

FACULTY OF DENTISTRY



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The academic year 2004 marked a milestone in the history of the Faculty of Dentistry when it received dedicated research laboratory space and facilities for the conduct of dental and oral health research. The new research laboratory provides a home for staff and students where fresh ideas sprout and thrive. The direction of dental research is focused and targets five key areas that translate into improving the status of oral health and the delivery dental care. The Faculty of Dentistry has also grown its share of competitively secured funding for research. The number of graduate research students have increased, especially PhD candidates.

While research is often discussed around data, dollars, space, and impact factor, this Research Report will also provide an important and unique perspective about the research work of individuals that drive the Faculty's mission of research, and showcases projects that ultimately impact the lives and health of our patients.

Kelvin W. C. Foong
Vice-Dean (Research)

MAJOR ACHIEVEMENTS OF RESEARCH PROJECTS COMPLETED IN FY2004



Principal Investigator:

Dr Mohamed
Azharashid
Mohamed Tahir

Title:

A Pilot Study on
Laser-induced
Prevention of
Enamel Erosion

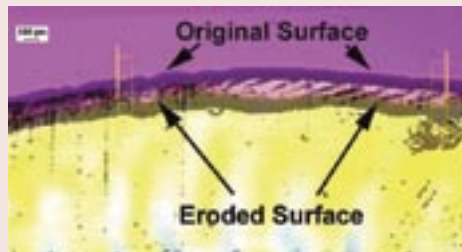
Total Project Value:

\$9,926

Major Achievements: This research project aimed to determine the effect of laser in preventing enamel erosion as well as identify an optimal set of laser parameters for this purpose. Recent studies conducted in vitro and in vivo have demonstrated that low-energy erbium lasers are capable of enhancing acid resistance of enamel for potential caries inhibition. However, evidence of the preventive effect of this particular type of laser on enamel erosion is unclear due to a lack of published studies. The Er: YAG laser was the first laser system approved for hard-tissue procedures by the Food and Drug Administration in 1997 and it would be beneficial if sub-ablative low-energy Er: YAG laser can be shown to prevent enamel erosion.

A tooth was mounted on a stage and the exposed enamel lased with a pulsed Er: YAG laser (Fotona Fidelis, Ljubljana, Slovenia), 2Hz at a subablative energy density of 5.1 J/ cm² with water cooling. The distance between the laser handpiece and the tooth was kept at a distance ensuring the laser spot size was 1 mm. The tooth was moved by setting the stage so that there was no overlap of the lased spots.

The results of this study showed that Er: YAG laser has the potential to reduce enamel erosion to acidic beverages but the continued exposure to erosive acid challenge may reduce this protective effect of the laser. The study was also able to identify a set of laser parameters for preventing enamel erosion without adversely affecting the enamel surface.



A representative polarized light microscopy image of an enamel section with erosive areas delineated by the original enamel surface (on top) and the eroded surface (below) within a pre-selected 100 µm wide box. On the left is the lased area and the right the unlased area.



Principal Investigator:

Assoc Prof Kelvin
Foong Weng Chiong

Title:

Multi-Dimensional
Imaging, Visualisation,
and Modelling for
Craniofacial
Anomalies and
Orthodontic
Applications

Total Project Value:

\$72,025

Major Achievements: This project was the Principal Investigator's and the Faculty of Dentistry's first attempt to develop the important area of three-dimensional research for orthodontic and craniofacial applications. It has resulted in significant achievements in the areas of (i) core capabilities in 3D image processing and visualisation, and (ii) 3D applications developed in this research for potential clinical usage. The noteworthy applications that were developed include a software application suite for:

- (i) Morphometric and space analysis of dental crowding from the 3D images of dental models
- (ii) Morphometric analysis of cleft palate shape
- (iii) Growth modelling of cleft palate shape
- (iv) Tooth segmentation and computer-aided virtual tooth movement (Tooth movement simulator)

The ultimate aim of the research programme in 3D imaging is to develop a virtual human head that is patient-specific and acts as a virtual double of each patient that would facilitate treatment planning, as means of assessing treatment outcome, and assist the clinician in the course of treatment.

MAJOR ACHIEVEMENTS OF RESEARCH PROJECTS COMPLETED IN FY2004

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Faculty of
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2004/05



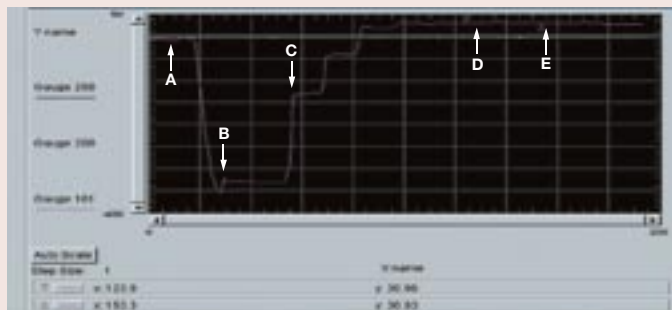
Principal Investigator:
Assoc Prof Keson
Tan Beng Choon

Title:

Critical Bending
Moment of Implant
Component Screw
Joint Interfaces

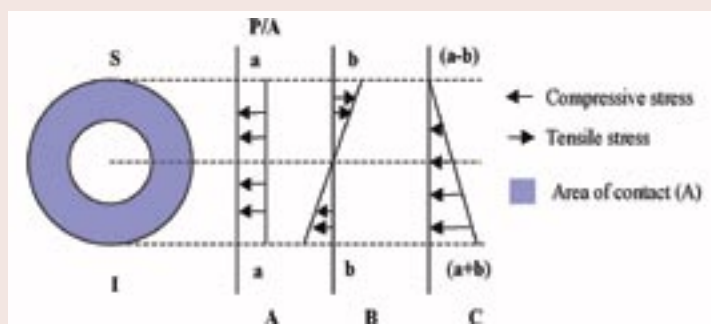
Total Project Value:

\$61,240

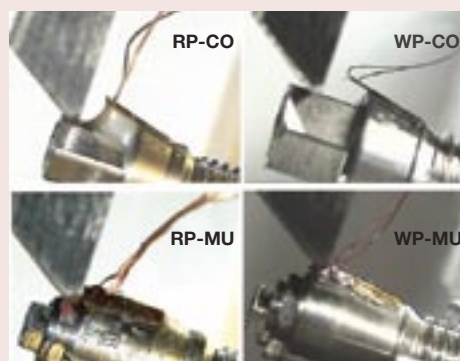


Representative strain output diagram in Critical Bending Moment determination. A - no torque applied, B - torque applied to impart preload within screw joint, C - incremental external loads applied (bending moment), D - point of joint opening; E - further load increments with no strain change observed.

Major Achievements: This research introduces a bioengineering term to implant dentistry defined as critical bending moment (CBM). This is the bending moment at which the external non-axial load applied overcomes screw joint preload and causes loss of contact between the mating surfaces of the implant screw joint components. When the screw joint opens asymmetrically from an eccentrically applied load, the additional external load will be resisted by the screw shank. The asymmetric stress induced predisposes the screw shank to earlier failure. The methodology developed in this research allows confirmation of the gap opening of the screw joint for the test groups and determination of CBM under different experimental variables. CBM was found to differ by abutment system, implant diameter and torque level. This study was able to report actual CBM measurements in the dental literature for the first time. Dental Implant systems in clinical use exhibit significant differences in terms of system characteristics like screw preload levels, area of component interface contact, screw joint characteristics. The expected variation in CBM in these systems can now be directly measured utilising the methodology developed in this study. The level of bending moment at which this critical overload occurs for a particular abutment systems would be of great significance in designing and specifying biomechanical situations that minimize risk for prostheses in function, especially single-tooth implants.



The mating interface. Change in stress state at the fixture-abutment mating interface during loading. A: Overall stress on the interface during torque application. B: Reduction in compressive stress at superior point of mating interface (point S) and increase at inferior point of mating interface (point I). C: At the critical bending moment, stress on point S becomes (a-b) = 0 and at point I becomes (a+b). a, b - amount of stress; P - pressure; A - surface area.



Load application on strain gauged fixture-abutment systems. RP- Regular platform; WP- Wide platform; CO- CeraOne abutment; MU- Multi-unit abutment.

MAJOR ACHIEVEMENTS OF RESEARCH PROJECTS COMPLETED IN FY2004



Principal Investigator:

Dr Chng Hui Kheng

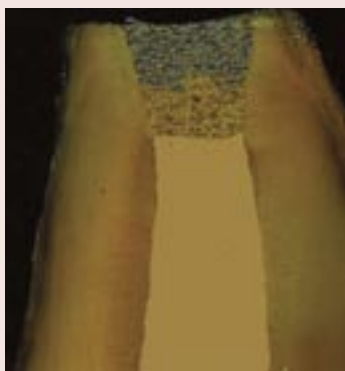
Title:

Physical Characterization of White and Developmental MTA

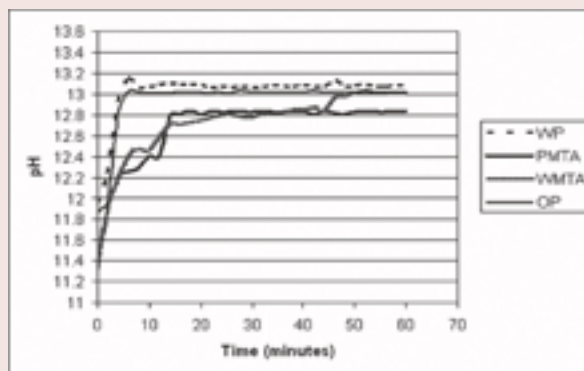
Total Project Value:

\$34,541

Major Achievements: This project compared the physical properties and sealing ability of ProRoot MTA, ProRoot MTA and Portland cement. A novel root repair material, Viscosity Enhanced Root Repair Material (VERRM) was developed. This new material was subjected to extensive physical properties, sealing ability and cytotoxicity testing. A U.S.A provisional patent (serial no. 60/513,557) was filed for VERRM on 24/10/2003 and a Patent Cooperation Treaty was filed on 22/10/04. Technology offers were sent to various dental product companies and a Confidential Agreement was established with 1 interested U.S.A based company (Tulsa Dental). The properties of this new material were presented at a lecture in National Dental Centre, Singapore, as well as at a scientific conference. One research paper on VERRM has been accepted for publication in Journal of Endodontics. A further research grant application of \$45,382 to investigate the tissue reaction to VERRM when implanted into guinea pigs was approved by the Faculty Research Committee in November 2004.



