Dental Implants:
Treatment Planning Decision Making
JANUARY 24, 2017

RESEARCH DAY 2017
Tenth Anniversary
Advancing oral health through outstanding education, research, and community service.

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The 10th UBC Dentistry Research Day returns to a topic that continues to grow in importance in clinical dentistry. The use of dental implants to replace missing teeth is increasing at a rapid pace. Implant placement and restoration has become part of the practice repertoire of a continually expanding number of both general dentists and dental specialists. The first UBC Dentistry Research Day featured research and clinical applications related to dental implants. The field has advanced rapidly in the past 10 years. This Research Day will highlight the most recent developments in dental implants and provide a look at what will be happening in the future.

Until relatively recently, there were only a very limited number of ways to replace missing teeth. The ability to place a dental implant directly into the bone of the mandible or maxilla and use the implant as an abutment for a restoration has transformed how restorative dentistry is practiced. There is new information related to the types of pathology that can occur at the implant–bone junction and the mechanisms that inflammation can play to disrupt osseous integration leading to implant failure. The opportunity to place and restore an implant on the same day has resulted in new approaches to treatment plan patients with missing teeth. Implants have become an important part of clinical dentistry. Learning where it has come in the past 10 years will also provide some ideas about where it will be going in the future.

Enjoy the day, and I hope you acquire new information related to the clinical applications of dental implants and the scientific research that supports their use. The educational programs at UBC Dentistry all provide considerable theory and practice in the use of dental implants. These presentations will offer some insight into the future of dental implants.

Thank you for your participation.

Charles F. Shuler, DMD, PhD
Professor and Dean, UBC Faculty of Dentistry
An eleven-year-old presented with non-centred midlines, a congenital absence of the maxillary right lateral incisor, and a small maxillary left lateral incisor. There is an anterior crossbite, minimal attached gingiva on the labial surface of the lower incisors, ectopic canines, and a family history of Class 3 malocclusion (Figure 1). Decisions were made to prepare this patient for future implant placement for the missing lateral incisor (Figure 2). A three-stage treatment plan was developed. The first stage involved anterior crossbite correction, which resulted in improvement of the lower incisor attached gingiva; also guidance of the ectopic canines to the correct position was employed. The canine position was improved to enhance bone in the future implant site (Figure 2). The second stage involved full fixed orthodontic appliances to prepare the patient for future implant placement. As this stage of treatment was done, the orthodontist worked with the implant surgeon and the restorative dentist to ensure that the needs of future implant placement and restorative care were met (Figure 3). The third stage of treatment was performed some 12 years after the patient first presented, and was delayed until the cessation of all facial growth. This involved implant placement and final restoration, not only of the missing incisor but also of the small contralateral incisor (Figure 4).

[Case courtesy of Dr. David B. Kennedy]

Learning Objectives:

At the end of the day, participants are expected to be able to:

- Discuss treatment planning decisions that enhance successful implant placement.
- Identify clinical considerations that enhance immediate anterior implant success.
- Describe surgical treatment approaches to develop implant-recipient sites.
- Recognize the prosthodontic considerations needed to enhance implant rehabilitation.
- Explain non-surgical treatment approaches for the management of implant-associated biofilms.
- Describe surgical treatment approaches to manage failing implants.
- Identify factors affecting long-term implant stability.
8:00 - 8:30  REGISTRATION & CONTINENTAL BREAKFAST
8:30 - 8:40  WELCOME
Dr. Charles Shuler, Professor and Dean, UBC Faculty of Dentistry

INTRODUCTION & OVERVIEW OF THE DAY
Dr. Edward Putnins, Professor and Director of Research, Graduate & Postgraduate Studies, UBC Faculty of Dentistry

8:40 - 9:15  INTERDISCIPLINARY CARE: THE ORTHODONTIST’S ROLE IN PREPARING THE PATIENT FOR IMPLANTS
Dr. David Kennedy, Clinical Professor and Clinical Co-Director, Graduate Orthodontics, Department of Oral Health Sciences, UBC Faculty of Dentistry
“What can the orthodontist do to prepare the patient for implants?”

9:15 - 9:50  RETROSPECTIVE ANALYSIS OF IMMEDIATE ANTERIOR IMPLANT THERAPY
Dr. Mark Kwon, Dental Clinician and Chair, BITES Institute Implant Training Centre, Burnaby, British Columbia
“What clinical considerations guide immediate anterior implant placement?”

9:50 - 10:25  IMPLANT SITE DEVELOPMENT
Dr. Dimitrios Karastathis, Certified Specialist in Periodontics, Vancouver, British Columbia
“What techniques are currently available to aid in implant site development?”

10:25 - 10:55  COFFEE BREAK

10:55 - 11:30  LIMITING PROSTHODONTIC COMPLICATIONS THROUGH APPROPRIATE TREATMENT PLANNING AND IDEAL IMPLANT PLACEMENT
Dr. Anthony McCullagh, Clinical Associate Professor, Department of Oral Health Sciences, UBC Faculty of Dentistry
“Why is dental implant placement so crucial in ideal prosthetic prosthesis design, limiting long-term complications, and improved treatment outcomes?”

