial stain removal of composite resin

**Researchers:** Yoon Seok Jang, Constance Ju, George Liao
**Supervisor:** Chun Xu, Prof Adam Ye, Dr Helen He

### Background

Direct anterior aesthetic restorations have increased in recent decades, however, these restorations are often replaced due to discolouration, leading to further tooth loss. This study presents the staining potential of beverages on composite materials and the effect brushing can have on removing stains.

### Objective

This study assessed if certain beverages stained composite resin restorations more so than others and whether these stains could potentially be removed by mechanical means.

### Method

Three composite resins (Kerr Harmonize A2, Gradia G-aenial A4, and Kerr Harmonize A3) were made into tiles and a portion were polished to 800 grit. Coffee, red wine, and tea were used as colourants. Images of polished and unpolished composite tiles were collected. The colour change was compared using LAB colour space system before and after brushing with pumice, then analysed using two-sample Student's t-test in Microsoft Excel 2013.

### Results

Harmonize A3 had the largest amount of staining with a lightness decrease of ($\Delta L$) 25.66 ± 2.53. Wine induced the greatest staining across all composite samples tested. Unpolished specimens (46.15 ± 4.43) stained less than those polished (65.12 ± 3.00). Brushing provided similar stain removal on unpolished and polished surfaces.

### Conclusion

The composites tested in this study showed a significant potential to stain however, powered tooth brushing demonstrated the ability to remove a percentage of such stains. This information can be used by clinicians to inform patients on how to maintain their restorations.

# REDFACES: Rapid Endodontic Debridement Fluorescence Assisted Control for Endodontics

**Researchers:** Minal Thatikonda, Monisha M Kumar
**Supervisor:** Professor Laurence Walsh

## Background

Chemo-mechanical debridement involves the use of hand or rotary files with irrigation solutions. One suggested approach to achieve conservative root debridement and avoid technical issues faced with conventional endodontic preparation is laser activated irrigation.

## Objective

To determine the effectiveness of plain versus honeycomb optical fiber tips for fluorescence controlled Er:YAG laser debridement of root canals using sodium hypochlorite, by scoring debris and biofilm remnants

## Method

A total of 50 gamma irradiated extracted human teeth (sectioned to 10mm length) were allocated into 5 groups: Nil treatment (A); Non-inoculated canals treated with a plain tip (tip code 40/28) (B1) or a honeycomb tip (B2), Inoculated canals treated with a plain tip (C1) or a honeycomb tip (C2). Groups B2 and C2 were inoculated using human saliva diluted in Brain Heart Infusion medium for one week. Debridement involved 6X10 seconds irradiation (120mJ/pulse, 15Hz) with the Kavo Key3+ laser using 4% NaOCl irrigant, with fluorescence control. After vertical sectioning of the roots, optical images were used to assess transportation, carbonisation, and tip breakage, while organic debris and dentine tubule patency were assessed using SEM (up to 3,000X).

## Results

There were no identifiable differences between treatments using plain or honeycomb tips. Both successfully removed organic debris and created unobstructed patent dentine tubules consistently in the coronal and middle root thirds. Non-instrumented regions were located mostly in the apical third, where biofilm residues were found. Most instances of carbonisation, canal transportation and tip breakage occurred in the apical third.

## Conclusion

This proof of concept study provides promising results for a simplified fluorescence-guided ablation approach. Both tips demonstrated effective cleaning. Technical problems relating to optical fiber tips need to be addressed, to improve performance in constricted areas.



# Investigating the Efficacy of Dentine Desensitizing Agents Using Scanning Electron Microscopy

**Researchers:** Ai Leen Wee
**Supervisor:** Dr Sowmya Shetty

## Background

Dentine hypersensitivity is a highly prevalent problem in dentistry. Newer over-the-counter desensitizing products have been introduced and claim to relieve dentine hypersensitivity by dentine tubule occlusion.

## Objective

This study investigated and compared the efficacies of the desensitizing agents in tubule occlusion following application, after citric acid challenge and phosphate buffered saline immersion using scanning electron microscopy (SEM).