Typical tooth specimen retrofilled with ordinary Portland cement illustrating the depth of dye penetration after storage in methylene blue dye for 72 hours.



Principal Investigator:

Prof Chew Chong Lin

Title:

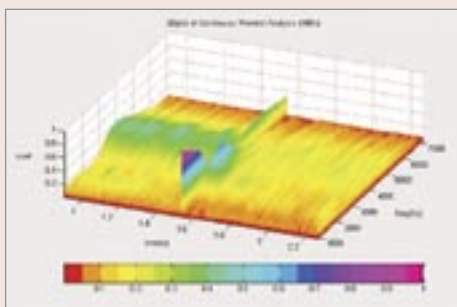
Noise Reduction of High Speed Turbine Handpiece

Total Project Value:

\$17,000

Major Achievements: Noise generated from high speed dental handpieces have been an age old problem for both the patients and dentists. It has been made apprehensive to dental treatment and it also has adverse effects on the hearing capacity of the dentists. The sources of noise from dental handpiece during operation are: a) the air noise emitted by the drive air for the air turbine b) the mechanical noise from the rotation of the air turbine and c) the air discharge noise from the air and water coolant.

The project identified the major sources of noise from high speed handpiece and a simple method to reduce noise generated by the handpiece. The method developed has industrial value and the Principal Investigator is sourcing an industrial partner to license our noise control measure.



3-D plot of continuous wavelet analysis at 160,000 rpm looking from the right.

MAJOR ACHIEVEMENTS OF RESEARCH PROJECTS COMPLETED IN FY2004

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Faculty of
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report
2004/05



Principal Investigator:

Assoc Prof Keson
Tan Beng Choon

Title:

Load Fatigue
Performance of
Implant Abutment
Combinations

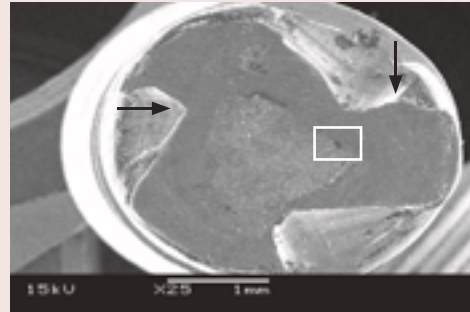
Total Project Value:

\$94,618

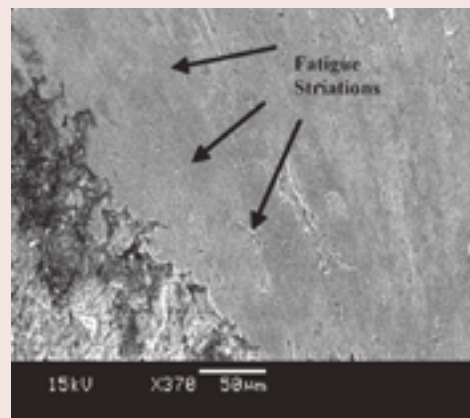
Major Achievements: The methodology developed and validated in this study allows better prediction of long-term clinical longevity of osseointegrated dental implant prostheses. Rotational load fatigue testing of dental structures is a niche area in dental research. This in-vitro method of determining load-fatigue performance has the potential of predicting possible mechanical complications and component failure that affect the clinical longevity of single-tooth implant systems as load fatigue performance testing is more relevant compared to the gross monotonic load to catastrophic failure of traditional dental testing. This test methodology is also in compliance with latest US Food and Drug Administration testing protocol requirements.

The study shows that for single-tooth clinical situations with significant functional loading, narrow diameter implants would be at significantly greater risk of fatigue failure. The single-tooth wide diameter CeraOne system demonstrated the best in-vitro load fatigue performance. Precautions for handling of components by technicians and clinicians were highlighted by the failures types observed in this study and failure mechanisms postulated. Inadvertent damage to abutment screws, inappropriate tightening leading to roughening of component surfaces and damaged threads, machining defects and errors during manufacture are all implicated as potential initiation points and mechanisms for the fatigue failures observed.

When different implant-abutment interface systems and abutment screws (design, material and coatings) were compared, it was evident that none of the systems tested were immune from fatigue failure. External hex, cam-tube and cone-screw interface systems all experienced fatigue failures. The study has revealed several potential design weaknesses in all the systems. We were able to test some of the latest systems introduced into the market. In some cases, screw-loosening preceded the eventual fatigue failure, leading to the conclusion that the overall system design with all components considered is critical. Correlation with actual clinical complications of implant systems in service will confirm the findings. New insights obtained could lead to the development and design of superior implant-abutment systems, possibly leading to new design patents.



SEM of fractured implant. Fracture from cyclic fatigue failure occurred at the start of the self-tapping notch (arrows) - Regular Diameter Nobel Biocare implant fixture.



SEM at higher magnification of boxed area showing fatigue striations (arrows) indicating fatigue failure

MAJOR ACHIEVEMENTS OF RESEARCH PROJECTS COMPLETED IN FY2004

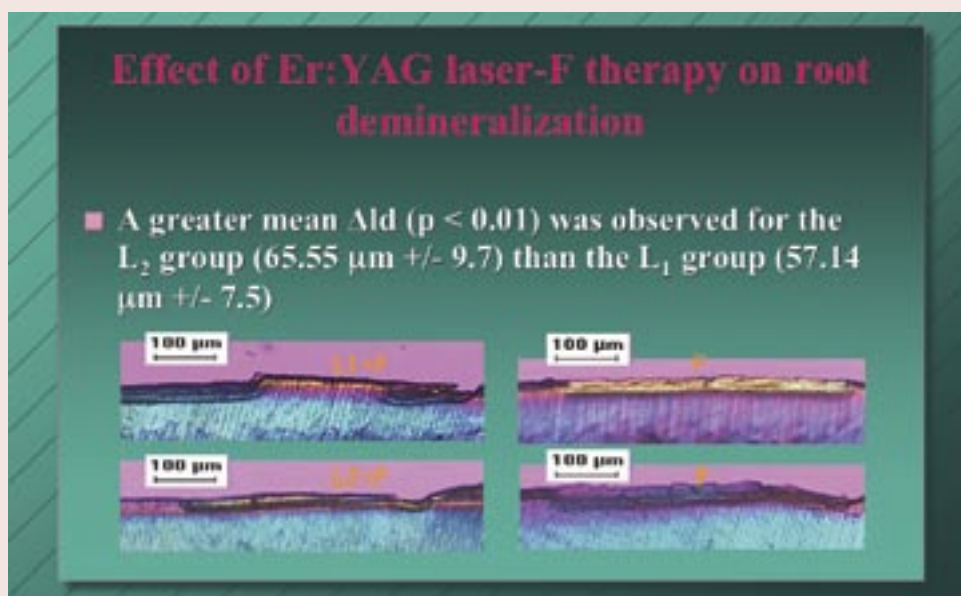


Principal Investigator:
Assoc Prof Stephen
Hsu Chin Ying

Title:
Laser-induced
Fluorides Uptake in
Enamel and Root

Total Project Value:
\$183,000

| Er:YAG Laser/F effects : on Enamel & Root | | |
|---|---------------------------------|---|
| On Enamel | Mean (SD) of Lesion depths (μm) | % Reduction (Compared with the control) |
| Control (F treatment alone) | 127.97(22.84)/118.85 (27.56) | |
| F followed by Laser 1(40mJ) | 79.34 (16.53) | 38% |
| F followed by laser 2 (80mJ) | 144.24 (36.88) | -21% |
| On Root | Mean (SD) of Lesion depths (μm) | % Reduction (Compared with the control) |
| Control(F treatment alone) | 137.70 (17.12)/157.75 (11.2) | |
| F followed by Laser 1(40 mJ) | 80.55 (17.04) | 41.5 % |
| F followed by Laser 2 (80 mJ) | 92.20 (7.39) | 41.6 % |



Major Achievements: This project has identified appropriate parameters for Er:YAG laser to enhance the fluoride uptake in enamel and root. The identified low-energy laser treatment can substantially enhance the fluoride deposition into the enamel crystalline structure, in addition to the increased fluoride deposition on the enamel surface. In root, the laser effect is more pronounced on the crystalline F-uptake, compared with that in the enamel. As to the loosely bound F-uptake on the root surface, the increase is about 37%. The crystallographic data indicated that the fluoride uptake has enhanced the crystalline stability with a significant reduction of a-axis. Micro-Raman spectroscopic evaluation suggested that the laser treatment, finished in seconds, may have a greater effect on the enamel crystallinity than that of a "72-hour" topical fluoride treatment. The reduction of type-A and type-B carbonates in the enamel treated with the laser-F combined therapy is remarkable, indicating a purification of enamel structure and the increase of its acid resistance. This research has provided unequivocal and clinically relevant evidence elucidating an important role of laser in enhancing fluoride-uptake and preventing tooth decays.

RESEARCH HIGHLIGHTS

UNDERGRADUATE RESEARCH OPPORTUNITIES

PROGRAMME PROJECT

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2004/05



Students:

Low Jiun Sian,
Ngauw Njuk Khim,
Angela, Wong Li
Beng and
Lum Jing Li

Title:

Preventive Effects
of Er:YAG Laser
on Enamel
Demineralization and
Erosion caused by
Acidic Beverages.