11:30 - 11:45  RESEARCH POSTER AWARDS PRESENTATION
Dr. Ravindra Shah, Associate Professor and Director, International Relations, UBC Faculty of Dentistry
Undergraduate & Graduate Students

11:45 - 12:45  LUNCH (BOX LUNCH PROVIDED) & RESEARCH POSTER VIEWING
Posters by undergraduate students, graduate students, postdoctoral fellows, research associates, visiting scientists, and faculty members

12:45 – 1:20  MECHANICAL MANAGEMENT OF BIOFILM FOR IMPLANT MAINTENANCE
Ms. Penny Hatzimanolakis, Clinical Associate Professor, Department of Oral Biological & Medical Sciences, UBC Faculty of Dentistry
“Are we at a paradigm shift in the mechanical management of biofilm?”

1:20 – 1:55  APPROACHES IN THE TREATMENT OF FAILING IMPLANTS
Dr. George Giannelis, Assistant Professor and Director, Graduate Periodontics Program, Department of Oral Biological & Medical Sciences, UBC Faculty of Dentistry
“How can we improve the prognosis of failing implants?”

1:55 – 2:55  AN ANALYSIS OF TREATMENT PROTOCOLS AND IMPLANT FAILURES FROM A PRIVATE PRACTICE DATASET OF UP TO 9,000 IMPLANTS (KEYNOTE ADDRESS)
Dr. David French, Certified Specialist in Periodontics, Calgary, Alberta
“What is an expected outcome in private practice with various treatment protocols and various implant systems? Can sinus augmentation be simplified and at the same time improve outcomes? Is all bleeding at implants a risk indicator for bone loss?”

2:55 – 3:10  WRAP-UP & DISCUSSION
Thank you for attending and celebrating our Tenth Anniversary UBC Dentistry Research Day.

MESSAGE FROM THE DIRECTOR OF RESEARCH

Our Annual Research Day began with the purpose of introducing students to the importance of research and the critical role it plays in new knowledge and technology development to enhance patient care. The focus of our first Research Day in 2008 was on implants. Over the past decade, significant advances in implant design, recipient site development, best maintenance practices, and the development of surgical approaches to dealing with failing implants have all occurred. These are also examples of how new understanding through research continues to advance decision making and dental practice. I am delighted that we are returning to this exciting topic for our 10th Research Day anniversary.

We begin our morning with four presentations from faculty and alumni. Collectively they will discuss how effective early treatment planning and surgical intervention can enhance implant site development. In addition, we will hear about clinical considerations of immediate implant placement and prosthodontic considerations that must be accounted for to ensure long-term implant success. The afternoon talks will focus on non-surgical implant maintenance and surgical treatment options that are available to clinicians to maintain implant health and stability over time. We are delighted to finish the day with Dr. David French, who will present the keynote address on his long-term private practice experiences in implant placement and their stability. I would like to express our appreciation to all of the outstanding faculty, alumni, and our corporate supporters, who have all agreed to participate and support Research Day 2017.

In addition, please do read through this research day program booklet to see the other exciting research currently being done by our faculty and students at the University of British Columbia. This book and day are made possible by the efforts of many people on the Research Day Organizing Committee. I would like to personally thank Ingrid Ellis, George Giannelis, Penny Hatzimanolakis, David Kennedy, Anthony McCullagh, Jane Merling, Kim Schultz, and Terry Wintonyk, who have all worked very hard to make this day a success.


Edward E. Putnins, DMD, PhD, DipPerio
Professor and Director of Research,
Graduate & Postgraduate Studies
DAVID KENNEDY
MARK KWON
DIMITRIOS KARASTATHIS
ANTHONY MCCULLAGH
PENNY HATZIMANOLAKIS
GEORGE GIANNELIS
DAVID FRENCH
DAVID KENNEDY, BDS, MSD, FRCD(C)

Dr. Kennedy has master’s degrees in both Pediatric Dentistry and Orthodontics. He is the first Canadian to hold Fellowship in both specialties, and is a Diplomate of the American Boards of both Pediatric Dentistry and Orthodontics. He has served as an examiner for the Royal College of Dentists of Canada and the American Boards of Pediatric Dentistry and Orthodontics, and is a Past President of the Royal College of Dentists of Canada. Dr. Kennedy has published over 50 articles, including chapters in textbooks and his own textbook “Paediatric Operative Dentistry,” which was published in 4 languages and in 4 editions. He has given over 30 1–2 day courses and over 100 lectures. He serves as a peer reviewer for 5 dental journals and has received teaching awards at UBC for 5 consecutive years.

