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*The 38th
Research day*

25th February 2026

FACULTY OF DENTISTRY
CHULALONGKORN UNIVERSITY





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Message from the Dean

Dear Faculty, Students, and Staff,

Welcome to the 38th Annual Research Day of the Faculty of Dentistry, Chulalongkorn University. This year, we celebrate more than just our long-standing legacy of inquiry; we celebrate a historic milestone for our institution.

I am immensely proud to share that our Faculty continues to lead the way, securing the Triple #1 spot in Thailand across three prestigious global platforms: the QS World University Rankings, the SCImago Institutions Rankings, and the Shanghai Ranking (ARWU). This achievement reaffirms our unwavering commitment to excellence in dental education, research, and innovation.

The core purpose of Research Day is to provide our students with a platform to showcase their dedication and to expand their horizons through the exchange of knowledge. We are also honored to welcome our distinguished guest speakers, whose expertise and career journeys serve as a powerful inspiration for our academic community.

I would like to extend my sincere gratitude to the Research Committee and the Office of Research and Innovation for their invaluable contributions. I wish all faculty members and students continued success, confident that our collective research will drive the sustainable development of dental practice for years to come.

Thank you.

Professor Pornchai Jansisyant D.D.S., M.Sc., Ph.D.
Dean of Faculty of Dentistry, Chulalongkorn University

Organizing committee

1. Professor Thantrira Porntaveetus	Chairperson
2. Associate Professor Sirawut Hiran-us	Committee
3. Assistant Professor Wisarut Prawatvatchara	Committee
4. Associate Professor Chalida Limjeerajarus	Committee
5. Associate Professor Boosana Kaboosaya	Committee
6. Associate Professor Piyamas Sumrejkanchanakij	Committee
7. Associate Professor Panida Thanyasrisung	Committee
8. Associate Professor Palinee Detsomboonrat	Committee
9. Associate Professor Waleerat Sukarawan	Committee
10. Associate Professor Soranun Chantarangsu	Committee
11. Associate Professor Nareudee Limpuangthip	Committee
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13. Assistant Professor Supreda Srithanyarat	Committee
14. Assistant Professor Wichaya Wisitrasameewong	Committee
15. Assistant Professor Nicha Ungvijanpunya	Committee
16. Assistant Professor Phoonsuk Limraksasin	Committee
17. Assistant Professor Napat Nalamliang	Committee
18. Assistant Professor Vorapat Trachoo	Committee
19. Assistant Professor Dusit Nantanapiboon	Committee
20. Dr. Sunpatch Benjavongkulchai	Committee
21. Dr. Kanokwan Sriwattanapong	Committee
22. Dr. Tanit Arunratanothai	Committee
23. Dr. Kittipat Termteerapornpimol	Committee
24. Head of Research and Innovation Management	Secretary
25. Mr. Ponchai Lo-orachun	Assistant to secretary
26. Miss Yanin Chamsai	Assistant to secretary
27. Miss Sureeporn Kaewhin	Assistant to secretary
28. Miss Areeya Lertprasopsuk	Assistant to secretary
29. Miss Sakonwan Kodchawiphan	Assistant to secretary

The 38th Research Day
Program Schedule on February 25th, 2026
Somdej Phra Yanasangvara Conference Room
19th floor, Boromanathsrinagarindra Building
Faculty of Dentistry, Chulalongkorn University

07.30 - 08.00	Registration
08.00 - 08.10	Opening Ceremony Professor Pornchai Jansisyanont <i>Dean, Faculty of Dentistry, Chulalongkorn University</i>
08.10 - 09.00	Faculty of Dentistry, Chulalongkorn University, Research Awards 2025
09.00 - 09.45	Special lecture "Think Small and Start Smart: A Clinician's Story of Turning Tongue Function into Innovation" Associate Professor Boosana Kaboosaya <i>Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University</i>
09.45 - 10.00	Break
10.00 - 12.00	Undergraduate Research Competition (Oral presentation)
12.00 - 13.00	Lunch 10 th floor, Boromanathsrinagarindra Building
13.00 - 13.45	Special lecture "Introduction to Generative AI for Academia and Research" Assistant Professor Pittipol Kantavat <i>Computer Engineering, Faculty of Engineering, Chulalongkorn University</i>
13.45 - 15.15	Poster Presentation for Student Research
15.15 - 15.30	Break
15.30 - 16.00	Award Announcement for Student Research Competition Closing Remark

Oral Presentation Program Schedule

Time	Somdej Phra Yanasangvara Conference Room 19th floor, Boromanathsrinagarindra Building
10.00	Remind about the rules
10.05 - 10.17	OR-BS01
10.20 - 10.32	OR-BS02
10.35 - 10.47	OR-BS03
10.50 - 11.02	OR-BS04
11.05 - 11.17	OR-BS05
11.20 - 11.32	OR-BS06

Time	Rareuk Khun Auditorium, 2nd floor, Boromanathsrinagarindra Building
10.10	Remind about the rules
10.15 - 10.27	OR-CN01
10.30 - 10.42	OR-CN02
10.45 - 10.57	OR-CN03
11.00 - 11.12	OR-CN04
11.15 - 11.27	OR-CN05
11.30 - 11.42	OR-CN06

Time	Faculty Board Meeting Room 18th floor, Boromanathsrinagarindra Building
10.10	Remind about the rules
10.15 - 10.27	OR-MC01
10.30 - 10.42	OR-MC02
10.45 - 10.57	OR-MC03
11.00 - 11.12	OR-MC04
11.15 - 11.27	OR-MC05

Oral Presentation

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OR-BS02	Taurine enhances osteogenic differentiation markers in mesenchymal stem cells derived from osteogenesis imperfecta patients	23
OR-BS03	The synthesis method for fluorapatite particles	24
OR-BS04	Effects of early immature durian and early immature pomelo crude extracts on cellular responses of human dental pulp stem cells	25
OR-BS05	Development and <i>in vitro</i> evaluation of a novel herbal oral spray for oral pathogen control	26
OR-BS06	Candida aided <i>Streptococcus mutans</i> in overcoming the inhibitory effects of early colonizing streptococci	27
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Poster Presentation Program Schedule

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13.57 - 14.09	PO-02	PO-08	PO-13
14.09 - 14.21	PO-03	PO-09	PO-14
14.21 - 14.33	PO-04	PO-10	PO-38
14.33 - 14.45	PO-05	PO-11	
14.45 - 14.57	PO-06		

Time	Digital Signage 4	Digital Signage 5	Digital Signage 6
13.45 - 13.57	PO-16	PO-21	PO-25
13.57 - 14.09	PO-17	PO-22	PO-26
14.09 - 14.21	PO-18	PO-23	PO-27
14.21 - 14.33	PO-19	PO-24	PO-28
14.33 - 14.45	PO-20		PO-29
14.45 - 14.57			PO-30

Time	Digital Signage 7
13.45 - 13.57	PO-31
13.57 - 14.09	PO-32
14.09 - 14.21	PO-33
14.21 - 14.33	PO-34
14.33 - 14.45	PO-35
14.45 - 14.57	PO-36
14.57 - 15.09	PO-37

Digital Signage 1: Right side, in front of the conference room

Digital Signage 2: Left side, in front of the conference room

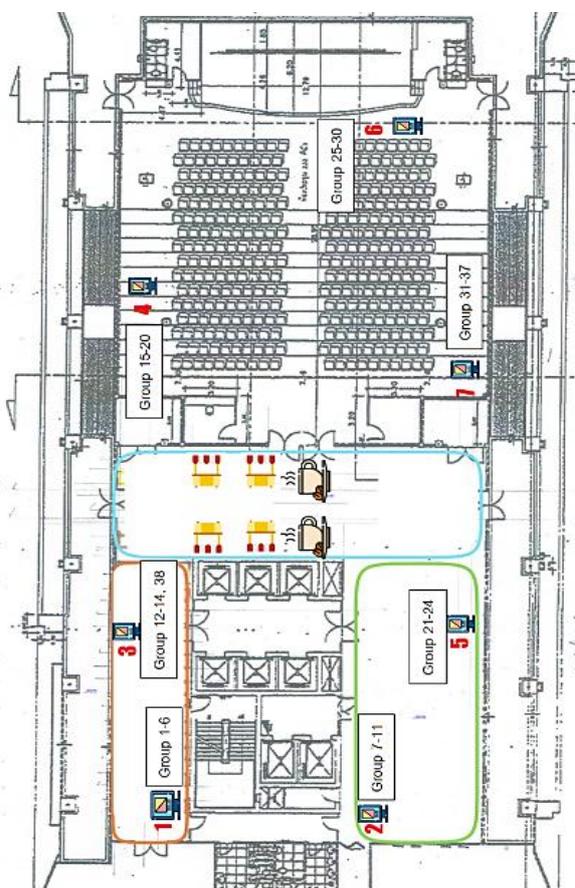
Digital Signage 3: Right side, in front of the conference room