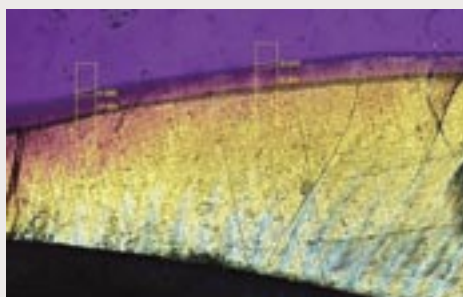
Supervisor:

Assoc Prof Stephen
Hsu Ching Ying

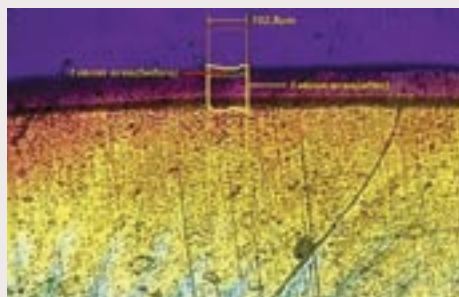
Problems: Recently the prevalence of enamel erosion caused by acidic beverages has increased substantially. The objective of this study is to evaluate the preventive effect of Er: YAG laser (PE-laser) on enamel demineralization and erosion caused by these beverages.

Methods: Six sound premolars were selected, varnished, each with 1 buccal window (4X2mm) exposed. Er: YAG laser treatment (5 J/cm², 3Hz for 3s, 1mm² spot) was done on one half of each window, leaving the other half untreated. The teeth were then sectioned and subjected to a 24-hour pH cycling regime with 6-hour demineralization (using Ribena®, Coca-Cola™ and Peel Fresh™) and 6-hour remineralization for each cycle. The demineralization and erosion depth of sections were evaluated using stereomicroscopy and polarized light microscopy. One-sample t-test, ANOVA, and Kolmogorov-Smirnov tests were employed to assess the PE-laser on enamel demineralization and erosion.

Results: Er:YAG laser treatment has significantly reduced the amount of demineralization and erosion of enamel caused by all three acidic beverages (all $p < 0.002$). The PE-laser on erosion was more marked in Coca-Cola™ when compared with the other two beverages (both $p < 0.002$); however, the PE-laser on demineralization caused by the three beverages was similar ($p = 0.786$). In conclusion, Er: YAG laser treatment may be promising in preventing enamel demineralization and erosion caused by acidic beverages.



Superimposed PLM image

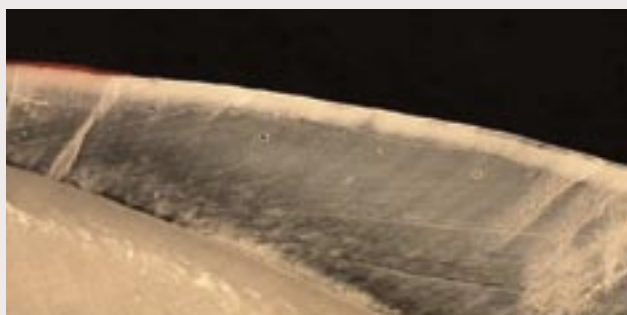


PLM lesion calculation

| Drink | Demin Depth (μm) | | | Erosive Depth (μm) | | |
|-------|----------------------|----------------------|------------------------|----------------------|----------------------|------------------------|
| | Lased surface | Unlased surface | Change in lesion depth | Lased surface | Unlased surface | Change in lesion depth |
| 1 | 44.84 (SD 19.27) | 88.18 (SD 20.01) | 43.34 (SD 30.56) | 56.71 (SD 18.72) | 67.63 (SD 16.60) | 10.92 (SD 8.11) |
| 2 | 135.50 (SD 21.84) | 170.06 (SD 31.59) | 34.56 (SD 14.91) | 106.83 (SD 41.13) | 139.26 (SD 43.99) | 32.43 (SD 17.09) |
| 3 | 41.33 (SD 9.777) | 67.91 (SD 8.428) | 26.59 (SD 9.709) | 23.00 (SD 11.27) | 31.72 (SD 7.084) | 8.718 (SD 7.048) |



Dentabot



Stereomicroscope view of tooth section

RESEARCH HIGHLIGHTS

A MASTER IN DENTAL SURGERY PROJECT IN ORAL AND MAXILLOFACIAL SURGERY



MDS Resident:
Dr Lai Juen Bin

Title:

The Effects of Locally
Injected Steroid
on Palatal
Mucoperiosteum
Secondary Wound
Healing

Supervisors:

Dr Goh Bee Tin
Dr George Yip

The classic palatal surgery for closure of cleft palatal defect involves undermining the palatal mucosa, swinging it medially to cover the defect of the palatine part and leaving the donor area with exposed bone for the mucoperiosteum to heal secondarily that eventually undergo wound contraction and scarring.

It has been supposed that myofibroblasts are involved in the contraction of dermal as well as palatal wounds. A marker of the myofibroblastic phenotype, which is present during wound healing is the expression of alpha - smooth muscle actin in the fibroblasts. Reducing the number of myofibroblast during palatal wound healing may decrease wound contraction and thereby reduce the impairment of maxillary and dento-alveolar growth and development.

Palatal scarring has been studied mainly in animal models. The scar tissue is characterized by an elevated amount of transversally oriented collagen type I fibers, a decreased amount of collagen type III fibers, increased alpha smooth muscle actin and by a lack of elastin. These characteristics indicate that the tissue is more rigid than normal mucoperiosteum. A modulation of the mentioned characteristics towards a more normal situation might reduce the unfavourable effects of scarring on maxillary growth and dento-alveolar development.

Corticosteroids are known to reduce collagen synthesis in vitro. Corticosteroids are the standard treatment for fibrotic and scar conditions in skin. However, reports are mainly confined to application in skin. The effects of intralesional steroids on palatal mucoperiosteum is still unknown as there is no study that looked into that.

The goal of this study is to analyse the effects of intralesional corticosteroid on mucoperiosteal wound healing process in 24 five-weeks old rats. The rats were divided into steroid injected treated groups, normal saline injected treated groups and non injected groups. They were then sacrificed at 8 and 42 days and stained for alpha-smooth muscle actin, type I and III collagen and measurement of the wound margin were done under light microscope.

The steroid injected treated groups have lower alpha-smooth muscle actin, type I and III collagen compared with the other 2 groups, of which the differences for alpha-smooth muscle actin and type III collagen were statistically significant despite the small sample size. The steroid treated group also had lesser wound contraction. This may imply that intralesional steroid can reduce the amount of wound contraction and scarring in cleft palate repair.



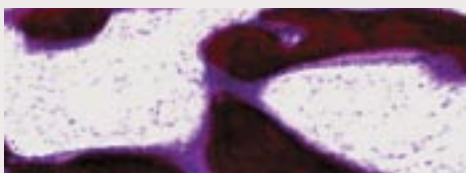
Alpha smooth muscle actin staining in
steroid treated specimen



Alpha smooth muscle actin staining in
control specimen

ENTREPRENEURIAL THRUST

A Tripartite Collaboration between Government, NUS and Industry



New bone formation, remodelling and reconstruction with
- biocompatible and biodegradable PLGA scaffolds.

A joint industrial collaboration between Rapid-Tech Pte Ltd and Faculty of Dentistry, entitled 'In-vitro and In-vivo testing of Bio-scaffold for Bone Reconstruction and Implants' received \$700,000 in April 2005 from The Enterprise Challenge, Prime Minister's Office. The Faculty of Dentistry is the co-proposer of the project, represented by Dr Victor Tan and Dr Cao Dong, with the Industry & Technology Relations Office, NUS as the piloting agency. Benefits arising from the success of the project would be multi-fold, contributing towards more indepth knowledge of bone augmentation in dental implantology and making a landmark in reconstructive surgery of the jaw. Subsequent commercialization of the bio-scaffold products could arise and NUS would share the resulting intellectual property rights.

RESEARCH HIGHLIGHTS

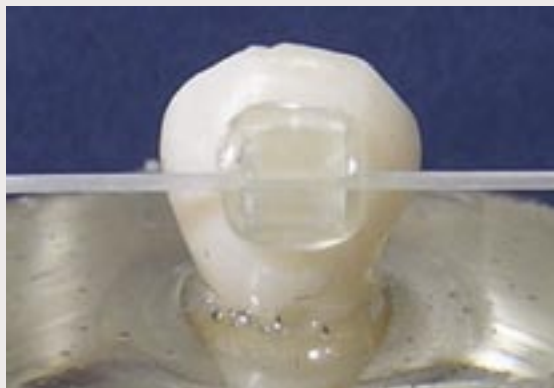
BIOMERS: AN AWARD-WINNING START-UP COMPANY

9

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BioMers clinches grand prize for the General Category of the 6th Start-Up@Singapore held on 28 May 2005



The translucent braces that won various awards

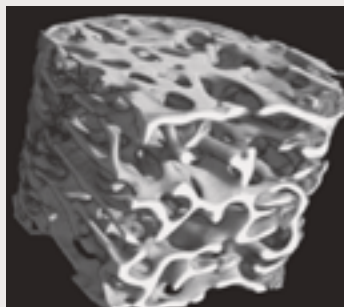
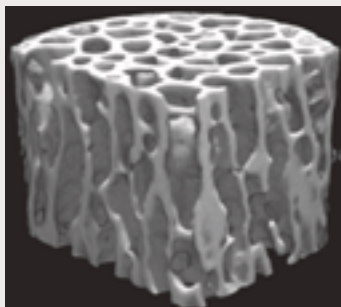
The company BioMers, was initiated by Ms Karen Teo, a research assistant of Restorative Dentistry, Faculty of Dentistry and Ms Renuga Gopal, a PhD student of Mechanical Engineering together with 3 members from the Centre for Scientific Enterprise, UK, to develop and market aesthetic orthodontic archwires and brackets. The team plans to produce some 200 wires for clinical use as a pilot project prior to carrying out a clinical trial.

Beating 300 other international entries, BioMers won the top prize of \$30,000 and the Best Executive Summary at the prestigious Start-Up @ Singapore Competition 2005. The team also received Honorable Mention with a US\$500 cash prize at the Pacific Specialty Insurance International Business Plan Competition held in the University of San Francisco. The team will also represent NUS in the World Championship of Business Plan competitions at "Global Startup @ Stanford" in January 2006 at Stanford University, USA.