INTERDISCIPLINARY CARE: THE ORTHODONTIST’S ROLE IN PREPARING THE PATIENT FOR IMPLANTS

This presentation will review the orthodontist’s role in interdisciplinary care for patients who need an implant. Correct interdisciplinary care requires the interdisciplinary team to develop the appropriate treatment plan and communicate with each other and the patient to enhance the final outcome. Specific emphasis will be placed on the appropriate treatment timing and the need for collaboration because failure results in unfavourable patient outcomes. The need for a “quarterback” on the interdisciplinary team will also be discussed so that the right treatment is done by the most qualified operator at the best time in order to enhance the outcome. A case of one patient, who started treatment at age 11 and completed treatment at age 23, will be used to demonstrate these principles.

MARK KWON, DMD

Dr. Kwon studied pharmaceutical sciences and obtained his Doctor of Dental Medicine from UBC. He is a full-time clinician in his implant-only practice, Chrysalis Dental Centre (www.implantmagic.com) and focuses on various implant surgery, advanced bone grafting, and full-mouth reconstruction including All-on-4 “Teeth-in-a-Day” procedures. Dr. Kwon is a founder of the BITES Institute, an implant centre that focuses on providing surgical and prosthetic training courses as well as monthly study clubs to support the ongoing needs of general dentists providing implant dentistry. He is well known throughout Canada for his appearances on various esteemed dental stages, including the Pacific Dental Conference Live Stage in 2013, 2014, 2015, and 2016, and continues to teach fellow practitioners the immediate implant solutions that define his clinical work throughout Canada and abroad.

RETROSPECTIVE ANALYSIS OF IMMEDIATE ANTERIOR IMPLANT THERAPY

“Immediate implant solution” has always been a popular topic. Patients are aware of it and in some instances demand it, especially for front teeth. It certainly has been a debated topic amongst colleagues over the past decade. Being able to provide a patient with a new tooth in a single surgical appointment is a highly attractive solution: extraction of a failing tooth, placement of an implant, and delivery of a provisional crown. The concept of immediate anterior implant therapy and the evolution of clinical applications in both surgery and prosthetics over the past decade will be highlighted.
DIMITRIOS KARASTATHIS, DMD, MSc, DipPerio
Dr. Karastathis graduated from the Faculty of Dentistry at the University of British Columbia with a Diploma in Periodontics in 2011 and currently practices as a full-time periodontist in Vancouver, Canada. In addition, he is a part-time clinical faculty member in the UBC Graduate Periodontics program and lectures to numerous study clubs and conferences throughout British Columbia.

IMPLANT SITE DEVELOPMENT
Implant placement has become one of the most popular options when replacing a missing tooth. However, a site that is to receive an implant must present with a certain amount of hard and soft tissues in order to allow for a favourable long-term outcome. This presentation will discuss the numerous methods available to develop both hard and soft tissues before, during, and after implant placement.

ANTHONY MCCULLAGH, BDS, MPhil, MFDSIre, FDS, MRD(Pros), RCSEdin
Dr. McCullagh is a full-time faculty member in the Division of Prosthodontics and Dental Geriatrics at the UBC Faculty of Dentistry and is a member of active staff in the Department of Dentistry at Vancouver General Hospital. He currently coordinates the teaching of partial removable dental prostheses and dental implant teaching for the UBC DMD program and the clinical module of the Graduate Prosthodontics Program.

LIMITING PROSTHODONTIC COMPLICATIONS THROUGH APPROPRIATE TREATMENT PLANNING AND IDEAL IMPLANT PLACEMENT
Significant maintenance issues can be associated with large implant-supported fixed reconstructions. Both biological and biomechanical failure can compromise the long-term success of restorations and necessitate the need for repair or replacement prostheses over time. Dental implant positioning should always be restoratively driven as failure or inability to position implants appropriately for the support of fixed restorations often results in compromises to prosthesis design and treatment outcomes. Contemporary prosthodontic maintenance protocols for implant restorations will also be outlined.
MECHANICAL MANAGEMENT OF BIOFILM FOR IMPLANT MAINTENANCE

The implant is osseointegrated. The prosthetic is restored. Now what? What are the best options currently available to help disrupt biofilm and maintain “sulcus” health? Does the current evidence support lasers, hand or power instrumentation, antiseptics, or are we at a paradigm shift in effective mechanical biofilm management? During the past few years in North America and for over 10 years in Europe, indications for the use of air-pressured mechanical biofilm disruption technology with the use of low-abrasive powders for both supragingival (airflow) and subgingival (periometer) biofilm removal have been developed. This evidence-informed review will explore the airflow mechanism and its clinical application for biofilm management on healthy and diseased implants.

APPROACHES IN THE TREATMENT OF FAILING IMPLANTS

Despite the current knowledge and advances in the dental implant industry and the high implant success rates that are consistently reported in the literature, peri-implant disease (peri-implant mucositis and peri-implantitis) still occurs. Debate continues as to the etiology of the problem, but it is clear that early diagnosis and early intervention are the key factors in the management of peri-implant disease. The treatment protocols for peri-implant disease vary from non-surgical therapy to surgical regenerative and resective approaches or even implant removal. The advantages and challenges of each therapeutic approach will be reviewed based on the current literature.
DAVID FRENCH, BSc, DDS, DipPerio

Dr. French graduated first-in-class from the School of Dentistry at the University of Alberta in 1991 and then received his specialty degree in Periodontics from the Faculty of Dentistry at the University of British Columbia. He has maintained a full-time private practice in Calgary focused on surgical implant dentistry. Dr. French is a Fellow of the International Team for Implantology and a member the American Academy of Periodontology, European Association for Osseointegration, and the AO Foundation. He is a published author with an emphasis on the retrospective analysis of clinical implant dentistry outcomes.