Digital Signage 4: In the conference room

Digital Signage 5: Left side, in front of the conference room

Digital Signage 6: In the conference room

Digital Signage 7: In the conference room

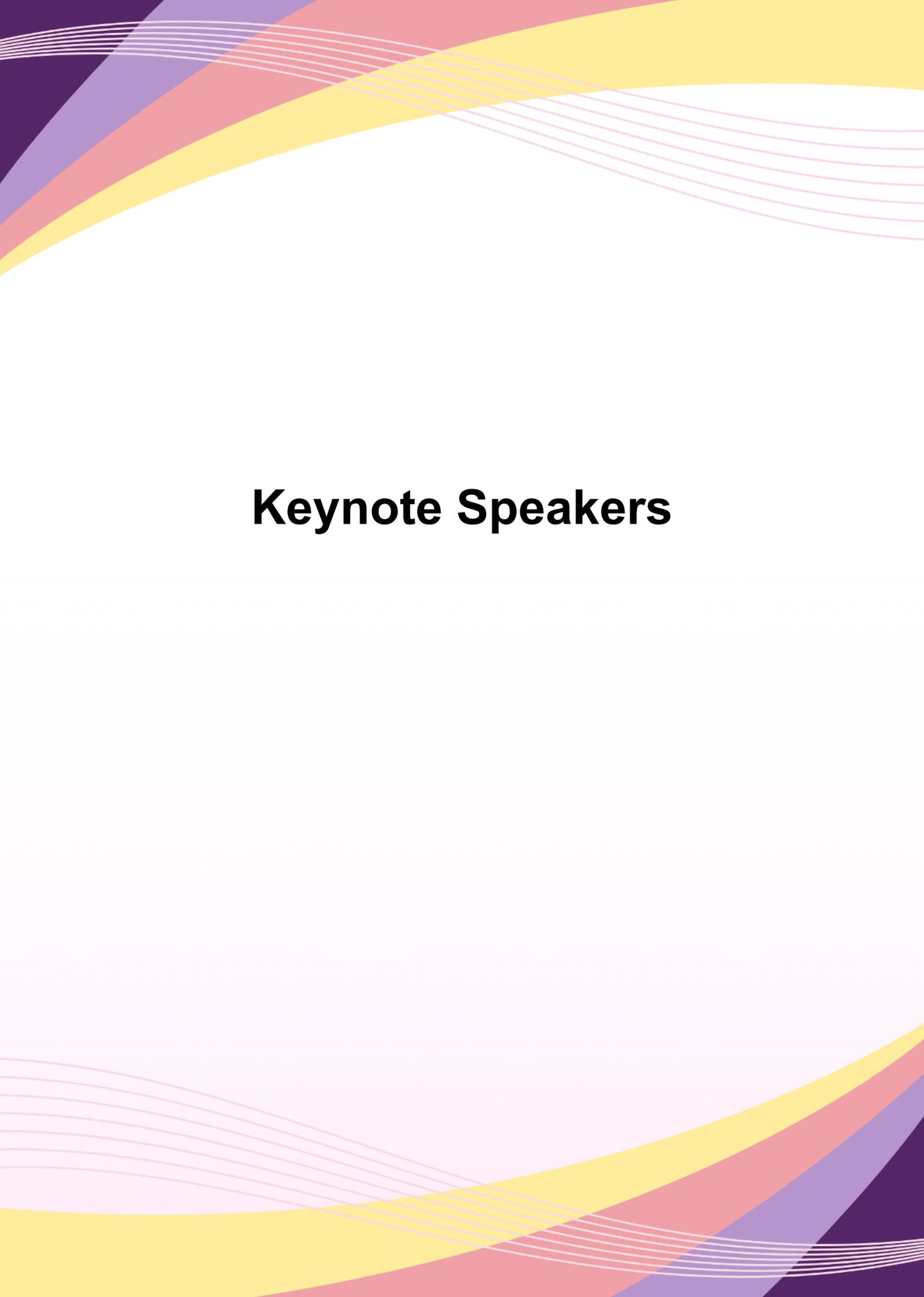


Poster Presentation

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Keynote Speakers

ชื่อ-นามสกุล รองศาสตราจารย์ ทันตแพทย์หญิง ดร.บุศนา คະบุศย์
วันเดือนปี ที่เกิด 1 มีนาคม พ.ศ. 2524
สัญชาติ ไทย



การศึกษา

พ.ศ. 2560 Oral Implantology and Regenerative Dental Medicine ปริญญาเอก
Tokyo Medical and Dental University
พ.ศ. 2553 ประกาศนียบัตรการฝึกอบรมทันตแพทย์เฉพาะทางระดับวุฒิบัตร
สาขาศัลยศาสตร์ช่องปากและแม็กซิลโลเฟเชียล จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2551 หลักสูตรประกาศนียบัตรบัณฑิตทางวิทยาศาสตร์การแพทย์คลินิก
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พ.ศ. 2548 ทันตแพทยศาสตรบัณฑิต ปริญญาตรี จุฬาลงกรณ์มหาวิทยาลัย

ประสบการณ์ทำงาน

พ.ศ. 2555 - ปัจจุบัน อาจารย์ประจำ ภาควิชาศัลยศาสตร์
คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2554 อาจารย์พิเศษ ภาควิชาศัลยศาสตร์
คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2550 หัวหน้าฝ่ายทันตสาธารณสุข โรงพยาบาลชุมพลบุรี จังหวัดสุรินทร์
พ.ศ. 2548 ทันตแพทย์ โรงพยาบาลชุมพลบุรี จังหวัดสุรินทร์

ความเชี่ยวชาญและงานวิจัยที่เกี่ยวข้อง

มีความเชี่ยวชาญด้านการผ่าตัดช่องปากและแม็กซิลโลเฟเชียล การฝังรากฟันเทียม และการทำงานของลิ้น และกล้ามเนื้อช่องปาก งานวิจัยมุ่งเน้นการพัฒนาและประเมินเทคโนโลยีที่เกี่ยวข้องกับการฟื้นฟูสมรรถภาพลิ้น และกล้ามเนื้อช่องปาก ในผู้ป่วยที่มีลิ้นและกล้ามเนื้อช่องปากอ่อนแรง เช่น ผู้ป่วยภายหลังการผ่าตัดและผู้สูงอายุ

บทความวารสารวิชาการ

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Faculty of Dentistry, Chulalongkorn University

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3. Janistar Lekvichittada and **Boosana Kaboosaya**. Comparison of Two Tongue Strengthening Exercises on Increasing Tongue Mobility in Healthy Young Adults: A Randomized Controlled Trial Study. RSU International Research Conference 2023 on Science and Technology. 2023. 228-235.
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5. **Boosana Kaboosaya**. Evaluation of the EffEvaluation of Topical Non-NSAID for Pain Reduction within 24 Hours after Minor Oral Surgery. IADR 2024 Southeast Asian Division Meeting (Malaysia).
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ชื่อ-นามสกุล ผู้ช่วยศาสตราจารย์ ดร.พิตติพล คันธวัฒน์
วันเดือนปี ที่เกิด 20 พฤศจิกายน พ.ศ. 2525
สัญชาติ ไทย

การศึกษา

พ.ศ. 2561 วิศวกรรมศาสตร์ ดุษฎีบัณฑิต ปริญญาเอก จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2551 วิศวกรรมศาสตร์ มหบัณฑิต ปริญญาโท จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2547 วิศวกรรมศาสตร์ บัณฑิต ปริญญาตรี จุฬาลงกรณ์มหาวิทยาลัย

ประสบการณ์ทำงาน (ทั่วไป)

พ.ศ. 2567 - ปัจจุบัน รองผู้อำนวยการศูนย์นวัตกรรมการเรียนรู้
ด้าน Teaching & Learning Tools และ Training
ศูนย์นวัตกรรมการเรียนรู้ จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2566 - ปัจจุบัน อาจารย์ระดับ A4 ภาควิชาวิศวกรรมคอมพิวเตอร์
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2563 - 2566 อาจารย์ระดับ A5 ภาควิชาวิศวกรรมคอมพิวเตอร์
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2561 - 2562 นักวิจัยหลังปริญญาเอก ภาควิชาวิศวกรรมคอมพิวเตอร์
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
พ.ศ. 2552 - 2557 ผู้จัดการโครงการ / นักวิเคราะห์ระบบ / นักวิเคราะห์ข้อมูล
บริษัท สยามกูรู จำกัด / บริษัท กูรูสแควร์ จำกัด
พ.ศ. 2549 นักวิเคราะห์ระบบ บริษัท ทู อินเทอร์เน็ต จำกัด

ประสบการณ์ทำงานด้านการบริหารโครงการ

พ.ศ. 2555 - 2556 กระทรวงพาณิชย์ ตำแหน่ง : ผู้จัดการโครงการ
ระบบ Business Intelligence สำหรับบริหารงาน “ร้านถูกใจ”
ภายใต้โครงการ “โซว์ช่วยชาติ”
พ.ศ. 2555 - 2557 บริษัท หลักทรัพย์กสิกรไทย จำกัด ตำแหน่ง : ผู้จัดการโครงการ
ระบบ Chat สำหรับสนับสนุนนักลงทุน “KS Webchat”
พ.ศ. 2554 - 2557 บริษัท หลักทรัพย์กสิกรไทย จำกัด ตำแหน่ง : ผู้จัดการโครงการ
เว็บไซต์ท่า (Website portal) และระบบบริหารจัดการเอกสารงานวิจัยและข้อมูลการ
ลงทุนเพื่อสนับสนุนนักลงทุน “KS Investor Portal”
พ.ศ. 2552 - 2555 การท่องเที่ยวแห่งประเทศไทย ตำแหน่ง : ผู้จัดการโครงการ
เว็บไซต์ท่า (Website portal) www.tourismthailand.org

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ประสบการณ์งานบริการด้านวิชาการและงานที่ปรึกษา