A full US patent application under "Fiber-Reinforced Composite Product with Flexible Longitudinal Geometry" has been submitted for the archwire and bracket. They have been published on the United States Patent and Trademark Office website. The team will also be registering its patents in Japan, China, India and Europe.

These achievements are spin-offs of the research project, "Development of a Fiber Reinforced Polymer Orthodontic Bracket and Arch Wire" whose Principal Investigators is Professor Chew Chong Lin, Faculty of Dentistry with Co-principal Investigator Professor Seeram Ramkrishna, Faculty of Engineering. Both professors were appointed Directors of BioMers.

NEW RESEARCH INITIATIVE



The biocompatible and biodegradable scaffold is made up of the Food & Drug Administration (US) approved clinical Poly-Lactic Co-Glycolic Acid bio-copolymer, fabricated through the rapid prototyping 3D printing based on CT/MRI data.

The research programme on "Graded Porous Bioscaffolds for Tissue Repair", received the in principle approval of the Biomedical Sciences Proof-of-Concept Scheme, Economic Development Board. This is a joint collaboration amongst SIMTech, A*STAR and Faculty of Dentistry, NUS. Dr Cao Tong and Dr Victor Fan represent the Faculty as the co-principal investigators of the Programme.

RESEARCH HIGHLIGHTS

MAJOR RESEARCH ACHIEVEMENT



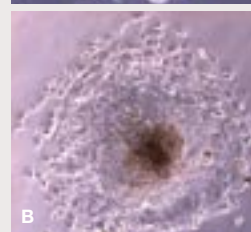
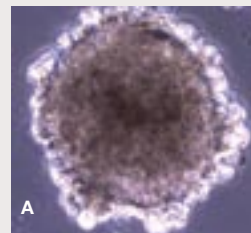
Principal Investigator:
Dr Cao Tong

Group Members:
Dr Heng Boon Chin,
Mr Ye Chaopeng,
Dr Liu Hua,
Mr Toh Wei Seong

Collaborators:
Dr Lawrence W. Stanton,
Dr Paul Robson,
Prof Hong Yunhan

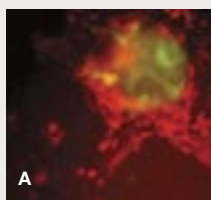
Dr Cao Tong and his stem cell group have successfully differentiated pluripotent human embryonic stem cells into specialised osteogenic and chondrogenic cells capable of growing into mature bone and cartilage tissue. These human embryonic stem cells derived bone and cartilage cells are unlimited, stable and ideal sources of genetically young and healthy bone and cartilage forming cells.

The major potential applications of these cells are: (1) Toxicity screening tests of biomaterials and drugs for bone and cartilage; (2) Cell transplantation based bone and cartilage regeneration and reconstruction; (3) Cell injection therapy for bone and cartilage repair; (4) Gene/protein delivery therapy to cure bone and cartilage lesions; (5) Study of genetic and developmental mechanisms relating to bone and cartilage biology and physiology; (6) Study of genetic and developmental disorders of bone and cartilage disease; and (7) Drug discovery and development of bone and cartilage disease.

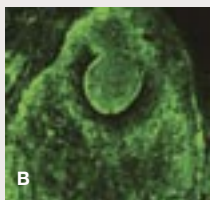


A: Sphere aggregation of human embryonic stem cells in suspension culture.

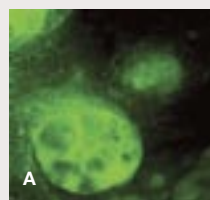
B: Attachment and migration of human embryonic stem cells during early stage of differentiation.



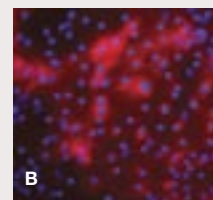
A: Bone-specific Alkaline Phosphatase fluorescent (red) stained human embryonic stem cell derived bone cells and STRO-1 fluorescent (yellow-green) stained human embryonic stem cell derived mesenchymal precursor cells.



B: Osteogenic nodule structure with human embryonic stem cell derived bone cells with FDA (green) and PI (red) stained under confocal laser microscope.



A: Osteopontin fluorescent (green) stained human embryonic stem cell derived cartilage cells.



B: Collagen-II fluorescent (red) and DAPI (purple) stained human embryonic stem cell derived cartilage cells.

International Awards

| Staff / Student | Award | Awarding Agency | Details |
|--|---|--|--|
| Department: Dean's Office | | | |
| Ms Bina Rai Team-Members: Prof Teoh Swee Hin, A/P D.W. Hutmacher, Dr Cao Tong and A/P Ho Kee Hai. | The Best Oral Presenter Cash prize: \$100 at Graduate Programme in Bioengineering Academic Conference, Singapore, 6 August 2004. | National University of Singapore | Paper entitled: "Novels PCL- based honeycomb Scaffolds as Drug Delivery Systems for rhBMP-2." |
| Department: Preventive Dentistry | | | |
| Dr Zou Xiao Hui Team-Members: A/P Kelvin Foong, Dr Cao Tong, A/P Bay Boon Huat, Prof Zhou Yi Fa and Dr George Yip | Travel Award on 6 August 2004 | Society for Glycobiology | Paper entitled: "Analysis of the Effects of Heparin Sulphation Patterns on Palatal Fibroblast Activities." |
| Department: Restorative Dentistry | | | |
| Ms Teo Chieh Yin, Karen Team-Members: Ms Renuga Gopal, Dr. Fathianathan Mervyn and Mr. George Aliphtiras | Top prize and Best Executive Summary at Start-Up@Singapore. S\$30,000 prize. | National University of Singapore | Business plan to develop and market a set of almost invisible braces that work just as well as the conventional ones. |
| Ms Teo Chieh Yin, Karen Team-Members: Ms Renuga Gopa, Dr. Fathianathan Mervyn and Mr. George Aliphtiras | Best Elevator Pitch at the University of Oxford Business Plan Competition | University of Oxford | Business plan to develop and market a set of almost invisible braces that work just as well as the conventional ones. |
| Ms Teo Chieh Yin, Karen Team-Members: Ms Renuga Gopal, Dr. Fathianathan Mervyn and Mr. George Aliphtiras | Honorable Mention with a US\$500 cash prize at the Pacific Specialty Insurance International Business Plan Competition | University of California, San Francisco | Business plan to develop and market a set of almost invisible braces that work just as well as the conventional ones. |

Regional Awards

| Staff / Student | Award | Awarding Agency | Details |
|---|--|--|---|
| Department: Oral And Maxillofacial Surgery | | | |
| A/P Ho Kee Hai | First Prize A\$250 prize | Nobel Biocare Asia/Pacific Conference 2004 | Paper entitled: "Tissue- engineered Bone Formation in an Implant-scaffold Construct." |
| Department: Preventive Dentistry | | | |
| A/P Stephen Hsu, Co-Author: Dr V Girija | Best Paper Award. Cariology and Mineralized Tissues Research Award. US\$500 prize | International Association for Dental Research (South East Asia Division) | Paper entitled: "Preventing Root Caries with combined Er: YAG Laser and Fluoride treatment." |
| Dr Ng Yuk Ching, Dr Selvajothi d/o Veerasamy, Dr Sng Hong Cheong, Dr Wee Chun Kheng, Dr Zheng Hongyan, Supervisors: A/P Stephen Hsu, A/P Keng Siong Beng | 1st Place at Dentsply Asia Student Clinicians Competition | International Association for Dental Research (South East Asia Division) | Project entitled: "In Situ Evaluation of Laser Effect on the prevention of Enamel Demineralisation Using an Intra-Oral Model." The winning team represents South-East Asia at the International Dentsply Student Clinician Programme at American Dental Association in annual meeting in Sept 2004. This is a significant honour for NUS, indicative of the high level of quality in research achieved in undergraduate UROP projects. |
| Dr Woo Mei Yee Co-Authors: A/P KelvinFoong, Dr Chan Yiong Huak | Best Paper Award. Craniofacial Biology (IADR 1995 Prize) US\$500 prize | International Association for Dental Research (South East Asia Division) | Paper entitled: "Light Based Visualisation System - A 3 D (South East Asia) Validation Study." |
| Department: Restorative Dentistry | | | |
| Dr Wang Xiao Yan Co-Authors: A/P Adrian Yap, Dr KY Zeng | Best Paper Award. Dental Materials - Laboratory Research US\$500 prize | International Association for Dental Research (South East Asia Division) | Paper entitled: "Effect of Environmental Calcium Phosphate on Acid Resistance of Glass Ionomers." |
| Ms Wu Xiaowa Co-Authors: A/P Adrian Yap Dr KY Zeng | Division Travel Award in the Senior Researcher Category. US\$1,000 prize | International Association for Dental Research (South East Asia Division) | Paper entitled: "Environmental Index of Resin-based Restorative Materials." She represents South-East Asia to compete in the Hatton Award Competition held at the International Association for Dental Research General Session in March 2005, Baltimore, USA. |

Local Awards

| Staff / Student | Award | Awarding Agency | Details |
|--|---|--|--|
| Department: Dean's Office | | | |
| Dr Liu Hua Co-Authors: Dr Heng Boon Chin, Ms Saw Tzue Yih, Dr Ouyang Hongwei, Dr Cao Tong | Best Oral Science Poster Award | National University of Singapore and National University Hospital Annual Scientific Meeting | Poster entitled: "Early Separation of MSC Differentiated Cells for Osteogenesis in Local Implantation." |
| Ms Bina Rai Co-Authors: Prof Teoh Swee Heng, A/P D.W Hutmacher, Dr Cao Tong, Dr F Chen Dr K Jacob, A/P Ho Kee Hai | The Best Paper Award (Postgraduate Category). Cash prize: \$300 | The Biomedical Engineering Society (Singapore) | Paper entitled: "The effect of rhBMP-2 on Canine Osteoblasts Seeded onto 3D Bioactive Polycaprolactone Scaffolds." |
| Department: Preventive Dentistry | | | |
| Ms Shen Peiling, Amelia & Ms Sim Yilin, Eileen, (Victoria Junior College students) Supervisor: A/P Stephen Hsu | Gold Award S\$400 book voucher | Singapore Science and Engineering Fair 2005 | Project entitled: "In Vitro study of the Inhibiting Effect of Er:YAG laser on Enamel Demineralisation in Adverse pH Condition" |
| Department: Restorative Dentistry | | | |
| Dr Anil Kishen Dr S George, Dr Song Keang Peng | Best Scientific Poster Award | Singapore Endodontic Society & Malaysian Endodontic Society | Poster entitled: "A Mono- Species Biofilm Model for Persistent Endodontic Infection" |