AN ANALYSIS OF TREATMENT PROTOCOLS AND IMPLANT FAILURES FROM A PRIVATE PRACTICE DATASET OF UP TO 9,000 IMPLANTS

Review of retrospective publications:
- Straumann survival and bone score analysis
- Zirconia abutment
- Osteotome-mediated sinus lift success and novel classification

Evaluation of 9,000 implants for patterns of failure and identification of risk:
- Definition of failure: relative versus absolute failure
- Implant-related risks: size, type, and design; tapered versus straight; and platform shift versus flat top
- Patient-related risks: habits, medications, and conditions
- Prosthetic-related risks: timing, loading, titanium versus zirconia, and generic components
- Surgical-related risks: timing, bone grafts, socket grafts, and sinus management
- Planning-related risks: diagnosis, case selection, planning, and difficulty assessment
POSTER ABSTRACTS
Poster Competition Judges

DR. RAVINDRA SHAH (Chair)
DR. MAHA AL-SAHAN
DR. DIETER BRÖMME
DR. S. ROSS BRYANT
DR. RICARDO CARVALHO
DR. NANCY FORD
DR. GEORGIOS GIANNELIS
DR. LARI HÄKKINEN
DR. KYLA LEUNG
DR. ADRIANA MANSO
DR. KAVITA MATHU-MUJU
DR. NASRINE MOSTAFA
DR. CHRISTOPHER OVERALL
DR. STEVEN PELECH
(Faculty of Medicine)
DR. BENJAMIN PLISKA
DR. JOY RICHMAN
DR. N. DORIN RUSE
DR. RANA TARZEMANY
DR. SIDDHARTH VORA
1. Proteomic Changes Between the Dental Pulp Stroma and Odontoblast Regions
   Abbey SR*, Eckhard U, Matthew I, Overall CM
   Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada

2. Craniofacial Features of Obese Obstructive Sleep Apnea Patients: Preliminary Report
   Alfuriji SN*, Ahmed F, Yen E1, Pliska B1, Almeida F1
   1Division of Orthodontics, Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada (UBC); 2Division of Respiratory Medicine, Faculty of Medicine, UBC

3. Dental Care Beyond BC Children’s Hospital: Identifying Challenges of Transition
   Algahtani MA*1,2, Campbell KM1,2, Brondani MA1, Harrison RL1
   1Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada; 2Department of Dentistry, BC Children’s Hospital (BCCH-DD), Vancouver, Canada

4. Review of Pediatric Dentistry Oral Sedation Outcomes and Influences
   Alkafaji Z1, Bush HM2, Garcia Fulle MI1, Harrison R1, von Bergmann HC1, Mathu-Muju KR1
   1Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada; 2Department of Biostatistics, College of Public Health, University of Kentucky, Lexington, USA

5. Factors Effecting Primary Stability of Mini-Implants In Vitro
   Alohali H1, Bahrami B1, Yen E1, Arzanpour S1, Ruse ND3, Chehroudi B1
   1Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada (UBC); 2Department of Mechatronic Systems Engineering, Simon Fraser University, Burnaby, Canada; 3Department of Oral Biological & Medical Sciences, Faculty of Dentistry, UBC

6. Assessing Different Mouthrinses in Reducing Malodor from Orthodontic Appliances
   Alsabban HA*, Donnelly L2, Brunette DM2, Loo A1
   1Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada (UBC); 2Department of Oral Biological & Medical Sciences, Faculty of Dentistry, UBC

7. The Efficacy of TSD in OSA Patients: a Preliminary Report
   Alshhrani W*1, Okuno K1, Kohzuka Y1, Hamoda M1, Peres B1, Fleetham JA2, Ayas NT2, Comey R2, Lowe AA1, Almeida FR1
   1Department of Oral Health Sciences, Faculty of Dentistry, Frontier Clinical Research Centre, The University of British Columbia, Vancouver, Canada (UBC); 2Department of Respiratory Medicine, Faculty of Medicine, UBC; 3Division of Functional Oral Neuroscience, Osaka University Graduate School of Dentistry, Osaka, Japan

8. Exploring Dental Care Experiences of Adults Whose Parents Were Incarcerated
   Amir N*1, Donnelly L2, Mathu-Muju K1, Harrison R1, Brondani M1, Martin R1
   1Department of Oral Health Sciences, Faculty of Dentistry, University of British Columbia, Vancouver, Canada (UBC); 2Department of Oral Biological & Medical Sciences, Faculty of Dentistry, UBC; 3Collaborating Centre for Prison Health and Education, Faculty of Medicine, UBC