- พ.ศ. 2568 หัวหน้าโครงการ
โครงการกิจกรรมการพัฒนาบทเรียน E-learning สำหรับการส่งเสริมซอฟต์แวร์สาขาอาหาร ภายใต้โครงการยกระดับหนึ่งหมู่บ้าน หนึ่งเซฟอาหารไทย กองพัฒนาอุตสาหกรรมชุมชน กรมส่งเสริมอุตสาหกรรม ประจำปีงบประมาณ พ.ศ. 2568
ในนามศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย
- พ.ศ. 2567 - 2568 ผู้เชี่ยวชาญด้านการวิเคราะห์ข้อมูล
โครงการระบบโต้ตอบ AI เพื่อตอบคำถามข้อมูลด้านภาษีสำหรับกรุงเทพมหานครด้วยเทคโนโลยีโมเดลภาษาขนาดใหญ่
บริษัท กรุงเทพธนาคม จำกัด
ในนามศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย
- พ.ศ. 2565 - 2666 ผู้เชี่ยวชาญด้านการวิเคราะห์ข้อมูล
โครงการบูรณาการและวิเคราะห์ข้อมูลเชิงลึกเพื่อบริการสารสนเทศพลังงานของประเทศ
สำนักงานนโยบายและแผนพลังงาน (สนพ.) กระทรวงพลังงาน
ในนามศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย
- พ.ศ. 2563 - 2664 ผู้เชี่ยวชาญด้านการจัดการข้อมูล
โครงการพัฒนาระบบสถิติข้อมูลและตัวชี้วัดเพื่อใช้ในการบริหารราชการแผ่นดินตามยุทธศาสตร์ชาติ
สำนักงานสภาพัฒนาการเศรษฐกิจและสังคมแห่งชาติ
ในนามศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย
- พ.ศ. 2562 - 2664 ผู้เชี่ยวชาญด้านวิศวกรรมข้อมูล
โครงการการบริหารจัดการและการพัฒนาการนำข้อมูลขนาดใหญ่มาใช้ในการบริหารราชการแผ่นดินตามยุทธศาสตร์ชาติและการปฏิรูปประเทศ
สำนักงานสภาพัฒนาการเศรษฐกิจและสังคมแห่งชาติ
ในนามสถาบันการขนส่ง จุฬาลงกรณ์มหาวิทยาลัย

ความร่วมมือด้านโครงการวิจัย

- พ.ศ. 2567 - ปัจจุบัน โครงการวิจัย "Phuket Air-Front Smart City as a Business-Life Regenerative Innovation Gateway Hub for Transformation (AIR SC-BRIGHTER 2050) ภายใต้โครงการ e-ASIA Joint Research Program
- พ.ศ. 2561 - 2567 โครงการยุทธศาสตร์การขนส่งอัจฉริยะสำหรับประเทศไทย 4.0 (The Project of Smart Transport Strategy for THAILAND 4.0)
ความร่วมมือด้านการศึกษาวิจัยวิทยาศาสตร์และเทคโนโลยีเพื่อการพัฒนาที่ยั่งยืน (Science and Technology Research Partnership for Sustainable Development - SATREPS) ภายใต้การกำกับดูแลของสำนักงานความร่วมมือระหว่างประเทศของญี่ปุ่น (Japan International Cooperation Agency - JICA)

ความเชี่ยวชาญและงานวิจัยที่เกี่ยวข้อง

- Artificial Intelligence, Machine Learning, Pattern Recognition, Data Analytics, Image Recognition, Large Language Model, Software Engineering

บทความวารสารวิชาการ

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2. Payatsuporn, T., et al. (2025). Papillary thyroid carcinoma semantic segmentation using multi-scale adaptive convolutional network with dual decoders. *IEEE Access*, *13*, 17340–17353. <https://doi.org/10.1109/ACCESS.2025.3532505>
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6. Chiawchansilp, P., & **Kantavat, P.** (2023). Spam article detection on social media platform using deep learning: Enhancing content integrity and user experience. In *Proceedings of the 13th International Conference on Advances in Information Technology (IAIT '23)* (Article 5, pp. 1–6). <https://doi.org/10.1145/3628454.3628459>
7. Buachuen, W., & **Kantavat, P.** (2023). Automated stock trading system using technical analysis and deep learning models. In *Proceedings of the 13th International Conference on Advances in Information Technology (IAIT '23)* (Article 37, pp. 1–9). <https://doi.org/10.1145/3628454.3631670>
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9. Kunathananon, T., & **Kantavat, P.** (2023). Estimating stock price based on information from financial statements using long short-term memory network. In *Proceedings of the 6th International Conference on Artificial Intelligence and Big Data (ICAIBD)* (pp. 255–260). <https://doi.org/10.1109/ICAIBD57115.2023.10206328>

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11. Kasempakdeepong, P., Ponchaiyaprupek, P., Viriyothai, P., Songchumrong, A., **Kantavat, P.**, & Pungprasertying, P. (2022). Sugarcane classification for on-site assessment using computer vision. In *Proceedings of the 17th International Joint Symposium on Artificial Intelligence and Natural Language Processing (iSAI-NLP)* (pp. 1–6). <https://doi.org/10.1109/iSAI-NLP56921.2022.9960252>
12. Thitisiriwech, K., Panboonyuen, T., **Kantavat, P.**, Iwahori, Y., & Kijirikul, B. (2022). The Bangkok Urbanscapes dataset for semantic urban scene understanding using enhanced encoder-decoder with atrous depthwise separable A1 convolutional neural networks. *IEEE Access*. <https://doi.org/10.1109/ACCESS.2022.3176712>
13. Wongsitthiphaithun, N., & Vatanawood, W. (2022). Transforming YAWL workflows with time interval constraints into timed automata. In *Proceedings of the 19th International Joint Conference on Computer Science and Software Engineering (JCSSE)* (pp. 1–6). <https://doi.org/10.1109/JCSSE54890.2022.9836308>
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Oral Presentation for Student Research

OR-BS01

Beyond Neutrophils: Cathepsin C deficiency drives epithelial barrier disruption and pro-inflammatory reprogramming in aggressive periodontitis

Buranajanyakul S*, Sriwattanapong K¹, Pornaveetus T¹

¹Center of Excellence in Precision Medicine and Digital Health, Department of Physiology,
Faculty of Dentistry, Chulalongkorn University

Objective Rapid tissue destruction in Aggressive Periodontitis and Papillon–Lefèvre syndrome (PLS) has traditionally been attributed solely to neutrophil dysfunction arising from CTSC (Cathepsin C) deficiency. Yet, the role of the gingival epithelium, the primary barrier against infection, remains largely unexplored. This study moves beyond the neutrophil-centric view to investigate how CTSC deficiency fundamentally disrupts oral keratinocyte homeostasis and drives a pro-inflammatory microenvironment.

Material and methods We established a model of CTSC insufficiency using lentiviral shRNA transduction in human oral keratinocytes (HOK-16B). We integrated functional cellular assays with Western blotting, immune-associated protein analysis, RT-qPCR, and comprehensive RNA sequencing to map the transcriptomic and phenotypic consequences of CTSC loss.

Results CTSC knockdown resulted in the significant upregulation of antimicrobial and proteolytic markers (LL-37, SLPI, NE), indicating a disruption in intracellular processing. Functionally, CTSC-deficient cells exhibited a “barrier breach” profile: markedly reduced proliferation coupled with heightened apoptosis. Crucially, these cells entered a hyper-inflammatory state, autonomously upregulating key proteases (NE, SLPI) and the antimicrobial peptide LL-37. Transcriptomic profiling revealed a global reprogramming of immune-related processes, specifically those driving neutrophil recruitment. This was confirmed by the elevated expression of osteolytic and pro-inflammatory cytokines (*IL6*, *IL8*, *TNF*) and activation of the TGF β and NF κ B signaling axes, establishing a molecular link between epithelial dysfunction and periodontal bone loss.

Conclusion Our data demonstrates that CTSC is essential for maintaining the anti-inflammatory phenotype of the oral epithelium. Deficiency leads to a dual defect: loss of barrier integrity via apoptosis and the active promotion of inflammation. This suggests that the aggressive periodontitis is driven by a synergistic failure of both the neutrophil response and the epithelial barrier.

Ethical protocol (HREC-DCU2025-041) Supported by Dental Research Fund, Dental Research Project 3200502#2/2025, Faculty of Dentistry, Chulalongkorn University

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Taurine enhances osteogenic differentiation markers in mesenchymal stem cells derived from osteogenesis imperfecta patients

Janjaruporn T*, Thukkahit P, Somkana S, Intarak N¹, Porntaveetus T¹

¹Center of Excellence in Precision Medicine and Digital Health, Department of Physiology, Faculty of Dentistry, Chulalongkorn University

Objective To investigate the effect of taurine supplementation on the osteogenic differentiation capacity of Mesenchymal Stem Cells (MSCs) isolated from patients with Osteogenesis Imperfecta (OI).

Material and methods Mesenchymal stem cells (MSCs) were isolated from femur and tibia samples of OI patients, and healthy controls were characterized. Baseline intracellular taurine levels were measured using a colorimetric taurine assay. The effect of taurine on cell proliferation was assessed using an MTT assay. Osteogenic differentiation was induced with or without taurine supplementation. Assessment methods included Alkaline Phosphatase (ALP) activity assays, qRT-PCR for osteogenic markers and the taurine transporter (TAUT), and histological staining (Alizarin Red and Aniline Blue) for matrix mineralization and collagen.

Results Analysis showed no significant difference in basal intracellular taurine levels or cell proliferation between OI and healthy MSCs. However, in the presence of taurine, ALP activity was significantly increased, correlating with upregulated ALP mRNA expression. While COL1A1 gene expression was significantly upregulated by taurine, Aniline Blue staining did not show a corresponding increase in total collagen protein at the study's endpoint. Notably, OI-derived cells exhibited significantly higher TAUT expression than controls at Day 3 of induction, suggesting a specific requirement for taurine during the initial phase of osteogenesis.

Conclusion Taurine supplementation enhances specific osteogenic parameters in OI-derived MSCs, particularly ALP activity and early osteogenic gene expression. The distinct expression pattern of TAUT implies that taurine plays a vital role in the early initiation of bone formation, suggesting its potential utility in OI management.