Patents

| Patent / Subject | Team | Status |
|--|---|---|
| "Advanced Non Invasive Light Activated Therapy to Eliminate Microbes in Teeth" | Dr Anil Kishen Mr Saji George Dr Song Keang Peng A/Prof Jennifer Neo | U.S. provisional patent filed on 13 June 2005 |

NEW RESEARCH PROJECTS APPROVED IN FINANCIAL YEAR 2004 - 2005

New Research Projects Funded by the Academic Research Fund



The Effects of Low Level Laser Therapy on the Rat's Sciatic Nerve following Lysolecithin – Induced Focal Demyelination

Principal Investigator: A/P Yeo Jin Fei
Amount: \$45,150

Aim:

This research study investigates the effects of Low-level laser therapy (LLLT) on the rate and completion of remyelination process as well as the rate and completion of re-clustering of remyelination of the sodium and potassium channels as compared to controls.

In this study, chemical demyelination would be achieved by lysolecithin application on the exposed sciatic nerves of the rats used as the experimental animals. In the controls, demyelination is allowed to take its course and the start and completion of remyelination are to be assessed. In the experimental group, LLLT applications would be given to the experimental animals to note its effects on the rate and completion of remyelination, together with the return of normal features of sodium and potassium channels. A comparison with the results of the controls would provide evidence-based information on the efficacy of LLLT on remyelination.

Abstract:

The relation between demyelination and pain has been well-known. Demyelination involves changes in the ultra-structures of myelin and effects on the sodium and potassium channels at the Nodes of Ranvier. In the case of trigeminal neuralgia which is commonly seen by dentists, the evidence linking demyelination to this painful condition is still lacking. Low-level laser therapy is reported to promote myelination.

Clinical Relevance:

Presently, demyelinating conditions like trigeminal neuralgia are treated by medication (Carbamazepine). Sometimes, it is ineffective due to adverse side effects and increasing dose dependency. Current surgical options are either by intracranial procedures or peripheral nerve avulsion, which have its morbidity and numbness respectively, both of which are not preferred by patients. This study would provide evidence-based treatment parameters of LLLT for remyelination in conditions involving demyelination (e.g. trigeminal neuralgia) and hence LLLT could provide an alternative treatment modality to enhance remyelination of this condition.



Tissue Reaction to Implanted Viscosity Enhanced Root Repair Material

Principal Investigator: Dr Chng Hui Kheng
Amount: \$45,382

Aim:

1. To evaluate the tissue reaction to Viscosity Enhanced Root Repair Material in the tibias and mandibles of guinea pigs using histomorphological studies.
2. To compare the tissue reactions to implanted Viscosity Enhanced Root Repair Material, ProRoot MTA and ProRoot MTA (Tooth colored formula).

Abstract:

The emergence of Mineral Trioxide Aggregate (MTA) as a root-end filling material has generated a lot of interest due to its superior sealing ability and biocompatibility. Although MTA possesses superior sealing ability and is less cytotoxic compared to traditional root-end filling materials such as Super-EBA and IRM, it has poor handling characteristics. A novel root-end filling material with similar chemical composition but improved handling characteristics was recently developed through a joint collaboration between Department of Restorative Dentistry and Department of Chemical Engineering at the National University of Singapore. A U.S.A. provisional patent was filed for this material, Viscosity Enhanced Root Repair Material, in October 2003. This material has been tested and was found to fulfill the physical properties requirements for use as root-end filling material. Our earlier studies also found the root-end sealing ability of this material to be comparable to MTA. The material is non-toxic when tested using Direct Contact Test, in accordance with ISO 10993-5:1999. However, there is a lack of in vivo studies to ascertain its biocompatibility. (The aim of this project is to examine the tissue reactions to implanted Viscosity Enhanced Root Repair Material in the tibia and mandible of guinea pigs and compare the reactions with those induced by MTA.)

Clinical Relevance:

A thorough understanding of the biocompatibility of Viscosity Enhanced Root Repair Material will lead to appropriate recommendations for its clinical application.

It is hoped that understanding the limitations of Viscosity Enhanced Root Repair Material will lead to further research to improve the material, with potential applications such as a bone filler or bone cement material used in oral surgery and orthopedics.

NEW RESEARCH PROJECTS APPROVED

IN FINANCIAL YEAR 2004 - 2005

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Faculty of
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2004/05



Molecular Profiles of Periodontal Tissues after Tooth Replantation- A Canine Model

Principal Investigator: A/P Varawan Sae-Lim

Amount: \$179,756

Aim:

To obtain an overview of the molecular factors which may be specifically expressed in periodontal tissues after tooth replantation.

Abstract:

Substantial investigations have attempted to regenerate functional periodontium after tooth replantation by inhibiting dentoalveolar ankylosis / replacement resorption, the sequelae of the severely damaged periodontium following prolonged extra-oral duration and/or undesirable extra-oral condition, which could potentially lead to tooth loss. However, these therapeutic strategies have not resulted in breakthrough success. While healing potential of the periodontal tissue on the replanted root surface and the role of the alveolar socket have been speculated upon, the mechanism underlying functional healing following replantation of avulsed teeth with severely damaged periodontium had not been fully elucidated. The recent advances in proteomics and genomics as well as the integrated bioinformatics implicate promising feasibility in the molecular diagnostics of dentoalveolar ankylosis / replacement resorption which to date have not been demonstrated. It is recognized that with these emerging technologies, multiple gene and protein expressions during the periodontal healing and regenerative processes could be extensively studied. The aim of this proposal is to investigate the differential spatial and temporal molecular profiles of periodontal tissue in replanted teeth susceptible to ankylosis / replacement resorption, in comparison to that of the replanted teeth having optimal healing with the non-experimental teeth serving as baselines. In this study, tooth extraction would be undertaken to simulate avulsion injury in a canine model. It is envisaged that novel genes / evidences discovered from the molecular expression profiles of this proposed replantation study would allow a more comprehensive understanding of the healing of replanted teeth under adverse conditions and that the data obtained would be used to establish definitive hypotheses for subsequent verification and functional studies. This basis is deemed imperative in the formulation of a therapeutic strategy and modulation of ankylosis / replacement resorption.

Tooth avulsion represents one of the more severe forms of dental injuries known to inflict extensive damages not only to the pulp but also to the tooth-supporting periodontium (PDL). While pulp injuries could be optimally managed, the undesirable periodontal complications usually result in tooth loss if replantation of avulsed teeth is not carried out immediately.

In order to achieve an understanding of the underlying molecular mechanisms during the periodontal healing, extraction and replantation are undertaken to simulate avulsion and replantation in a canine model.

The immediate and delayed replantation groups observed at 0-hr serve as control and the observation time points at 1,3,7 days serve as experimental groups. The periodontal structures, namely the periodontal ligament, cementum and alveolar bone, from the samples of each group are isolated and total RNA is thereafter extracted. The RNA sample is then processed for hybridization in separate affymetrix genechip canine genome array containing 21,500 transcripts. The gene expression data is analyzed using computational methods for identifying both upregulated and downregulated genes involved in this canine tooth replantation model. This gives a snapshot of the genes expressed in each condition of interest. Further validation of the biologically relevant genes is to be done by kinetic PCR. Attempts are made to classify the gene products according to their molecular function and biological process to which they contribute. The gene of interest can be mapped to the metabolic and signaling pathway databases in order to better understand their role.

Clinical Relevance:

Avulsion injuries are the most commonly occurring dental injuries which incur severe damage to the attachment apparatus of tooth. As a treatment, the tooth can be replanted back to the socket. Immediate replantation of the avulsed tooth is rarely possible in clinical scenario for obvious reasons like unavailability of immediate dental care and/or other primary injuries which make dental treatment rather elective. In such clinical situations, delayed replantation is inevitable. As a consequence, the health of supporting periodontal tissue is largely compromised thereby critically affecting the prognosis of replanted teeth. A better understanding of the molecular phenomena occurring in the periodontal tissues of delayed replanted teeth may elucidate the underlying mechanisms for complicated healing and will also aid in establishing a promising replantation treatment strategy.

NEW RESEARCH PROJECTS APPROVED

IN FINANCIAL YEAR 2004 - 2005



Caries Risk Assessment for Children in Singapore

Principal Investigator: A/P Stephen Hsu Chin-Ying
Amount: \$144,925

Aim:

To establish a sensitive and specific caries risk assessment/prediction (CRA) model for early identification of and treatment for the high caries risk children in Singapore

Abstract:

Tooth decay (caries) is a chronic infectious disease with a multifactorial etiology. Despite the decrease of caries rate in developed countries in the last few decades, caries remains as the single most common chronic childhood disease with the majority of lesions found in the minority of the children (15-25%). Recently, a resurgence of caries in children has been revealed in several industrialized countries, including Singapore. Therefore, to establish a CRA model for early identification of and treatment for the high risk patients is of paramount importance. However, there is no CRA model available in Singapore with satisfactory sensitivity and specificity.