9. Altered Craniofacial Morphology in Children with OSAS: Clinical Photographic Study
   Ayers E*, Huynh N2, Hamoda M1, Pliska BT1, Almeida FR1
   1Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada; 2Faculty of Dental Medicine, Université de Montréal, Montreal, Canada

10. Leukocyte and Platelet-Rich Fibrin Regulate Gingival Fibroblast Gene Expression
    Barona MF*, Bi J, Häkkinen L, Larjava H
    Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada
Prescriptive Patterns Using CBCT in Endodontics
Bhatt M*, Coil J1, Esteves A2, Chehroudi B2, MacDonald D1
1Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada (UBC); 2Department of Oral Health Sciences, Faculty of Dentistry, UBC

Suppression of αvβ6 Integrin Expression by Polymicrobial Oral Biofilms
Bi J*, Koivisto L, Owen GR, Shen Y, Haapasalo M, Häkkinen L, Larjava H
Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada

Characterizing Dense Granule Secretion from Platelets
Biddle C*, Mo R1,2, Morrissey J1, Kim H1,2,3
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Common Adverse Events for Oral Cancer Patients Following Local Excision
Chen D*, Liu KYP1, Poh CF1,2
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Complex Regulation of Cx43 by Wound Healing Associated Factors
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Intrinsic Mechanisms Are Responsible for Embryonic Midfacial Narrowing
Danescu A*, Woo J, Richman JM
Department of Oral Health Sciences, Faculty of Dentistry, Life Sciences Institute, The University of British Columbia, Vancouver, Canada

Evaluating HIV Screening in Dental Education Settings
Feng I*, Donnelly L, Brondani M
Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada

Craniofacial Morphology and Malocclusion in Children with Obstructive Sleep Apnea
Hamoda M*, Huynh N2,3, Pliska B1, Amin R4, Lee K1, Abikhzer J3, Laramée M2,3, Simone D4,5, Ayers E1, Narang I1, Almeida F1
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Quantum Dots as Contrast Agents for OPT/CT Correlative Imaging
Jow DJ*, Schipilow J, Sun G, Ford NL1,2,3
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Investigating the Role of WNT Signalling Mutations in Robinow Syndrome
Kim J*, Danescu A, Richman JM
Department of Oral Health Sciences, Faculty of Dentistry, Life Sciences Institute, The University of British Columbia, Vancouver, Canada
Effects of Sedation on Breathing in Patients Undergoing Dental Surgery
Kohzuka Y*1,2,3, Isono S2, Almeida FR1
1Frontier Clinical Research Centre, Department of Oral Health Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada; 2Department of Anesthesiology, Graduate School of Medicine, Chiba University, Chiba, Japan; 3Department of Anesthesiology, Showa University Koto Toyosu Hospital, Tokyo, Japan

Effectiveness of Cryotherapy for Oral Precancers: a Pilot Study
Lee NV*1, Liu KYP1, Ng S1, Poh CF1,2
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Unique Clinical and Pathological Characteristics of Gingival Squamous Cell Carcinoma
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Genomic Instability Analysis in Oral Samples Using Digital Droplet PCR
Lu XJD*1,2, Hughesman C1,2,3, Liu KYP1,2, Haynes C3,4, Poh CF1,2
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p16 Status Helps Predict Clinical Outcomes of Oral Premalignant Lesions
Lubpairee T*1,2, Rosin MP1, Prigge ES1, von Knebel Doeberitz M1, Reuschenbach M1, Zhang L1,2
1BC Oral Cancer Prevention Program, British Columbia Cancer Agency, Vancouver, Canada; 2Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada; 3Department of Applied Tumor Biology, Institute of Pathology, University Hospital Heidelberg, Heidelberg, Germany

Effects of Curing Mode on Bond Strength and Cure Depth
Makhdoom SN*1, Campbell KM1, Carvalho RM2, Manso AP2
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Effect of Irrigant Flow Velocity on Killing Microbes in Biofilm
Mirdad L, Shen Y, Haapasalo M
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Insurance at a Not-for-Profit Dental Clinic in Vancouver, British Columbia
O’Dwyer C*, Lee D2, Brondani M1
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Dermal Fibroblasts Exhibit Distinct Pro-Contractile Phenotype Compared to Gingival Fibroblasts
Olver D*, Mah W, Jiang G, Larjava H, Häkkinen L
Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada

Establishing a Functional Peri-Implant Connective Tissue Attachment with Surface Topography
Owen GR*, Huang P, Kashani SG, Häkkinen L, Larjava H
Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada
Osmosis is the Main Mechanism for Cyst Enlargement
Park JW*, MacDonald D, Zhang L
Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada

Comparison of Smoking Related and Non-Smoking Related Oral Dysplasia
Rock LD*1,2, Rosin MP2,3, Zhang L1,2, Shariati B*, Laronde DM1,2
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Rough Dental Implant Surface Disinfection by Leukocyte and Platelet-Rich Fibrin
Schuldt LA*, Bi J, Owen GR, Kim H, Shen Y, Haapasalo M, Häkkinen L, Larjava H
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Quantum Dot Immunolabeling of Oral Squamous Cell Carcinoma FFPE Tissue
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Connexin 43 Hemichannels Regulate Fibroblast Wound Healing Related Gene Expression
Tarzemany R*, Jiang G, Larjava H, Häkkinen L
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Effect of Torsional and Fatigue Preloading on HyFlex EDM Files
Tra C, Haapasalo M, Shen Y
Division of Endodontics, Department of Oral Biological & Medical Sciences, Faculty of Dentistry, The University of British Columbia, Vancouver, Canada

Prognostic Biomarkers in Obstructive Sleep Apnea: a Systematic Review
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Morphometric Analysis of Fetal Craniofacial Bones and Cervical Vertebrae
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Reliability of Upper Pharyngeal Airway Assessment Using Dental CBCT
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RESEARCH SUPPORTERS
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For more information on graduate programs visit www.dentistry.ubc.ca/grad
or contact: Vicki Koulouris
vkoulouris@dentistry.ubc.ca T 604 822 4486

GRADUATE RESEARCH OPPORTUNITIES

PhD or MSc in Craniofacial Science
The UBC Faculty of Dentistry offers advanced study leading to a PhD or MSc in Craniofacial Science. The PhD program requires the successful completion of a research-specific curriculum, a comprehensive exam, and defense of a research-based thesis. A minimum of four years of full-time study is typically required. The MSc program requires successful completion of a research-specific didactic curriculum in conjunction with a research-based thesis. This program typically requires two years of full-time study; however, an extended part-time option for an MSc degree is available. Research options in one of the following three broad areas of study are available:

- Population health research explores the complex interactions (social, cultural, environmental) that affect the oral health of individuals, communities, and populations.
- Oral health-related clinical research includes both interventional and observational studies focusing on the following: disease prevention, diagnosis, risk, treatment, prognosis, and health care.
- Basic science research in the areas of biomaterials, cell biology, developmental biology, microbiology, and molecular biology.

These graduate programs are available as stand-alone degrees or may be completed as a combined diploma in a clinical specialty with a PhD or MSc degree (see criteria below). Clinical specialty training options are available in the following areas.

Endodontics
PhD or MSc combined with a Diploma in Endodontics
- PhD degree (minimum 6 years) or MSc degree (minimum 3 years)
- Diploma in Endodontics

Graduates will be eligible to take the examinations for specialty certification in endodontics offered by the Royal College of Dentists of Canada and the American Board of Endodontists.

Research Focus
- eradication of microorganisms from the root canal system
- development of unique in vitro and ex vivo models for biofilms which simulate oral in vivo biofilms
- industry collaborations on new devices to improve antimicrobial solutions
- safety and effectiveness of instrument systems to deliver disinfecting agents into the root canal
- impact of file design on the eradication of root canal microbes

Clinical Training
- treatment management (including surgery) of diseases and trauma of the tooth root and pulp

Criteria
- Applicants must hold a DMD or its equivalent

Orthodontics
PhD or MSc combined with a Diploma in Orthodontics
- PhD degree (minimum 6 years) or MSc degree (minimum 3 years)
- Diploma in Orthodontics

Graduates will be eligible to take the examinations for specialty certification in orthodontics offered by the Royal College of Dentists of Canada and the American Board of Orthodontists.

Research Focus
- craniofacial morphology and function in different populations
- efficiency and efficacy of treatment modalities
- societal and economic strategies that govern access to care
- craniofacial molecular and cellular control mechanisms
- impact of biomaterials on delivering orthodontic mechanics

Clinical Training
- diagnosis, prevention and treatment management of abnormal congenital or developmental relationships of the dentofacial anatomy from infancy to adulthood in diverse populations

Criteria
- Applicants must hold a DMD or its equivalent
- Postgraduate clinical and/or academic experience preferred
Pediatric Dentistry

PhD or MSc combined with a Diploma in Pediatric Dentistry
- PhD degree (minimum 6 years) or MSc degree (minimum 3 years)
- Diploma in Pediatric Dentistry

Graduates will be eligible to take the examination for specialty certification in pediatric dentistry offered by the Royal College of Dentists of Canada and the diplomate examination of the American Board of Pediatric Dentistry.

Research Focus
- biomedical research (craniofacial development)
- clinical research (facial symmetry of cleft lip and palate)
- population health and health services research (oral health promotion and access to care for disadvantaged children)

Clinical Training
- diagnostic, preventive, therapeutic and consultative expertise for children and adolescents including those with special healthcare needs at BC Children’s Hospital Dental Department, Oral Health Centre at UBC Vancouver, and community settings throughout the province

Criteria
- Applicants must hold a DMD or its equivalent

Periodontics

PhD or MSc combined with a Diploma in Periodontics
- PhD degree (minimum 6 years) or MSc degree (minimum 3 years)
- Diploma in Periodontics

This program is recognized by the American Dental Association and the Academy of Periodontology. Graduates will be eligible to take the examination for fellowship in the Royal College of Dentists of Canada and the board examination of the American Academy of Periodontology.