Ethical protocol (HREC-DCU 2025-073) Supported by Dental Research Fund, Dental Research Project 3200502#5/2025, Faculty of Dentistry, Chulalongkorn University

The synthesis method for fluorapatite particles

Phrukkanon P*, Vacharaksa A¹

¹Department of Microbiology, Faculty of Dentistry, Chulalongkorn University

Objective The effectiveness of fluorapatite in alleviating dentin hypersensitivity is strongly influenced by its particle size and morphology, underscoring the need for synthesis protocols that enable precise control over these parameters for optimal dental application. This study aims to synthesize fluorapatite via an EDTA- and CTAB-assisted hydrothermal process and determine how additives, pH, precursor concentration, and reaction time influence particle morphology from nano- to micro-scale.

Material and methods Fluorapatite was synthesized using calcium nitrate tetrahydrate ($\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$), diammonium hydrogen phosphate ($(\text{NH}_4)_2\text{HPO}_4$), and ammonium fluoride (NH_4F) as precursors, maintaining a stoichiometric Ca/P molar ratio of 1.67 and P/F ratio of 3:1. Ethylenediaminetetraacetic acid disodium salt dihydrate (EDTA, chelating additive), and hexadecyltrimethylammonium bromide (CTAB, cationic surfactant) were used to modulate nucleation and crystal growth. Hydrothermal treatment was conducted at 160 °C for 1 to 8 hours under pH conditions between 6.0 and 9.0 with Ca^{2+} precursor concentration ranging from 0.1 to 0.4 M. Products were characterized by using X-ray diffraction (XRD), scanning electron microscopy (SEM) with energy-dispersive X-ray spectroscopy (EDS), and Fourier-transform infrared spectroscopy (FTIR).

Results XRD patterns from all groups (surfactant-free, CTAB, EDTA, and CTAB/EDTA) showed an apatite-type phase, with small differences in peak width and intensity between conditions. FTIR showed phosphate bands and indicated minimal residual organics after washing, while SEM–EDS detected Ca/P ratios close to 1.67 with fluoride present in the samples. SEM showed that rod size changed with synthesis conditions. The CTAB/EDTA screening sample formed larger micro-rods (10–30 μm), whereas the optimized condition (pH 6, 2 h, 0.4 M) produced more uniform rods around ~4 μm long and ~1 μm thick. Within the CTAB/EDTA system, pH 6 promoted stronger anisotropic growth with clearer hexagonal prisms than pH 9, consistent with the sharper XRD peaks. At pH 6, morphology evolved from axial elongation to radial thickening with time; therefore, 2 h was selected as a practical baseline for precursor-concentration tuning, and 0.4 M was identified as the optimal concentration that yielded uniform fluorapatite architectures.

Conclusion Fluorapatite morphology can be optimized from nanoscale rod-like structure to microscale rods by controlling the additive system and hydrothermal environment, offering a reproducible protocol optimization for specific dental applications.

Ethical protocol (HREC-DCU 2025-177) Supported by Dental Research Fund, Dental Research Project 3200502#13/2025, Faculty of Dentistry, Chulalongkorn University

**Effects of early immature durian and early immature pomelo crude extracts
on cellular responses of human dental pulp stem cells**

Chaowanawat P*, Voravanichdilok K, Thongthai P¹, Namangkalakul W²

¹Department of Operative Dentistry and Smart Innovations for Preventive and Restorative Dentistry Research Group,

²Department of Anatomy and Center of Excellence for Dental Stem Cell Biology,
Faculty of Dentistry, Chulalongkorn University

Objective Early immature durian extract (ED) contains procyanidins, potent plant-derived antioxidants that exert antioxidative, antibacterial, and anti-inflammatory effects. Early immature pomelo extract (EP) contains naringin and pectin, bioactive compounds with antioxidant, anti-inflammatory, and anti-apoptotic properties. Pectin can be hydrolysed into pectin oligosaccharides (POS), which exhibit enhanced biological activities, including stronger antioxidant capacity, promotion of cell proliferation compared to native pectin. This study aims to investigate the effects of crude extracts from ED and EP on cell proliferation and differentiation of human dental pulp stem cells (hDPSCs) *in vitro*.

Material and methods hDPSCs were isolated from third molars and characterised for mesenchymal stem cell (MSC) markers. The freeze-dried ED and EPs (pectin and POS) powders were dissolved in sterile distilled water to prepare stock solution. hDPSCs were cultured with either ED or EPs solution at various concentrations. The antibacterial activity and biofilm viability test against *Streptococcus mutans* were investigated by broth dilution and *in vitro* biofilm formation, respectively. Cell viability and proliferation were assessed using an MTT assay. Colony-forming unit (CFU) and cell migration were examined by crystal violet staining and scratch wound assay, respectively. Osteogenic differentiation and mineralisation were assessed by Alizarin Red S staining and osteogenic-related gene expression using RT-qPCR. All statistical analyses were evaluated at $p < 0.05$.

Results The isolated hDPSCs exhibited spindle-shaped morphology and expressed MSC surface marker characteristics. Only ED revealed anti-microbial activity against *S. mutans* (NTCT10449) in a dose-dependent manner and inhibited biofilm formation on bovine tooth discs. ED concentrations higher than 0.625 mg/mL exhibited cytotoxic effects, whereas pectin and POS at concentration ≤ 5 mg/mL did not show cytotoxicity. The cell proliferation and CFU formation ability of hDPSC did not change after ED and EPs treatment. ED inhibited cell migration, whereas lower concentrations of pectin and POS showed a trend toward enhancing migration of hDPSCs at 48 hours.

Conclusion These findings suggest that crude extracts of ED and EPs have potential for further study and development as the alternative natural biomaterials for promoting dentin–pulp complex regeneration, antibacterial activity, and dentin remineralisation.

Ethical protocol (HRDC-DCU 2025-057) Supported by Dental Research Fund, Dental Research Project 3200502#16/2023, Faculty of Dentistry, Chulalongkorn University

OR-BS05

Development and *in vitro* evaluation of a novel herbal oral spray for oral pathogen control

Kitti-udom N*, Limsakul L, Lertsuwanroj W, Sutthiboonyapan P¹, Matangkasombut O², Sangpitak M²,
Chanvorachote P³, Wiriyaakijja P⁴

¹Department of Periodontology, ²Department of Microbiology, ⁴Department of Oral Medicine,
Faculty of Dentistry, Chulalongkorn University

³Department of Pharmacology and Physiology, Faculty of Pharmaceutical Sciences, Chulalongkorn University

Objective This study aimed to evaluate the antibacterial efficacy of formulated herbal extracts against oral pathogenic bacteria, to assess their effects on selected commensal oral streptococci, and to identify the optimal extract concentration that provides maximal inhibitory activity against *Streptococcus mutans* and *Aggregatibacter actinomycetemcomitans*.

Material and methods Eleven herbal extract mixtures (F1-F11), consisting of peppermint oil, emblica extract, and perilla extract at varying concentrations, were formulated. Antibacterial activity was evaluated *in vitro* against *S. gordonii* (DMST20560), *S. sanguinis* (ATCC10556), *S. mutans* (UA159), and *A. actinomycetemcomitans* (ATCC29522). Based on preliminary screening, five formulations (F1, F2, F3, F5, and F6) were selected for further analysis. Bactericidal efficacy against *S. mutans* was assessed using a spread plate assay with glass beads at concentrations of 0.5, 0.25, and 0.125 g/mL across four independent experimental rounds. Antibacterial activity against *A. actinomycetemcomitans* was evaluated using the same method across two experimental rounds. Colony-forming units (CFUs) were enumerated to quantify bacterial inhibition.

Results All tested formulations exhibited complete bactericidal activity against *A. actinomycetemcomitans* and commensal streptococci at the evaluated concentrations. Against *S. mutans*, all selected formulations achieved complete inhibition at 0.5 g/mL, while antibacterial efficacy varied at lower concentrations. Among the tested formulations, F1 and F5 demonstrated the most consistent reduction in CFUs across concentrations, whereas F3 showed the weakest activity, with substantial bacterial regrowth observed. Formulations containing higher relative proportions of peppermint oil consistently exhibited greater antibacterial efficacy against *S. mutans*.

Conclusion Formulations F1 and F5 demonstrated the greatest antibacterial activity against *S. mutans*, while all formulations showed complete activity against *A. actinomycetemcomitans*. Peppermint oil appeared to be the primary contributor to antibacterial efficacy, supporting the potential of balanced herbal formulations for further development and optimization toward microbiome-friendly formulations.

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***Candida* aided *Streptococcus mutans* in overcoming the inhibitory effects
of early colonizing streptococci**

Sujipinyo T*, Wongyangprasert P, Thanyasrisung P¹, and Matangkasombut O¹

¹Department of Microbiology, Faculty of Dentistry, Chulalongkorn University

Objective Since early colonizing streptococci could inhibit *Streptococcus mutans* growth through hydrogen peroxide (H₂O₂) production while *Candida* species enhance *S. mutans* biofilm formation and cariogenicity, especially in the presence of sucrose, we aimed to examine whether *Candida albicans* or *C. tropicalis* could facilitate *S. mutans* to survive the inhibitory effects of early colonizers, and to evaluate the effect of sucrose on H₂O₂ production and these interspecies interactions.

Material and methods To evaluate whether *C. albicans* (SC5314) or *C. tropicalis* (ATCC750) could facilitate *S. mutans* (UA159) growth in the presence of early colonizers, log-phase culture each early colonizer (*S. sanguinis*, *S. oralis*, *S. gordonii*, and *S. mitis*) (10 µL) was pre-spotted and incubated for 24 hours onto Brain-heart-infusion (BHI) agar with glucose or sucrose. Then, 10 µL of *S. mutans* monoculture and dual-species co-culture at 1:100 ratio of *Candida spp*: *S. mutans* were spotted adjacent to the early colonizer spots, and the inhibition zones were measured after 24-hour incubation. To assess H₂O₂ production, ten microliters of each early colonizer culture were spotted onto Prussian blue indicator-agar with and without glucose or sucrose and the blue zones were measured. All assays were performed in triplicates.