In the past few years, our research team has carried out several preliminary studies to identify the disease/caries profile and potential caries risk factors among children in Singapore. This longitudinal study aims to profile the caries prevalence/incidence/risk for establishing a biopsychosocial CRA model relevant to children population aged 4-7 years in Singapore. Baseline data collection and a 1-year follow-up evaluation will be done using an interviewer-administered questionnaire, an oral examination, and salivary tests. The traditional statistical methods coupled with various artificial intelligence will be employed for model construction and validation.

Clinical Relevance:

The production model will enhance evidence-based diagnosis and planning of treatment in managing caries in children



Rapid Optical Method to Monitor Caries Activity in Children

Principal Investigator: Dr Mohamed Azharashid Mohamed Tahir

Amount: \$37,965

Aim:

1. To evaluate the ability of an optical biochemical sensor as a chair-side tool to identify caries activity in children.
2. To compare the effectiveness of the optical biochemical sensor with established salivary test markers of caries activity.

Abstract:

Dental caries is one of the most prevalent infectious diseases in children. Mutans streptococci (MS) and Lactobacillus species are believed to be the main indicator organisms. They are aciduric, acidogenic and involved in high caries activity. Sugary diet forms the substrate for these bacteria to produce acids that demineralise tooth enamel that initiates the carious process. Therefore, it is important to be able to identify children at risk of dental caries so that they benefit from aggressive preventive measures thus avoiding dental surgical intervention. An optical chemical sensor is a device that is used to measure the concentration or activity of a chemical species in a sample of interest. The potential of using the sensor enables us to conduct rapid, selective and quantitative in-situ measurements of specific biochemical changes. Recently an optical chemical sensor that can monitor chemical variables associated with MS activity in saliva has been reported. In the proposed study, an extrinsic optical chemical sensor will be used to determine the acidogenic profile of saliva and plaque of known caries-free and caries-active children. The proposed sensor will enable us to attain a chair-side system that may indicate caries activity in children.

Clinical relevance:

The sensor would be able to provide real-time, quantitative information of caries activity in children at the chair-side compared to established bacterial screening tools.

NEW RESEARCH PROJECTS APPROVED

IN FINANCIAL YEAR 2004 - 2005

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2004/05



Roles of Chondroitin Sulphate Proteoglycans in Palatal Wound Healing

Principal Investigator: A/P Kelvin Foong Weng Chong

Amount: \$69,500

Aim:

The main purpose of the study is to analyse the roles played by chondroitin sulphate proteoglycans in palatal wound healing. The specific objectives are to:

1. Determine and compare the expression of chondroitin sulphate proteoglycans in palatal fibroblast during wound healing in vitro;
2. Examine the biological effects of perturbation of chondroitin sulphate proteoglycan biosynthesis on palatal fibroblast behaviour; and
3. Evaluate the biological effects of different chondroitin sulphate proteoglycans on palatal wound healing in vitro.

Abstract:

Critical events for wound healing after surgical repair of the cleft palate include proliferation, adhesion and migration of both fibroblasts in the connective tissues and cells in the overlying epithelium. Since the roles played by chondroitin sulphate proteoglycans in regulating palatal fibroblast biological behaviour during wound healing are currently not well understood, this project aims to extend our previous work on palatal wound healing in rabbits by analysing the functions of chondroitin sulphate proteoglycans in human palatal fibroblasts by means of an in vitro wound healing model. Transcript and protein levels of various chondroitin sulphate proteoglycan species will be measured and compared at different time points during wound healing in this model. The biological effects of perturbation of chondroitin sulphate proteoglycan biosynthesis on palatal fibroblast will be examined, and the potential of using chondroitin sulphate proteoglycans to promote palatal wound healing in vitro will be evaluated. Together, these experiments will help to extend our understanding of the biology in palatal wound healing, and may lead to new therapeutic approaches to promote post-surgical palatal wound healing.

Clinical relevance:

Results from this project may be used in the development of membranes enriched with specific chondroitin sulphate proteoglycans which could be used in the surgical repair of the cleft palate to reduce and minimize scarring during post-surgical wound healing.

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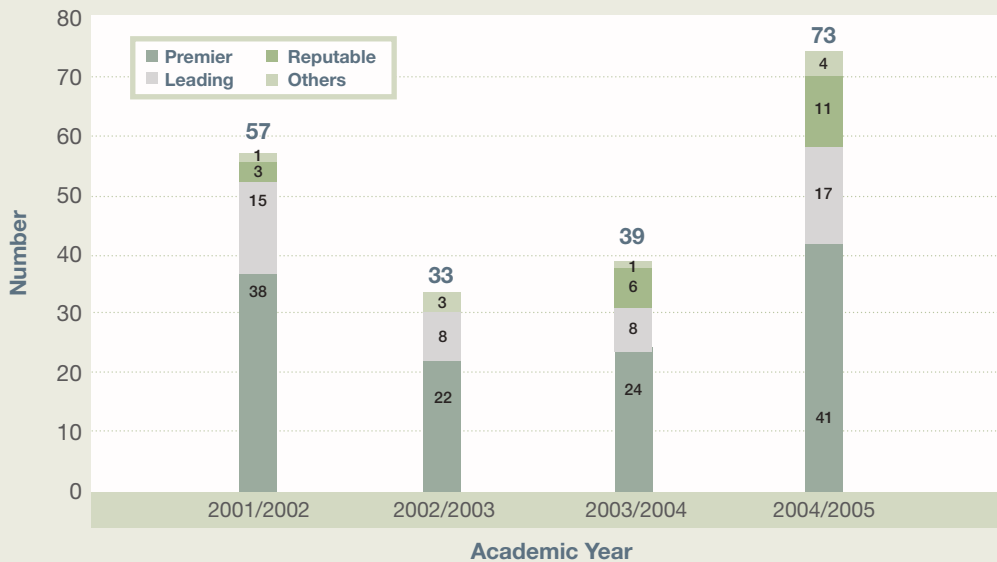
Number of New Research Grants and On-going Projects for FY2000 - FY2004 Supported by the Academic Research Fund



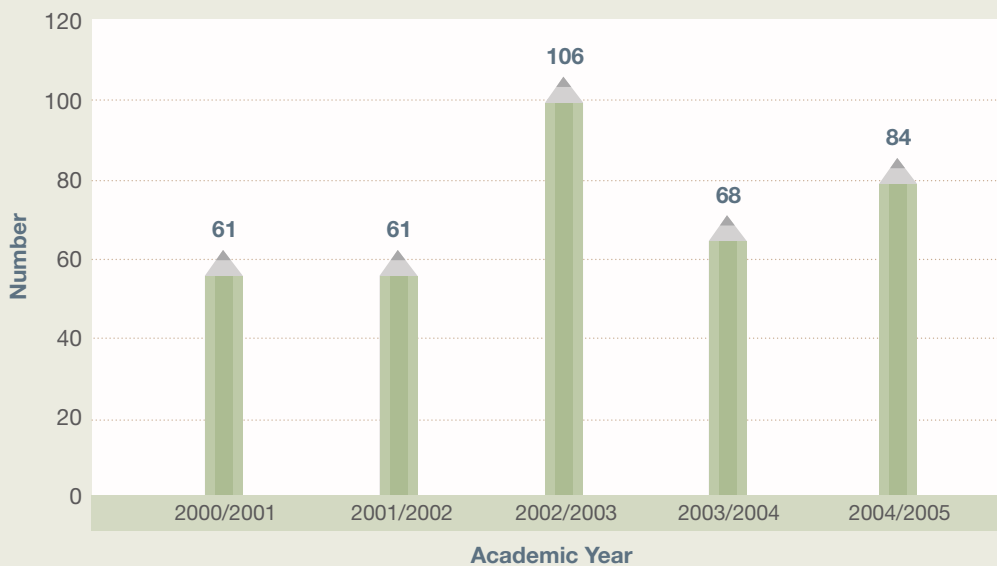
Research Funds Allocated to Dentistry from the Academic Research Fund for FY2001 - FY2005



Number of Refereed Publications for AY2001 - AY2004



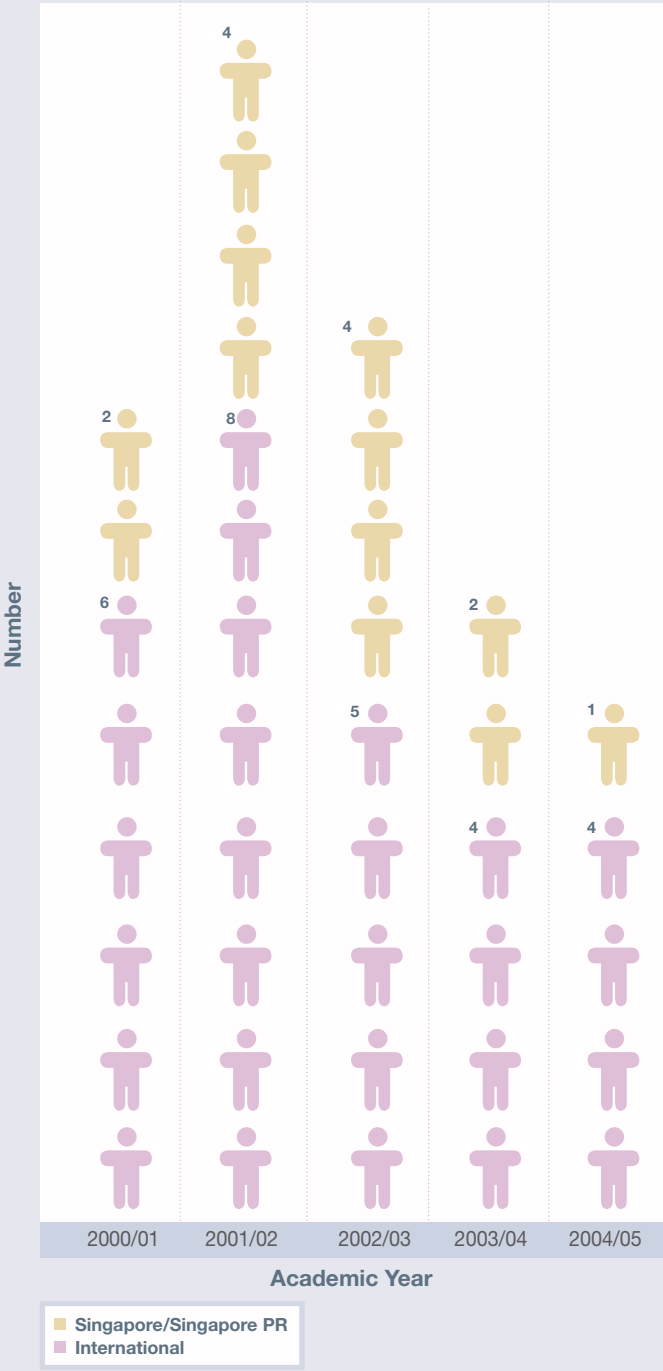
Number of Conference Papers for AY2000 - AY2004