Research Focus
- molecular pathology of periodontal disease
- periodontal and skin wound healing
- clinical aspects of tissue healing around implants
- stem cell-mediated regeneration of lost tissues

Clinical Training
- management of tooth-supporting structures using non-surgical and surgical procedures
- tooth replacement with implants when needed

Criteria
- Applicants must hold a DMD or its equivalent
**Prosthodontics**

PhD or MSc combined with a Diploma in Prosthodontics

- PhD degree (minimum 6 years) or MSc degree (minimum 3 years)
- Diploma in Prosthodontics

Graduates will be eligible to take the examinations for specialty certification in prosthodontics offered by the Royal College of Dentists of Canada and the American Board of Prosthodontics.

**Research Focus**

- biomaterials
- caries management
- community healthcare needs
- geriatric dentistry
- oral cancer rehabilitation
- oral implants and related prostheses
- psychosocial aspects of aging
- xerostomia

**Clinical Training**

- diagnosis, restoration and maintenance of oral function, comfort, appearance and health of patients by the restoration of natural teeth and/or the replacement of missing teeth and contiguous oral and maxillofacial tissues with artificial substitutes
- aesthetics/cosmetic dentistry
- crowns, bridges, veneers, inlays
- complete and removable partial dentures
- dental implants
- digital dentistry
- TMD-jaw joint problems
- traumatic injuries to the structures of the mouth

**Criteria**

- Applicants must hold a DMD or its equivalent

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**Dental Public Health**

MPH combined with a Diploma in Dental Public Health

- Master of Public Health degree from the UBC School of Population & Public Health
- Diploma in Dental Public Health from the UBC Faculty of Dentistry

This 2.5-year combined Dental Public Health degree is a non-thesis, course-based program that connects the academic, service, and international research excellence of the Faculty of Dentistry with the interdisciplinary academic environment offered by the School of Population & Public Health.

**Research Focus**

- community-based health programs and interventions
- health disparities and determinants of oral health
- health policy and critical issues in dental public health
- program evaluation and oral health services utilization
- access to care by marginalized communities, including First Nations and Inuit populations
- data analysis on health expenditures and on provincial, national, and international data sets

**Field Experience**

- practicum placement at local, national, or international organizations
- development of a major project via a learning contract
- production of a peer-reviewed publication
- hands-on activities

**Criteria**

- Applicants must hold either a DMD or its equivalent, or a BDSc (Dental Hygiene) or equivalent dental hygiene education with a 4-year bachelor’s degree
POSTGRADUATE OPPORTUNITIES

General Practice Residency Program

UBC Dentistry and Vancouver General Hospital (VGH) offer positions in a 1- or 2-year hospital-based dental residency program (General Practice Residency, or GPR) beginning in June of each year. The residencies are full-time salaried hospital resident positions with union benefits, including one month of vacation.

The GPR program is centered at VGH in the dental ambulatory care unit, the wards, the operating rooms (ORs), and the emergency room (ER). Most resident activities relate to the evaluation and provision of care to patients who are medically complex, hospitalized, have complex orofacial problems, need the operating room, or are in the hospital ER.

Residents will also participate in specialty clinics in oral medicine, pediatric dentistry, and oral and maxillofacial surgery (OMFS), as well as medical and surgical off-service rotations that typically include 3 months of OMFS, 1 month of ENT, 3 weeks of plastic surgery, 1 week of anesthesia, and the ER. Please note that this is not an advanced education in general dentistry (AEGD) program and instead is focused on hospital skill sets, OMFS, medicine, surgery, medically complex dental care, and a strong community dental experience.

Residents successfully completing this program should be qualified to (a) enter any advanced graduate program, especially OMFS or Periodontics, (b) work within a hospital dental service, (c) practice in any urban or remote area utilizing a hospital (wards, ER, ORs), and (d) work collaboratively and professionally with other medical and dental specialists.

Selection is by application and personal interview. Eligible candidates must be graduates of an accredited Canadian or US dental school; foreign graduates are eligible to apply provided they have passed the National Dental Examining Board of Canada (NDEB) examinations.

The application form and an information sheet are available for download in PDF format. Applications may be obtained at www.dentistry.ubc.ca, under education/postgraduate programs.

Oral Medicine and Oral Pathology Residency Program

This hospital-based postgraduate specialist residency is a 4-year program leading to a certificate and eligibility for the Royal College of Dentists of Canada Fellowship examination.