Results Early colonizing streptococci inhibited *S. mutans* growth to different degrees, with *S. mitis* showing the highest level of inhibition. Interestingly, co-culturing *S. mutans* with *C. albicans* or with *C. tropicalis* attenuated this inhibitory effect. The levels of *S. mutans* inhibition of early colonizers correlate with the degrees of H₂O₂ production. In addition, the presence of sucrose reduced H₂O₂ production by early colonizing streptococci compared with glucose.

Conclusion *Candida albicans* and *C. tropicalis* enabled *S. mutans* to evade the H₂O₂-mediated inhibition by early colonizing streptococci. The addition of sucrose further modulates these inter-species interactions by suppressing H₂O₂ production of early colonizers. These findings suggest that both fungal co-colonization and sucrose may promote *S. mutans* establishment.

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OR-CN01

The effectiveness of a novel lip product containing *Caulerpa Lentillifera* extract for reducing lip hyperpigmentation

Ongkosit P*, Lertwatthiphong W, Wiriyakijja P¹, Sutthiboonyapan P²

¹Department of Oral Medicine, ²Department of Periodontology, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the effectiveness of a lip product containing *Caulerpa lentillifera* extract on lip hyperpigmentation and overall lip condition using objective clinical assessments and participant-reported outcomes.

Material and methods This prospective, single-arm interventional study enrolled Thai adults aged 18–60 years with concerns regarding darkened lips. Participants applied the lip product containing *Caulerpa lentillifera* extract twice daily for 7 days. Objective assessments were performed at baseline (day 0) and day 7 using the Antera 3D® imaging to evaluate texture, wrinkle parameters, melanin index, and haemoglobin index. Standardized clinical photographs were obtained using a digital camera and the FotoFinder® system. Participant-reported outcomes assessing perceived lip darkness and dryness, using a numerical rating scale (0–10), were collected on day 0, day 1, and day 7. Product satisfaction was evaluated on day 7 and reported as a frequency and percentage. Statistical analyses were performed using paired T-test, with a *p*-value <0.05 considered statistically significant. Data were analyzed using the SPSS Statistics.

Results Thirty-five participants completed the study. Significant improvements were observed in lip texture, wrinkle parameters, and haemoglobin index after 7 days of product use (*p* < 0.05), whereas no statistically significant change in melanin index was detected. Participant-reported outcomes demonstrated significant improvements in perceived lip darkness and dryness from baseline to day 7 (*p* < 0.05). High overall product satisfaction and favorable participant acceptance were reported.

Conclusion Short-term use of a lip product containing *Caulerpa lentillifera* extract was associated with improvements in lip surface characteristics and participant-perceived lip appearance, despite no measurable change in melanin levels.

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**Remineralization capability of eggshell-extracted hydroxyapatite toothpaste
on artificial enamel carious lesion**

Gulpanich M*, Soontanon P, Limlawan P¹, Songvejkasem M²

¹Department of Oral Medicine, ²Department of Pediatric Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective To synthesize hydroxyapatite particles from eggshell and characterize their morphology, structural and chemical properties, to compare eggshell-derived hydroxyapatite toothpaste remineralizing properties to standard HA toothpaste and fluoride toothpaste.

Material and method Hydroxyapatite (HA) was synthesized from eggshell-derived CaO via wet chemical precipitation and characterized by XRD, FT-IR, and SEM-EDS. Forty-four upper premolars were used. All specimens were ruled out from caries, white spot lesions, developmental anomalies, cracks or any NCCLs. The buccal sides of all specimens were sectioned to obtain 3x4x6 mm enamel slab. Baseline hardness evaluation with Knoop hardness was performed. The indentation load is 100g for 15 seconds lodging time. All specimens were prepared and demineralized (pH 5.1) to induce artificial caries before second hardness evaluation. Specimens (n=10 per group) underwent a 7-day pH-cycling protocol comparing four treatments: 10% eggshell-derived HA toothpaste, 1450 ppm F toothpaste, standard HA toothpaste (CU NHA toothpaste: imported nano HA + 1450 ppm F), and deionized water (control). Remineralization efficacy was evaluated via percentage hardness recovery (%HR) and SEM surface analysis. Data were analyzed by ANOVA with the post hoc Tukey multiple comparison test. All statistical analyses were performed using SPSS statistics.

Results Significant differences in %HR were observed between the deionized water (control) group and the three experimental groups. However, no statistically significant differences ($p > 0.05$) were found in remineralization properties among the 10% eggshell-derived HA, 1450-ppm fluoride toothpaste, and standard HA toothpaste groups. SEM images revealed a distinct enamel rod pattern in the control group, whereas this pattern was less pronounced in Groups 2 and 3. In Group 4, HA particles were observed on the enamel surface

Conclusion Eggshell-derived hydroxyapatite was successfully synthesized and formulated into toothpaste, showing no significant difference in performance compared to conventional hydroxyapatite and fluoride toothpastes. This indicates its potential as a sustainable alternative for oral care applications.

Ethical protocol (HRE-DCU-2025-110) Supported by Dental Research Fund, Dental Research Project 3200502#30/2023, Faculty of Dentistry, Chulalongkorn University

OR-CN03

A comparative analysis of irrigation techniques for improving cleaning efficiency in isthmus constructions

Borvornwattananont K*, Srirattanapong N, Sinsareekul C¹, Chivatxaranukul P¹

¹Department of Operative Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective To compare the effectiveness of various irrigation techniques in enhancing the cleaning efficiency of root canal model with isthmus.

Material and methods A 3D-resin models with 2 types of isthmus morphology were constructed using a micro-CT-scanned permanent mandibular first molar as a reference. Two types of isthmus included type I, and type III, based on Fan's classification. One empty model from each group was scanned using micro-CT to serve as a baseline reference. A hydrogel-based artificial biofilm mixture containing potassium iodide as a radiographic contrast agent, was added into the canals. Standardized photographs of hydrogel-filled models were taken to confirm comparable baseline hydrogel volumes among the groups. Then, each type of model was allocated into three groups based on irrigation techniques (n = 10 for each group): conventional needle irrigation (NI) using a 27-G needle, sonic activated irrigation (EDDY), and laser-activated irrigation (LAI: 2940 nm Er:YAG-laser, 15 Hz, 20 mJ/pulse, SWEEPS, tip at the canal entrance). Subsequently, the models were scanned using a micro-CT device. Baseline and post-irrigation micro-CT images were reconstructed into cross-sectional slices using a CT analyzer program. The volume of remaining hydrogel within the root canal system was then calculated. The Kruskal-Wallis H test and Dunn test with Bonferroni adjustment were performed to compare the reduction percentage of hydrogel between groups ($p \leq 0.05$).

Results In both type of isthmus, the LAI group showed the highest hydrogel removal efficacy, followed by the EDDY group. While the NI group had the largest volume of remaining hydrogel. There was a significant difference ($p < 0.05$) in the NI group compared to the EDDY and LAI groups.

Conclusion Complex anatomical structures of a root canal system, including isthmuses, influenced the cleaning efficacy. LAI and EDDY enhanced the cleaning performance in the isthmus area compared to NI.

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OR-CN04

Effects of different storage conditions on dimensional stability, and physical properties of conventional, milled, and 3D-printed denture bases

Chakawannorasing P*, Limpuangthip N¹, Lee JH²

¹Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

²Department of Prosthodontics and Dental Research Institute, Seoul National University School of Dentistry

Objective To evaluate the effect of dry and wet storage conditions on dimensional stability of milled and three-dimensional (3D) printed compared with heat-polymerized denture base materials. In addition, flexural strength and hardness were assessed.

Material and methods Three denture base materials (milled, 3D-printed, and heat-polymerized) were fabricated as 2-mm-thick baseplates for dimensional stability assessment and as rectangular specimens for flexural strength and Vickers hardness testing. Specimens were stored under dry or wet conditions at 25 °C in the dark. Dimensional stability was evaluated using 3D analysis software by calculating roots mean square (RMS) deviation at baseline, 2 weeks, 1 month, 2 months, and 3 months after storage. Flexural strength and Vickers hardness were assessed at baseline and after 3 months.

Results No significant RMS changes occurred after 2 months. At 3 months, wet storage produced higher RMS deviation than dry storage in 3D printed and milled materials, with 3D printed material showing the greatest deviation. Flexural strength decreased in 3D printed material after dry storage and in both 3D printed and milled materials after wet storage. Hardness increased in 3D printed material after dry storage but decreased after wet storage; heat-polymerized material showed reduced hardness only after wet storage, while milled material remained unchanged.

Conclusion Wet storage caused greater dimensional changes than dry storage in 3D-printed and milled materials. Both storage conditions reduced flexural strength in 3D-printed materials, with a greater reduction under wet conditions, while in milled dentures only wet storage caused a reduction. For hardness, dry storage increased and wet storage decreased hardness in 3D-printed materials; heat-polymerized material showed reduced hardness only after wet storage, and milled material showed no change.

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OR-CN05

Protective effects of radiation shields on the physical properties of tooth structure during radiotherapy

Buabucha N*, Nantanapiboon D¹, Prawatvatchara W²

¹Department of Operative Dentistry, ²Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate and compare the protective effectiveness of radiation shields made from different materials and fabrication techniques in preserving the physical properties of teeth during radiotherapy.