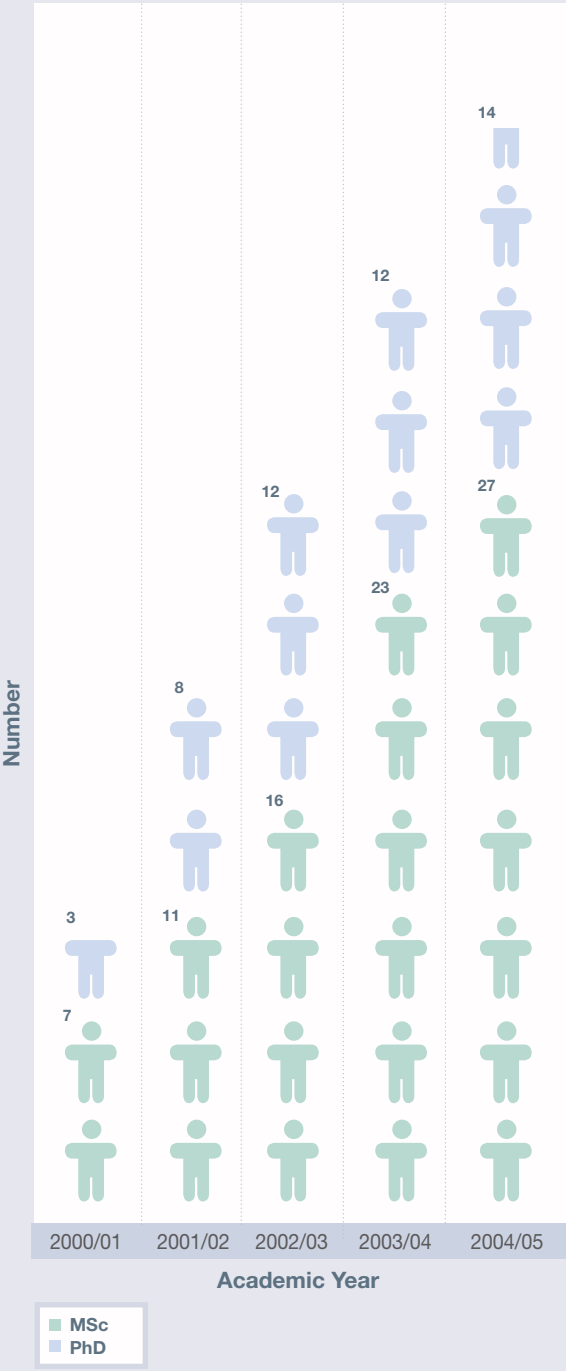
POSTGRADUATE RESEARCH STUDENTS PROFILE

FROM AY2001 TO AY2005

Intake by Nationality



Cumulative Enrolment in
MSc and PhD Programmes



EXTERNAL RESEARCH COLLABORATIONS

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Collaborations with other Universities

| S/N | International / Local | Name of University | Principal Investigator | Collaborating Department in Faculty | No. of Collaborations |
|-------|-----------------------|----------------------------------|------------------------|-------------------------------------|-----------------------|
| 1 | International | Saratov State University | Dr Anli Kishen | Restorative Dentistry | 1 |
| 2 | Local | Nanyang Technological University | Dr Anli Kishen | Restorative Dentistry | 1 |
| 3 | Local | Nanyang Technological University | Dr Anli Kishen | Restorative Dentistry | 1 |
| 4 | International | University of Washington | Assoc Prof Keson Tan | Restorative Dentistry | 1 |
| 5 | International | National Taiwan University | Assoc Prof Stephen Hsu | Preventive Dentistry | 1 |
| 6 | International | Sichung University | Assoc Prof Stephen Hsu | Preventive Dentistry | 1 |
| 7 | International | Eastman Dental Institute | Assoc Prof Ho Kee Hai | Oral & Maxillofacial Surgery | 1 |
| 8 | International | Georgia Tech Research Institute | Assoc Prof Ho Kee Hai | Oral & Maxillofacial Surgery | 1 |
| 9 | International | Karolinska Institute, Sweden | Dr Cao Tong | Dean's Office | 1 |
| 10 | International | University of Wisconsin Madison | Dr Cao Tong | Dean's Office | 1 |
| 11 | International | Harvard University | Dr Cao Tong | Dean's Office | 1 |
| Total | | | | | 11 |

Collaborations with Industries

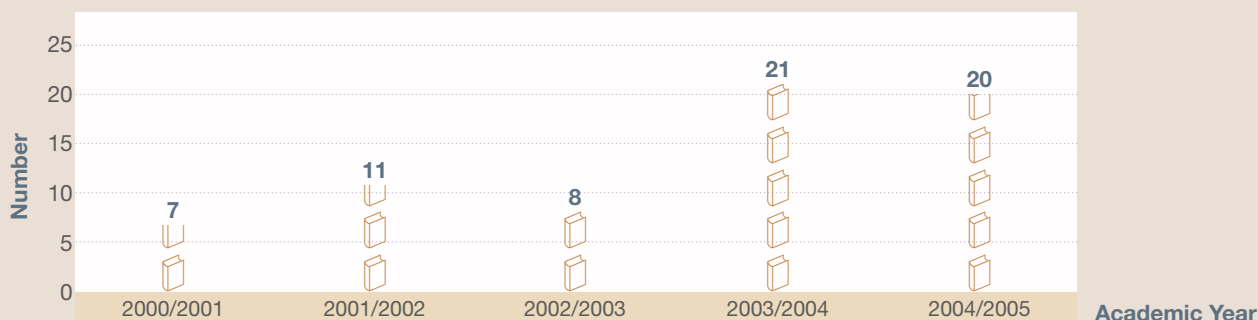
| S/N | International / Local | Name of Company | Principal Investigator | Collaborating Department in Faculty | No. of Collaborations |
|-------|-----------------------|-------------------------------------|--|-------------------------------------|-----------------------|
| 1 | International | 3M | Assoc Prof Jennifer Neo | Restorative Dentistry | 1 |
| 2 | Local | Rapid Tech Pte Ltd Dr Victor Fan | Dr Cao Tong & Maxillofacial Surgery | Dean's Office & Oral and | 1 |
| Total | | | | | 2 |

Collaborations with Research Institutions

| S/N | International / Local | Name of Research Institutions | Principal Investigator | Collaborating Department in Faculty | No. of Collaborations |
|-------|-----------------------|--|--|-------------------------------------|-----------------------|
| 1 | Local | Genomic Institute of Singapore, A*STAR | Dr Cao Tong | Dean's Office | 1 |
| 2 | Local | SIMTech Pte Ltd, A*STAR Dr Victor Fan | Dr Cao Tong & Maxillofacial Surgery | Dean's Office & Oral and | 1 |
| Total | | | | | 2 |

EDITORIAL MEMBERSHIPS

Number of Staff Holding Editorial Memberships for AY2000-AY2004



RESEARCH PROJECTS IN THE MASTER OF DENTAL SURGERY PROGRAMMES

ACADEMIC YEAR 2004-2005

Endodontics

Year 3

1) Dr Ang Ee Choon, Richard

Analysis of VEGF Expression in Immediate and Delayed Replanted teeth.

Supervised by
Assoc Prof Varawan Sae-Lim

2) Dr Kuah Hong Guan

The Effects of Chelating Agents on Smear Layer Removal With and Without Ultrasonics at the Apical 1/3 of the Root Canal: A SEM Study

Supervised by
Dr Patrick Tseng

3) Dr Lee Chee Wee

PDLF/Tooth Co-culture

Supervised by
Assoc Prof Varawan Sae-Lim

Year 1

1) Dr Lim Toh Seong, Andy

Microarray Evaluation - Penodontal Ligament

Supervised by
Assoc Prof Varawan Sae-Lim

Prosthodontics

Year 3

1) Dr Leong Woei Jian, Elvin

The Effect of Tooth Preparation Height and Taper on Resistance Form

Supervised by
Assoc Prof Keson Tan Beng Choon
Dr Chua Ee Kiam
Dr Wong Keng Mun

2) Dr Mirza Rustum Baig

Evaluation of Marginal Fit of Cerec 3 or Other Contemporary CAD/CAM All Ceramic Full Coverage Crowns

Supervised by
Assoc Prof Keson Tan Beng Choon

Year 1

1) Dr Nguyen Thi Ouyinh Huong

Load Fatigue Performance of Implant - Ceramic Abutment Combinations

Supervised by
Assoc Prof Keson Tan Beng Choon

Oral and Maxillofacial Surgery

Year 3

1) Dr Lai Juen Bin

The Effects of Locally Injected Steroid on Palatal Wound Healing

Supervised by
Dr Goh Bee Tin

2) Dr Ng Chee Hon

A Local study anticonvulsant on prescription by oral healthcare professionals.

Supervised by
Dr Myra Elliott
Assoc Prof Yeo Jin Fei
Prof Loh Hong Sai

3) Dr Seah Tian Ee

Effects of Chemical Injury on the Inferior Alveolar Nerve of the Rat.

Supervised by
Dr Andrew Tay

Year 2

1) Dr Chew Shen Hui, Bertrand

A Double Blind, Randomized, Clinical Trial to Compare the Efficacy of an Alcohol-based Mouthwash, Preidex with an Alcohol-free Mouthwash, Trihexid on Dental Plaque Accumulation, Gingival Health, and Healing After Wisdom Teeth Operation.