Local hospital-based training sites
- UBC-affiliated teaching hospitals: BC Cancer Agency, Vancouver Hospital & Health Sciences Centre, St. Paul’s Hospital

Clinical practice component (training diagnosis, assessment, and management)
- oral mucosal disease
- orofacial disorders associated with aging, systemic disease, and medical therapies
- non-surgical salivary gland disorders
- rotations in internal medicine, rheumatology, neurosciences, dermatology, diagnostic pathology, oncology, otolaryngology, surgical pathology (including autopsy), head and neck pathology, and dermatopathology
- OM pathway: additional training in dental management of medically complex patients and diagnosis and treatment of orofacial pain and neurosensory disorders
- OP pathway: additional training in surgical and anatomical histopathology and laboratory procedures, techniques, and diagnosis

Didactic component
- postgraduate-level seminars, case presentations, and literature reviews
- teaching rounds
- ongoing basic and/or clinical research studies
RESEARCH CLUSTERS

CLINICAL RESEARCH, TECHNOLOGY TRANSFER & DENTAL MATERIALS SCIENCES RESEARCH CLUSTER

This cluster encompasses groups engaged in research on cancer diagnosis and prevention, dental biofilms, dental hygiene, dental instruments and materials, dental sleep medicine, forensic dentistry, and interactive dental anatomy. Our areas of expertise include biomaterials, dental morphology, obstructive sleep apnea, oral cancer, and root canal irrigation. We study matters such as bacterial eradication, cellular interactions, cephalometrics, community outreach programs, computational fluid dynamics, diagnostic tools, DNA analysis, fracture mechanisms, molecular markers, novel disinfection strategies, oral care products, surface characterization, and treatment strategies.

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LEWEI ZHANG
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 COMMUNITY & EDUCATIONAL RESEARCH CLUSTER

The research in this cluster relates to three of the four Canadian Institutes of Health Research themes: health services research; social, cultural, environmental, and population health; and clinical research—and to a range of educational studies. These domains are loosely interconnected and employ various quantitative and qualitative research methods and knowledge transfer. Our members conduct studies on diverse topics such as healthcare promotion, oral implants, dental caries, systematic literature reviews, and community service learning.

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**iMATRIX RESEARCH CLUSTER**

iMatrix is an interactive research cluster combining the research interests of 12 highly active laboratories in oral and biomedical sciences. We conduct basic science research in areas such as cancer, cell behaviour, craniofacial development, integrins, molecular biology, periodontal disease, proteases, proteomics, and wound healing. Highly motivated undergraduate and graduate students, postdoctoral fellows and other trainees, as well as interested collaborators, are welcome to contact our member laboratories.

**DIETER BRÖMME**, Coordinator, iMatrix Research Cluster, dbromme@dentistry.ubc.ca

<table>
<thead>
<tr>
<th>NAME</th>
<th>RESEARCH INTERESTS</th>
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</thead>
<tbody>
<tr>
<td>DIETER BRÖMME</td>
<td>Lysosomal proteases and their role in health and disease: protease mechanisms, inhibitors, mouse disease models <a href="mailto:dbromme@dentistry.ubc.ca">dbromme@dentistry.ubc.ca</a></td>
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<tr>
<td>DONALD BRUNETTE</td>
<td>Regulation of cell behaviour on implant surfaces by substratum topography <a href="mailto:brunette@dentistry.ubc.ca">brunette@dentistry.ubc.ca</a></td>
</tr>
<tr>
<td>VIRGINIA M. DIEWERT</td>
<td>Prenatal development of the human face: 3D analyses of growth and variations contributing to cleft lip, cleft palate, and jaw discrepancies <a href="mailto:vdiewert@dentistry.ubc.ca">vdiewert@dentistry.ubc.ca</a></td>
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<td>NANCY FORD</td>
<td>Micro-computed tomography, small animal imaging, cone beam CT <a href="mailto:nlford@dentistry.ubc.ca">nlford@dentistry.ubc.ca</a></td>
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<td>HANNU LARJAVA</td>
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<td>CHRISTOPHER OVERALL</td>
<td>Proteomic investigation of inflamed periodontal and synovial tissues and cancer to elucidate proteolytic mechanisms of cell signalling and in regulating inflammation <a href="mailto:chris.overall@ubc.ca">chris.overall@ubc.ca</a></td>
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<tr>
<td>EDWARD PUTNINS</td>
<td>Regulation and protection of mucosal and skin epithelial cell barrier integrity during inflammation <a href="mailto:putnins@dentistry.ubc.ca">putnins@dentistry.ubc.ca</a></td>
</tr>
<tr>
<td>JOY RICHMAN</td>
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</tr>
<tr>
<td>CLIVE ROBERTS</td>
<td>Extracellular matrix remodelling and cell biology in inflammation, fibrosis, and wound healing <a href="mailto:clive.roberts@ubc.ca">clive.roberts@ubc.ca</a></td>
</tr>
<tr>
<td>CHARLES SHULER</td>
<td>Studies focused on characterizing the molecular mechanisms regulating secondary palatal fusion with specific emphasis on the TGFβ signalling pathway <a href="mailto:cshuler@dentistry.ubc.ca">cshuler@dentistry.ubc.ca</a></td>
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Endodontics
Orthodontics
Pediatric Dentistry
Periodontics
Prosthodontics
Dental Public Health

POSTGRADUATE PROGRAMS
General Practice Residency Program
Oral Medicine and Oral Pathology Residency Program