Material and methods Sixty sound maxillary premolar teeth extracted for orthodontic purposes were disinfected and placed in models imitating half of a dental arch. The specimens were randomly allocated into five groups: non-covered, covered with shields of 5 mm thickness fabricated using conventional polymethylmethacrylate (PMMA), milled PMMA, 3D-printed resin, and putty-type polyvinyl siloxane shield. Fractionated radiotherapy was administered at 2 Gy per fraction, five days per week, for a total of 35 fractions, yielding a cumulative dose of 70 Gy. Microhardness was assessed using a Knoop microhardness tester, and the data were analyzed using Shapiro-Wilk test for normality, one-way repeated-measures analysis of variance (ANOVA) and Tukey's HSD test ($\alpha = 0.05$).

Results Following radiotherapy, the unshielded specimens showed lower microhardness values compared to shielded specimens. Specimens covered by milled PMMA shield did not show a statistically significant change in microhardness, whereas the putty-type polyvinyl siloxane group demonstrated a significant difference in microhardness when compared to the unshielded group.

Conclusion Radiotherapy lowers the microhardness of teeth. Radiation shields limited this effect, with putty-type polyvinylsiloxane shield of 5 mm thickness providing superior protection compared to other materials.

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**Effect of type and thickness of radioprotective spacer materials
on the attenuation of ionizing radiation in radiotherapy**

Tantiniramai T*, Apasrawirote T, Nantanapiboon D¹, Prawatvatchara W²

¹Department of Operative Dentistry,²Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the radiation attenuation properties of four dental materials—resin composite (RC), ceramic-reinforced composite resin (CC), polymethyl methacrylate (PMMA), and putty-type polyvinyl siloxane (P-PVS)—at 5- and 10-mm different thicknesses following exposure to fractionated ionizing radiation.

Material and methods All specimens were fabricated with standardized dimensions (75 × 100 mm) and thicknesses of 5- and 10-mm. Restorative materials (RC, CC, and PMMA) were designed using EXOCAD and fabricated via a 3D-printing system (SprintRay), whereas impression material (P-PVS) was prepared using plastic molds by a single operator. Radiation dose was measured using a calibrated ionization chamber positioned beneath the specimens in a solid water phantom. Specimens were exposed to 6-MV X-rays with a 6 × 20 mm² field size, delivering 1 Gy per fraction for 15 fractions. Radiation attenuation was assessed based on the remaining transmitted dose. Statistical analysis included the Shapiro–Wilk test for normality, followed by two-way ANOVA and Games–Howell post hoc tests ($\alpha = 0.05$).

Results Radiation attenuation was significantly influenced by both material type and thickness ($p < 0.01$), with a significant interaction between these factors. At a thickness of 5 mm, most materials exhibited attenuation comparable to the control, except for putty-type PVS, which demonstrated significantly greater attenuation ($p < 0.01$). Increasing the thickness to 10 mm resulted in a significant reduction in transmitted radiation dose for all materials compared with the 5-mm specimens ($p < 0.01$). Among the materials evaluated, putty-type PVS showed the highest radiation attenuation, followed by ceramic-reinforced composite resin.

Conclusion Radiation attenuation during external beam radiotherapy is influenced by both material type and thickness. Increasing spacer thickness to 10 mm significantly enhances dose reduction across all materials. Putty-type PVS demonstrated the highest attenuation and appears to be a promising material for radioprotective dental spacers in head and neck cancer patients.

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OR-MC01

Effect of ionized radiation on the color stability of resin infiltration technique: an *in vitro* study

Pintola P*, Prawatvatchara W¹, Nantanapiboon D²

¹Department of Prosthodontic, ²Department of Operative Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective The esthetic outcome of resin infiltration is highly dependent on its color stability. However, there is still limited evidence regarding the effect of ionizing radiation on the color of resin-infiltrated enamel, particularly in patients undergoing radiotherapy for head and neck cancers. This experimental study aims to examine the impact of ionizing radiation on the color stability of resin-infiltrated enamel. The results will help evaluate whether resin infiltration could be a suitable esthetic alternative treatment for white spot lesions in head and neck cancer patients preparing for radiation therapy.

Material and methods One hundred bovine enamel specimens with artificial white spot lesions were prepared and treated using resin infiltration technique. Baseline color values were recorded using a HunterLab UltraScan Pro spectrophotometer under standardized conditions. The specimens were randomly divided into two groups (n = 50). The control group was stored in artificial saliva, while the experimental group was subjected to ionizing radiation with a total dose of 70 Gy, fractionated into 2 Gy per day over 35 days. After the experimental period, color measurements were repeated for all specimens. Color changes were calculated using the CIEDE2000 formula (ΔE_{00}), and the ΔE_{00} values between the two groups were statistically compared.

Results The irradiated group exhibited significantly greater color changes than the control group ($p < 0.05$). The ΔE_{00} values in the radiation group exceeded the threshold for clinical perceptibility, whereas the control group demonstrated minimal color alteration. The discoloration in the irradiated specimens was primarily associated with a reduction in lightness (L^*) and shifts in chromatic parameters.

Conclusion Ionizing radiation compromises the color stability of resin-infiltrated enamel. These findings suggest that the esthetic outcome of resin infiltration may be adversely affected following radiotherapy. Clinicians should take the potential risk of discoloration into consideration when planning minimally invasive esthetic treatments for patients receiving head and neck radiation therapy.

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OR-MC02

Comparison of stress and displacement distributions in a 3D human craniofacial bone model influenced by various Double-Axis Maxillary Skeletal Expander (DAMSE) designs: A Finite Element Analysis (FEA) study

Kobkuerkul P*, Choetkiattikul P*, Na Lampang S, Dhammayarnnarangsi P, Limjeerajarus CN¹, and Limjeerajarus N²

¹Department of Physiology, ²Office of Academic affairs, Faculty of Dentistry, Chulalongkorn University

Objective To determine the stress and displacement of the maxilla and palatine bones resulting from different Double-Axis Maxillary Skeletal Expander (DAMSE) designs using finite element analysis (FEA), and to compare their expansion efficiency and asymmetry against a conventional single-axis MSE.

Material and methods A realistic 3D maxillary craniofacial model was developed from the cone-beam computed tomography (CBCT) dataset of an adolescent patient. This model was integrated with various designs of single-axis MSE and DAMSE (featuring varying screw pitches) using ANSYS SpaceClaim software. Stress and displacement of the maxilla and palatine bones at early activation were analyzed using FEA. Comparison was performed based on expansion efficiency, Asymmetry Index (AI), and Root Mean Square Asymmetry (RMSA).

Results The DAMSE design with unequal expander screw pitch demonstrated the highest stress and displacement distributions, resulting in the highest expansion efficiency (41.1%), which was 10.5% superior to the conventional single-axis MSE (37.2%). However, this increased efficiency was associated with slightly higher asymmetric expansion. The DAMSE exhibited a marginally greater RMSA (8.147 μm) compared to the single-axis MSE (RMSA: 7.263 μm).

Conclusion With proper design optimization, DAMSE is a promising tool for maxillary expansion. It offers significantly greater expansion efficiency while maintaining acceptable symmetry levels. Thus, DAMSE can accelerate the expansion process while maintaining similar levels of patient comfort and invasiveness. As the first MSE capable of independently controlling anterior and posterior nasal spine expansion, DAMSE offers unique benefits for treating patients with complex maxillary transverse deficiencies, making it a valuable innovation in orthodontics and craniofacial surgery.

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OR-MC03

Psychology on dental education: how each type of Enneagram is related to the Kolb's Learning Style and the trajectory on how it will affect the undergraduate dental education

Jirajariyavej P*, Chuenjitwongsa S¹, Limpuangthip N²

¹Department of Biochemistry, ²Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Objective To identify the relationship between Enneagram types and Kolb's learning style in undergraduate dental students.

Material and methods Participants were undergraduate dental students, comprising preclinical (Years 1–3) and clinical (Years 4–6) students. Data were collected using paper-based questionnaires and included sociodemographic characteristics, year of study, personality type, and learning style. Personality types were assessed using the Thai-version Enneagram questionnaire, which classifies participants into nine personality types. Learning styles were evaluated using the Thai-translated version of Kolb's Learning Style Inventory (KLSI) version 3.1, classifying participants into four learning styles.

Results In the preclinical years, the most common personality types were The Peacemaker (29.7%) and The Enthusiast (18.8%), while The Individualist was least prevalent (3.1%). Predominant learning styles were Converging (32.8%), Assimilating (28.1%), and Accommodating (21.9%), with Diverging being least common (9.4%). The Peacemaker type showed a relatively even distribution across Converging, Assimilating, and Accommodating learning styles. The Enthusiast type was primarily associated with the Converging learning style. In the clinical years, The Peacemaker (37.8%) and The Investigator (21.6%) were the most prevalent types. The dominant learning styles were Converging (43.2%) and Accommodating (24.3%). Similar trends were found in The Peacemaker type which associated with Accommodating and Converging.

Conclusion Associations between Enneagram personality types and Kolb's learning styles were identified in some personality types. However, interpretation for less prevalent types was limited due to small sample sizes.

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**Maintaining protective thickness in double-layered sports mouthguards:
an experimental study of additive fabrication approaches**

Arayangkoon P*, Raknaisil P, Uma U¹

¹Department of Occlusion, Faculty of Dentistry, Chulalongkorn University

Objective To assess the effectiveness of different additive techniques applied before the lamination of the second sheet in maintaining the final thickness of double-layered sports mouthguards.

Material and methods Seven maxillary working casts were fabricated for each experimental group (n = 7). The first 3-mm thermoplastic sheet was heated and vacuum-pressed onto each cast. Before forming the second 3-mm sheet, different protocols were performed on the first layer. Group 1 (Control): No modification was applied. Group 2 (Puncturing): The interproximal regions of labial and buccal surfaces at the first layer were immediately punctured after forming. Group 3 (Monomer Application): Monomer was applied to the outer surface of the first layer. Group 4 (Combined Technique): Both puncturing and monomer application were carried out on the first layer. After 24 hours, thickness measurements were obtained at predetermined locations on the left and right maxillary central incisors and first molars using a digital caliper. Statistical analysis was performed with SPSS version 29.0 using one-way ANOVA followed by Tukey's post hoc comparisons.