Supervised by
Assoc Prof Yeo Jin Fei
Dr Sylvia Tay

2) Dr Deepthy A Nair

Neurosensory Disturbance Following Orthognathic Surgery - A Clinical Audit

Supervised by
Assoc Prof Yeo Jin Fei

Year 1

1) Dr Rahul Harshad Nagadia

Spatial position of IDN in local Chinese population

Supervised by
Dr Andrew Tay

Orthodontics

Year 3

1) Dr Mok Tong Bee

A Cephalometric Study of Cranial Bases in Chinese Adults

Supervised by
Dr Mimi Yow
Dr Chew Ming Tak

2) Dr Poon Kee Hoon

The Effectiveness of Mandibular Advancement Device on Chinese Patients with Obstructive Sleep Apnoea

Supervised by
Dr Chay Siew Han
Assoc Prof Kelvin Foong Weng Chiong

3) Dr Woo Mei Yee

3D Assessment of Facial Expression (Posed Smile)

Supervised by
Assoc Prof Kelvin Foong Weng Chiong

Year 2

1) Dr Oh Sin Yin Geraldine

3D Analysis of Palatal and Arch Form Changes Associated with Orthodontic Treatment

Supervised by
Dr Soh Jen
Assoc Prof Ong Sim Heng

2) Dr Poon Kee Hwang

Cephalometric Dimensions of the Width of the Anterior Alveolus in Chinese

Supervised by
Assoc Prof Kelvin Foong Weng Chiong

3) Dr Tang Sin Yee Anna

3D Analysis of Orthodontic Tooth Movement with First and Second Premolar Extractions in the maxillary arch

Supervised by
Assoc Prof Kelvin Foong Weng Chiong

Year 1

1) Dr Chng Chai Kiat

SEM and Frictional Evaluation of Esthetic Resin Braided Wires

Supervised by
Assoc Prof Kelvin Foong Weng Chiong
Prof Chew Chong Lin

2) Dr Mah Kuan Seet Michael

A 3-Dimensional Frontal Evaluation of Occlusal Plane changes

Supervised by
Assoc Prof Kelvin Foong Weng Chiong
Assoc Prof Ashraf Kassim

3) Dr Koh Wei Ching Robyn

Frictional Evaluation of conventional & self-ligating Aesthetic Brackets of various aesthetic arch wire configurations

Supervised by
Assoc Prof Kelvin Foong Weng Chiong

4) Dr Wee Teng Yau

3D analysis of orthodontic Tooth Movement in the Mandibular Dental Arch with 1st & 2nd Premolar Extractions

Supervised by
Assoc Prof Kelvin Foong Weng Chiong

Periodontics

Year 3

1) Dr Khurram Ataullah

Non-Surgical Periodontal treatment and High Sensitive C-reactive preteen level in Diabetics

Supervised by
Assoc Prof Lim Lum Peng

2) Dr Tan Wah Ching

Effects of Simple Periodontal Therapy on Periodontal Disease and Glycaemic Control in Patients with Diabetics

Supervised by
Assoc Prof Lim Lum Peng

Year 2

1) Dr Chee Hoe Kit

Longitudinal Evaluation of Periodontal Healing Response in Patients with Diabetes

Supervised by
Assoc Prof Lim Lum Peng

2) Dr Tan Ching Ching

Periodontal Research in Patients with Diabetes

Supervised by
Assoc Prof Lim Lum Peng

PHD AND MSC RESEARCH PROJECTS

ACADEMIC YEAR 2004-2005

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Faculty of
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2004/05

Doctor of Philosophy

Ms Bina Rai

Effect of Growth Factors on Bone Regeneration on 3D PCL-TCP Scaffolds

Supervised by

Assoc Prof Ho Kee Hai
Prof Teoh Swee Hin

Dr Hla Myint Htoon

Oral Health Promotion Programme for Diabetics in Singapore

Supervised by

Assoc Prof Lim Lum Peng

Dr Khoo Suan Phaik

Biopsychosocial Characteristics as Predictors of Treatment Outcome of Temporomandibular Disorder (TMD) Patients with Symptoms of Pain.

Supervised by

Assoc Prof Adrian Yap
Dr Chan Yiong Huak

Dr Wang Xiaoyan

Interaction between Environmental Calcium/Phosphate and Glass Ionomer Restoratives

Supervised by

Assoc Prof Adrian Yap
Assoc Prof Hien Ngo
Dr Zeng Kaiyang

Dr Zou XiaoHui

Proteoglycans & Palatal Wound Healing

Supervised by

Assoc Prof Kelvin Foong Weng Chiong
Dr Cao Tong
Dr George Yip

Mr Chung Sew Meng

Development of Micro-mechanics Strategies for Characterization of Dental Composites

Supervised by

Assoc Prof Adrian Yap
Assoc Prof Tsai Kuo Tsing
Assoc Prof Lim Chwee Teck

Dr Gao Xiaoli

Caries Risk Assessment for Children in Singapore.

Supervised by

Assoc Prof Stephen Hsu Chin-Ying

Mr Saji George

Advanced Non-invasive Light Therapy to Eradicate Bacterial Flora in Dentine

Supervised by

Dr Anil Kishen

Ms Soh Mui Siang

Synthesis and Characterisation of "Non-shrinking" Nanocomposites for Dental Application

Supervised by

Assoc Prof Adrian Yap
Dr Alan Sellinger

Dr Sum Chee Peng

Structural and Functional Characterisation of Dentine for Endodontic Retreatment

Supervised by

Dr Anil Kishen

Dr Deng Bin

Inverse Analysis of Dental Implant Systems Using Finite Element Method

Supervised by

Assoc Prof Keson Tan Beng Choon
Assoc Prof Liu Gui Rong

Dr Nyi Lay Maung

Characterization of Enamel Diffusion Modulated by Er:YAG Laser.

Supervised by

Assoc Prof Stephen Hsu Chin-Ying

Master of Science

Dr Abhiram Maddi

Effect of Therapeutic Ultrasound on Bone Regeneration via Release of Growth Factors and Cytokines

Supervised by

Assoc Prof Ho Kee Hai

Dr Joseph Antoniraj Jude Aarthi

Genetic Profile of Periodontal Tissues in Replanted Teeth - a Baseline Study

Supervised by

Assoc Prof Varawan Sae-Lim
Dr George Yip
Dr Yang He, Henry

Dr Meenaskhi

The myelination effects of Low Level Laser Therapy on the rat's sciatic nerve following Lysolecithin - Induced Demyelination

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Prof Loh Hong Sai

Mr Toh Wei Seong

Stimulations and Modulations of Chondrogenic Differentiation from Human Embryonic Stem Cells

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Dr Cao Tong

Dr Wu Xiaowa

Chemo-Mechanical Degradation of Resin-Based Hybrid Restoratives.

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Dr Zeng Kai Yang

Dr Ye Chaopeng

Characterisation of Osteogenic Cells Differentiated from Human Embryonic Stem Cells

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Molecular Events in Nerve and Bone Healing in Jaw Defects

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Assoc Prof Yeo Jin Fei
Dr Victor Fan

Ms Huang Li

Laser - Induced Caries Prevention

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Assoc Prof Stephen Hsu Chin-Ying

Dr Adeela Rafique

Investigations on Effect of Hydration on the Mechanical Characteristics of Dentine

Supervised by

Dr Anil Kishen

Dr Vinoth Kumar Jayaseelan

Hepatic Differentiation of Human Embryonic Stem Cells for Toxicity Screening of Dental Materials

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Tissue Reaction to Implanted Viscosity Enhanced Root Repair Material

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Dr Tarun Kumar Maheshwari

Molecular Profile of Periodontal Tissues following Tooth Replantation

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UNDERGRADUATE RESEARCH OPPORTUNITIES PROGRAMME

PROJECTS COMPLETED IN ACADEMIC YEAR 2004-2005

Osteogenic differentiation of Mesenchymal Stem Cell.

Teo Kuo-Yih, Terry
Seow Yian San (Miss)
Yang Shi Lin, Sherine (Miss)
Tang Panmei (Miss)

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Cytotoxicity of Composite resin with Neutral Red and MTT.

Quek Yeow Hsien
Seah Soon Kwang
Lee Kwan Kai, Kenneth
Khoo Tuo Sheng, Joel
Kwan Wei Yen

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Preventive Effects of ER: YAG Laser on Enamel Demineralization and Erosion caused by Acidic Beverages.

Low Jiun Sian
Ngauw Njuk Khim, Angela (Miss)
Lum Jing Li
Wong Li Beng

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Does Controlled Light Polymerization really Work?

Chye Chuan Hee, Kelvin
Neo Bijuan (Miss)
Teo Juin Wei
Lai Ye Choung

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Psychometric Evaluation of Oral Lichen Planus Patients in an Asian Population: A Pilot Study.

Co Hao Ming, Kevin
Sham Pui Yin, Enrica (Miss)
Low Yi Han
Wong Ren Jie, Patricia (Miss)

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Accuracy of Computer-Aided Methods of Measuring Intermaxillary Tooth-Size Discrepancy.

Ng Kok Wai, Edwin
Ng Dih Hann, Simon
Hong Pooi Mun (Miss)
Tan Kian Meng

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A Comparison of the Efficacy of a Power-driven Sonic Toothbrush and a Manual Toothbrush in Care-Dependent Residents of a Nursing Home.

Syed Fadzleigh Bin Shafari
Lim Tse Chiun (Miss)
Loo Sun Din
Sim Qiuxia, Chelsia (Miss)

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Dr Benjamin Tan*

An Invitro Evaluation of Antibacterial Effect of Stannous Fluoride Against E.Faecalis in the Presence of Dentine.

Soong Poh Luon
Gan Tsering, Sapphire (Miss)
Chong Tse Feng, Gabriel
Yap Hejia, Louise (Miss)

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