## Method

Dentine discs were prepared from extracted human teeth with each disc sectioned into 4 pieces to be allocated into 4 subgroups. The desensitizers tested were Colgate Sensitive Pro-Relief Extra Protect (CSPREP), Colgate Sensitive Pro-Relief (CSPR), Sensodyne Rapid Relief (SRR), Sensodyne Repair and Protect (SRP) and Listerine Advanced Defence Sensitive (LADS). One subgroup was untreated with the remaining subgroups treated with one of the desensitizers. Of the three treated subgroups, one subgroup was challenged with citric acid and another subgroup was immersed in PBS for 24 hours. The percentage of tubule occlusion and the dentine morphology were evaluated from SEM micrographs. The Tukey's multiple comparison test was used to analyse the quantitative data.

## Results

There was significant increase in tubule occlusion following treatment with all desensitizers with CSPREP achieving 100% tubule occlusion. All desensitizers had a significant reduction in tubule occlusion following citric acid challenge, except LADS. PBS immersion resulted in a decrease in all desensitizer groups, except CSPR.

## Conclusion

CSPREP and LADS provide superior tubule occlusion and acid resistance which will most likely result in significant relief for hypersensitivity. The immersion of desensitizers in PBS solution generally resulted in a decrease in tubule occlusion, with CSPR and SRP performing best amongst the 5 desensitizers.

# Effect of lyophilization on decellularized biphasic tissue engineered constructs in periodontal regeneration

**Researchers:** Rachel Wheeler, Jee Who Choi, Yan Zhao Loo
**Supervisor:** Dr Amro Farag

## Background

Periodontal regeneration aims to restore periodontium lost as a consequence of periodontal disease, however the complex nature of the periodontium makes complete regeneration difficult to achieve. Recent advances in cell sheet technology have offered a promising solution through utilization of decellularized matrices carrying biomimetic extra cellular matrix (ECM). Previous studies have shown decellularized tissue engineered constructs induce selective cellular repopulation whilst avoiding a host immune response in animal models. A method to preserve these constructs whilst maintaining their integrity offers the possibility of developing an off-the-shelf product with commercial potential.

## Objective

To evaluate the effect of lyophilization on the biological and structural properties of novel decellularized biphasic tissue engineered constructs in vitro.

## Method

Alveolar bone cells (ABC) were seeded into calcium phosphate (CaP) coated polycaprolactone (PCL) scaffolds and periodontal ligament (PDL) cell sheets were loaded on top. Cellular content was removed by decellularization and furtherly lyophilized. The biological and structural properties of constructs were assessed via scanning electron microscopy (SEM), immunostaining, and mineralization was investigated by alizarin red staining.

## Results

CaP coating on the PCL scaffold was maintained throughout the study. Structural properties of the extracellular matrix (ECM) formed by ABC and PDL cells was preserved after decellularization with minimal cellular structures detected. The structural integrity of the ECM was not affected and minor alteration in PDL sheet surface structure was evident as a consequence of the lyophilization process. The bulk of the construct showed preservation of a sound collagenous network.

## Conclusion

The biphasic CaP-PCL construct supported effective growth and differentiation of both ABC and PDL cells and deposition of biomimetic ECM. The structural properties of the construct were preserved throughout the decellularization and lyophilization processes, providing proof of concept that lyophilization is a viable method of preserving complex biofabricated scaffolds of potential use in periodontal regeneration.



# Oral side effects of anti-rheumatic drugs

**Researchers:** Zixian Yang
**Supervisor:** Nicole Stormon

## Background

Oral side-effects as a result of anti-rheumatic medication is commonly observed. The data for the drugs involved will be extrapolated from the Australian Medicines Handbook along with other online databases, as well as providing recommended management for these oral side-effects.

## Objective

To identify the current recommended anti-rheumatic medication used in Australia to treat RA, and to provide information on the oral manifestations these drugs may present with to assist dental clinicians in diagnosis and treatment of these patients.