Results Significant differences in thickness were identified at the maxillary central incisors among the four groups ($p < 0.05$). Group 4 produced the greatest thickness values, whereas Group 1 consistently exhibited the thinnest measurements across all evaluated regions, including the incisal edge and the incisal, middle, and cervical thirds of the labial surface. Relative to the control, Group 2 resulted in significant thickness increases at the middle and cervical thirds, while Group 3 significantly enhanced thickness only at the cervical third. In contrast, no statistically significant differences were observed at the first molars among the groups for any measured areas, including cusp tips, pits, and buccal surfaces ($p > 0.05$). Thickness distribution at the central incisors demonstrated comparable uniformity across all groups, with no significant variation among measurement sites.

Conclusion Applying a combined puncturing and monomer technique to the first mouthguard layer before forming the second layer effectively increased overall mouthguard thickness in the central incisors without compromising thickness uniformity. This additive approach may be integrated into laboratory fabrication workflows to improve the protective performance of sports mouthguards.

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OR-MC05

Evaluation of a chatbot using large language models for patient care after oral surgery

Wilairatanaporn N*, Trachoo V¹

¹Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University

Objective This study aimed to develop and conduct a preliminary system-level evaluation of an automated postoperative follow-up chatbot for oral surgery patients that integrates symptom summarization, complication risk stratification, and self-care recommendations. The objective was to assess the capability and reliability of large language models (LLMs) in supporting these core functions.

Material and methods A web-based postoperative symptom follow-up system was developed and accessed via a messaging platform. The system collected structured symptom inputs, classified overall postoperative complication risk into four levels (low, moderate, high, and complex), and generated corresponding patient-centered self-care recommendations using predefined rule-based clinical logic combined with retrieval-augmented generation. To enable early-stage evaluation of LLM performance, a synthetic dataset of 100 postoperative follow-up cases was generated to simulate patient-reported symptoms. One case was excluded due to processing timeout, leaving 99 cases for analysis. System outputs were evaluated using an LLM-as-a-judge framework. A Question Answer Generation scorer was applied to assess factual accuracy and detect hallucinations, while the G-Eval framework, combined with chain-of-thought reasoning, was used to support qualitative evaluation. Four metrics were assessed: faithfulness, conciseness, completeness, and helpfulness. Scores ranged from 0 to 1, with mean scores ≥ 0.7 predefined as acceptable performance.

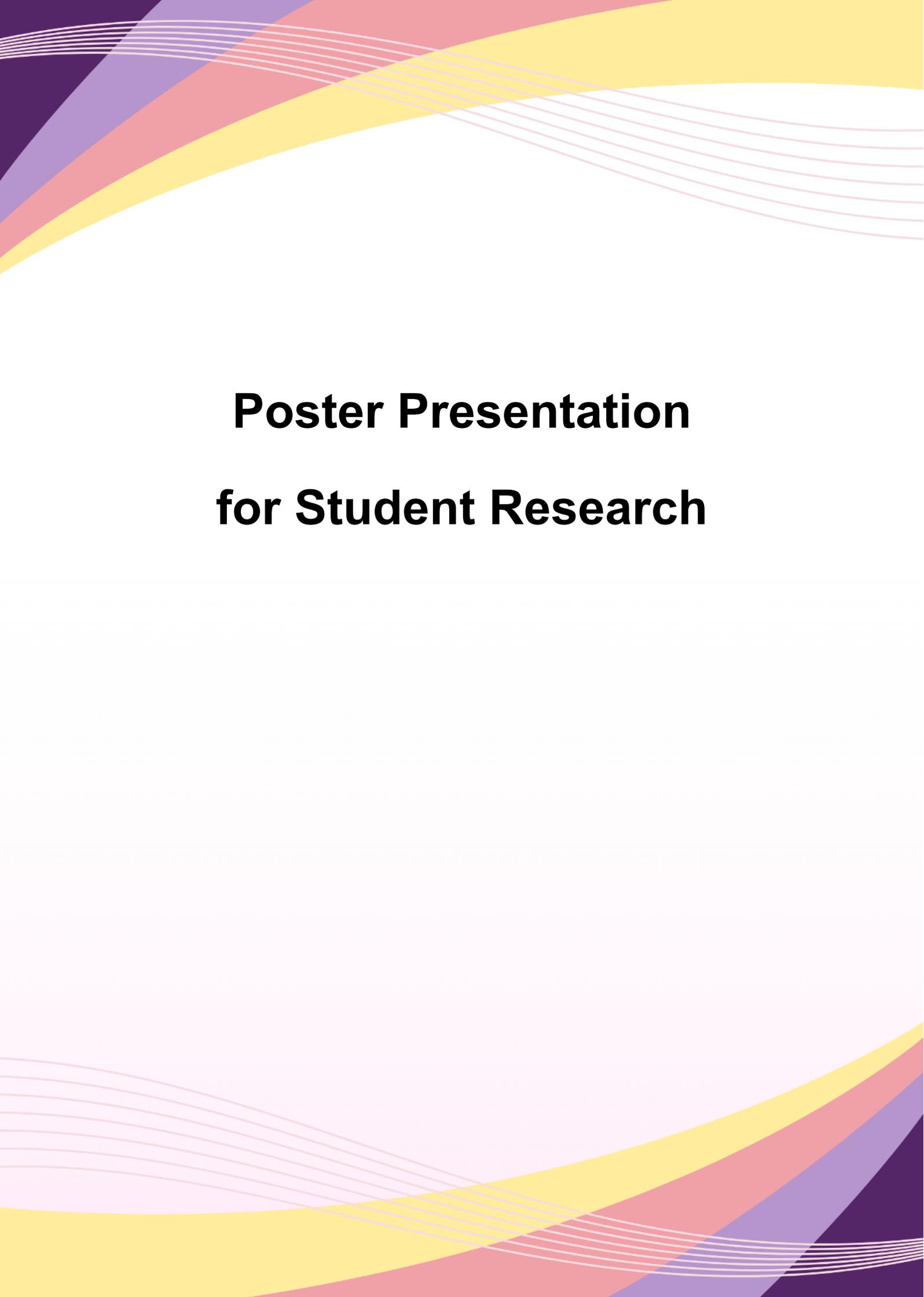
Results Of the 99 evaluable cases, 93 cases (93.9%) achieved passing scores across all evaluation metrics, with mean scores exceeding the predefined threshold. The Friedman test demonstrated significant differences among the metrics ($p < 0.001$). Completeness (mean = 0.9434) and faithfulness (mean = 0.9263) were the highest-performing dimensions and were statistically equivalent. Helpfulness followed with a mean score of 0.7828. Conciseness received the lowest mean score (0.6641), and post-hoc analysis confirmed that it was significantly lower than the other metrics. Spearman's rank correlation analysis further indicated that the evaluation metrics captured distinct and non-redundant aspects of output quality.

Conclusion The system demonstrated strong reliability in preserving clinical accuracy and completeness when generating postoperative summaries and recommendations. Lower conciseness reflects a deliberate design trade-off prioritizing clarity, clinical interpretability, and patient safety over textual brevity. These findings support the system's technical feasibility as a robust foundation for subsequent expert clinical validation and future real-world deployment to enhance postoperative monitoring efficiency and reduce healthcare provider workload.

Ethical protocol (HREC-DCU 2025-198) Supported by Dental Research Fund, Dental Research Project 3200502#50/2025, Faculty of Dentistry, Chulalongkorn University

The 38th
Research day
25th February 2026

Faculty of Dentistry, Chulalongkorn University



**Poster Presentation
for Student Research**

PO-01

Comparison of cleaning methods for thermoplastic orthodontic appliances to reduce coffee staining

Rukpongthai N*, Buthpongsakorn B, Satrawaha S¹

¹Department of Orthodontics, Faculty of Dentistry, Chulalongkorn University

Objective Thermoplastic orthodontic appliances are susceptible to discoloration from dietary chromogens such as coffee, which may compromise esthetics and patient acceptance. This study aimed to compare the effectiveness of four cleaning methods in reducing coffee-induced staining of thermoplastic orthodontic appliances.

Material and methods In this *in vitro* study, forty thermoplastic orthodontic appliance specimens (Essix® ACE) were fabricated using a thermoforming technique and immersed in coffee for 14 days. Color differences after coffee immersion (ΔE_{T1}) were measured using a spectrophotometer. Specimens were then randomly allocated to 1 of 4 cleaning protocols: (1) brushing with nonabrasive toothpaste, (2) brushing with chlorhexidine gluconate gel, (3) soaking in Polident® followed by brushing with nonabrasive toothpaste, and (4) soaking in 2.5% white vinegar followed by brushing with nonabrasive toothpaste. All brushing procedures were performed for 30 seconds using a custom-fabricated tooth brushing machine. Post cleaning color differences (ΔE_{T2}) were subsequently recorded. Data were analyzed using the Kruskal–Wallis test with Dunn’s post hoc comparisons ($\alpha = 0.05$).

Results Coffee immersion produced comparable discoloration among all groups ($\Delta E_{T1} \approx 32.50\text{--}33.73$; $p = 1.00$). The cleaning method significantly influenced stain reduction ($p < 0.05$), with Polident® soaking followed by brushing demonstrating the greatest reduction in coffee staining. Mean ΔE_{T2} values were 31.29 ± 5.04 for Polident®, 19.01 ± 4.00 for vinegar, 18.90 ± 2.90 for nonabrasive toothpaste, and 17.90 ± 5.30 for chlorhexidine gel.