## Method

The Australian Medicines Handbook and Monthly Index of Medical Specialties (MIMS) online databases were searched for recommended drugs for treatment of rheumatological conditions. Meyler's Side-effects of drugs Encyclopaedia was used to identify any additional oral adverse reactions for the medications included in the studies not covered in previous databases. Non-steroidal anti-inflammatory drugs (NSAIDs) were excluded from this study as the drugs included in this category are too numerous, a separate study should be conducted specifically examining NSAIDs.

## Results

Nineteen anti-rheumatic medications were examined along with ten identified oral side effects that they presented with. The most common side-effect is stomatitis, followed by mouth ulceration, oral herpes and tooth infections.

## Conclusion

Dental clinicians should be made aware of the variety of oral side-effects of anti-rheumatic medications and undergo additional steps when treating these patients to ensure these manifestations are identified and managed. Practitioners should be encouraged to consult these patients' medical practitioners for advice or information if required.

# The oral effects of antiepileptic medications

**Researchers:** Cindy Zhou, Jeannine Shen, Hsuan-Yao Wen
**Supervisor:** Nicole Stormon

## Background

Many medications used to treat epilepsy affect oral health. This study aimed to identify the reported oral side effects of antiepileptic drugs (AED) currently recommended for use in Australia and bring these to the attention of dental practitioners.

## Objective

This study aimed to provide a concise summary of all reported and documented oral side effects of AEDs commonly used in Australia.

## Method

AEDs used to treat epilepsy and its associated syndromes were identified using the Australian Medicines Handbook (AMH) and Australian Therapeutic Guidelines (ATG). Each of these medications were then searched in the Monthly Index of Medical Specialties (MIMS) electronic database and Meyler's Side Effects of Drugs and their reported oral side effects were documented.

## Results

Twenty-four AEDs and four non-AEDs (medications used to manage epilepsy's associated syndromes) were identified. The most frequently reported oral side effect was vomiting, followed by Stevens-Johnson Syndrome (SJS), erythema multiforme (EM), toxic epidermal necrolysis (TEN) and xerostomia. Overall, third-generation AEDs had fewer reported oral side effects than first or second-generation AEDs.

## Conclusion

Whilst AEDs are frequently associated with gingival hyperplasia, this review identified additional adverse effects including vomiting, xerostomia and mucocutaneous disorders. Dental professionals should be aware of the wide range of oral side effects likely to be experienced by this population. Identifying an epileptic patient's risk for oral diseases coupled with a multidisciplinary approach where possible is necessary in formulating a well-tailored care plan and providing the optimal treatment for an individual patient.



# Oral health impacts of medications used to treat asthma, chronic obstructive pulmonary disorder and cough

**Researchers:** Kendy Hwang, Hau Yung (Victor) Chai, Mingyang Lee
**Supervisor:** Nicole Stormon

## Background

Chronic respiratory conditions such as asthma, chronic pulmonary disease (COPD) and cough are largely managed through medication. While oral side effects of some commonly used medications have been identified, there is little existing literature which comprehensively reviews the effects of all recommended medications. With the prevalence of asthma, COPD and cough in the Australian population, it is important for dental practitioners to understand the oral health impacts of these drugs.

## Objective

The Objective of this study was to review the oral side effects of all current drugs recommended in Australia to manage asthma, COPD and cough and assist dental practitioners in their management.

## Method

The Australian Therapeutic Guidelines and the Australian Medicines Handbook were searched for medications used to treat asthma, COPD and cough. For each medication, the drug class, name, route of administration and company reported side effects were extracted from the Monthly Index of Medical Specialties database. Meyler's Side Effects of Drugs Encyclopaedia was used to identify additional oral adverse reactions.

## Results

Thirty-three drugs were identified for the treatment of asthma, COPD and cough. Nineteen oral side effects were identified with the most common being vomiting, tremor of skeletal muscle, dry mouth, dysphonia and candidal infections. Inhalers were the main route of drug administration.

## Conclusion

Dental practitioners should be aware of the oral side effects of these drugs and be able to readily to manage these through preventative measures and appropriate treatment. Preventative measures include good oral hygiene, use of a spacer and rinsing after inhaler use. Clinicians are encouraged to liaise with the patient's medical practitioner when these side effects may require ceasing of medication.

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