Conclusions Cleaning protocols incorporating a chemical soaking step are more effective in reducing coffee-induced staining of thermoplastic orthodontic appliances. Polident® soaking followed by brushing demonstrated the greatest stain reduction, whereas brushing with toothpaste or chlorhexidine gel alone was less effective. Further research is needed to assess the long-term effects of these cleaning methods on material properties and microbial control.

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The 38th
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PO-02

Comparison of the effects of vinegar, citric acid, and citric acid with EGTA as retainer cleansers on calculus removal and retainer mechanical properties

Areeyanan Y*, Wattanasukchai P*, Soompon S¹, Issaranggun Na Ayuthaya B¹, Charoenrat T²

¹Department of Pharmacology, ²Department of Orthodontics, Faculty of Dentistry, Chulalongkorn University

Objective This study evaluated the effects of two cleansing solutions on color stability and surface roughness of orthodontic materials.

Material and methods Eighteen rectangular plastic specimens (25 × 10 × 0.8 mm³) were stained with black tea and subsequently immersed in either 5% citric acid with 3% sodium bicarbonate (NaHCO₃) or 25% vinegar to assess color stability. Surface roughness was evaluated on nine acrylic and nine plastic specimens before and after immersion in the same two solutions. Data were analyzed using paired t-tests and mixed-model ANOVA for pre- and post-immersion comparisons.

Results Both 5% citric acid/NaHCO₃ and 25% vinegar produced significant color changes after immersion, with no significant differences between the two solutions. Surface roughness of acrylic specimens remained largely unaffected, whereas plastic specimens showed a significant increase in roughness following immersion. No significant differences were observed between the two cleansing solutions in overall surface roughness.

Conclusion Citric acid/NaHCO₃ and vinegar demonstrated comparable effects, inducing measurable color changes and showing minimal impact on surface roughness of acrylic specimens.

Ethical protocol (HREC-DCU 2025-099) Supported by Dental Research Fund, Dental Research project 3200502#21/2025, Faculty of Dentistry, Chulalongkorn University

PO-03

Knowledge and attitudes regarding denture hygiene among patients at the Chulalongkorn University special dental clinic

Sukkung P*, Suphanich B*, Komin O¹

¹Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the knowledge and attitudes toward denture cleansing, as well as the denture-wearing behaviors, among patients attending the Special Dental Clinic, Faculty of Dentistry, Chulalongkorn University.

Material and methods This study recruited 48 patients from the Chulalongkorn University Special Dental Clinic (CUSDC) who were aged 60 years or older and had worn removable dentures for at least 3 months. Data were collected using a structured questionnaire and clinical examinations, including the Tongue Coating Index (TCI), the Denture Cleanliness Index (DCI), and measurement of total oral microorganisms (CFU/mL) using a bacterial counter (Panasonic Healthcare Co., Ltd., Japan). Statistical analysis was performed using SPSS software, and associations between categorical variables were assessed using the chi-square test with a significance level of $p < 0.05$.

Results Among the participants, the largest age group was 60–69 years, accounting for 41.7% of the study population, with females representing 66.7% and males 33.3%. In terms of denture type, 39.6% wore metal removable partial dentures, 29.2% wore acrylic removable partial dentures, and 18.8% wore complete dentures. One-quarter of the participants reported not having received denture hygiene instructions from dentists. Brushing combined with soaking was the most commonly reported denture cleaning method (72.9%), and 57.4% of participants did not use cleansing tablets for denture cleaning. No significant associations were observed between total oral microorganism counts and the Tongue Coating Index (TCI), use of cleansing tablets, denture cleaning frequency and the Denture Cleanliness Index (DCI), or denture hygiene behaviors and demographic characteristics ($p > 0.05$).

Conclusion Elderly denture wearers at CUSDC demonstrated generally acceptable knowledge, attitudes, and denture cleansing behaviors. However, a proportion of patients had not received denture hygiene instructions, and many did not use cleansing tablets. No significant associations were found between denture hygiene behaviors, Tongue Coating Index (TCI), Denture Cleanliness Index (DCI), total oral microorganism counts and demographic characteristics.

Ethical protocol (HRDC-2025-123) Supported by Dental Research Fund, Dental Research Project 3200502#37/2025, Faculty of Dentistry, Chulalongkorn University

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PO-04

The comparison between nanohardness of CAD/CAM hybrid materials to human enamel

Chatsuphang A*, Lohaphithak P, Piemjai M¹

¹Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Objective This study aimed to investigate the nanohardness of E-Max CAD, natural enamel, and CAD/CAM hybrid materials, and to determine the correlation between CAD/CAM material thickness and nanohardness, in order to enhance material selection for laminate veneers and improve longevity of natural enamel.

Material and methods Specimens of E-Max CAD, natural enamel, and CAD/CAM hybrid materials with two thicknesses were prepared and allocated into thermocycling and non-thermocycling groups. All specimens underwent identical preparation except for thermocycling, followed by Bruker TS77 nanohardness tester. The force-displacement curve was obtained and used to determine elastic modulus and nanohardness. The measured values were averaged and used to calculate the mean and standard deviation for each group and analyzed using One-way ANOVA, Two-way ANOVA, and post-hoc tests.

Results One-way ANOVA and factorial analyses of variance were performed to evaluate the effects of CAD/CAM material types, thickness, and thermocycling on nanohardness. Nanohardness differed significantly amongst CAD/CAM hybrid materials ($p < 0.01$). However, no significant effects of material thickness (150 and 300 μm), thermocycling, or their interaction with material type on nanohardness were detected ($p > 0.05$).

Conclusion Within the limitations of this study, differences in nanohardness were shown among the CAD/CAM hybrid materials. The nanohardness of CAD/CAM hybrid materials was not significantly influenced by variations in material thickness or thermocycling. These findings suggest that CAD/CAM hybrid materials may show stable nanohardness even at reduced thicknesses or simulated thermal aging, which support their potential application in minimally invasive restorative procedures.

Ethical protocol (HREC-DCU 2025-188) Supported by Dental Research Fund, Dental Research Project 3200502#40/2025, Faculty of Dentistry, Chulalongkorn University

**Effect of thickness and color-measurement position
of strength-gradient zirconia on masking ability over metal substructure**

Vasunant PP*, Benchasiriluck P, Angkhanawiriyarak S¹, Namano S¹,

¹Implant and Esthetic Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective Metal abutments, particularly titanium, often compromise esthetic outcomes in the anterior region due to discoloration and gingival darkening. While strength-gradient zirconia has been developed to balance flexural strength with translucency, research on its specific masking ability remains limited. The objective of this study was to evaluate whether different thicknesses of strength-gradient zirconia (0.8, 1.0, and 1.5 mm) and variations in color measurement positioning (upper, middle, lower thirds) result in perceptible or unacceptable color differences when placed over titanium substructures.

Material and methods Thirty monolithic strength-gradient zirconia specimens (IPS e.max ZirCAD Prime Esthetic, Shade A2) were milled and divided into three groups based on thickness: 0.8 mm, 1.0 mm, and 1.5 mm (n=10). Specimens were placed over titanium substructures, with composite resin (3M Easy Match Universal Restoratives) substrates serving as a control group (n=30). CIELCH color coordinates (L*, C*, H*) were measured using a digital spectrophotometer at three specific positions against a white background in a light-controlled chamber (D65 mode = daylight): upper (representing incisal), middle, and lower (representing cervical) thirds. The total color difference (ΔE^*) was calculated. Statistical analysis was performed using a two-way ANOVA and Bonferroni post hoc tests with significance set at $p < 0.05$.

Results Mean ΔE^* values ranged from 0.21–0.73 for the 0.8–1.0 mm groups and 0.29–0.54 for the 1.5 mm group across positions. Thickness effects were position-dependent: no significant thickness differences were observed at the incisal or cervical thirds ($p > 0.05$), whereas the middle third showed a significant thickness effect ($p < 0.001$), with the 1.5 mm group differing significantly from both the 0.8 and 1.0 mm groups ($p < 0.05$). Position significantly influenced ΔE^* within the 0.8 and 1.0 mm groups (incisal > middle/cervical; $p < 0.001$) and within the 1.5 mm group (incisal vs cervical; $p < 0.05$). All mean ΔE^* values remained below perceptibility and acceptability thresholds.

Conclusion Strength-gradient zirconia demonstrated clinically acceptable masking over titanium across the tested thicknesses and positions. However, ΔE^* varied significantly by measurement position and showed a localized thickness effect in the middle third, indicating that both restoration thickness and the multilayer region assessed should be considered when interpreting color outcomes and optimizing esthetics over titanium.

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**Evaluation of surface roughness and translucency
of the aging multilayered zirconia after polishing: an *in vitro* study**

Limpanichkul T*, Yamockul S¹

¹Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Objective This study aimed to evaluate the surface roughness and translucency of each layer across different types and layers of the zirconia after aging and polishing. To help consider how to enhance the properties of zirconia after aging to maintain the good properties of zirconia restoration. The objective was to investigate the effect of aging and polishing on the surface roughness and translucency of different layers of the zirconia.

Material and methods Multiphase multilayered zirconia from Cercon HT ML and Katana YML were selected for this experiment. Each specimen was 0.5 mm in width and 1.0 mm in thickness. The specimens were prepared by cutting each zirconia disc into three layers (incisal, transitional, cervical), then polished with 320, 600, 800, 1,000, 1,200, and 2,000 grit sandpaper, respectively. The artificial aging was performed by a Thermocycling unit, with 20,000 cycles in distilled water between 5 °C and 55 °C, with a dwell time of 30 seconds per bath and a transfer time of 10 seconds. Specimens were measured for their surface roughness and translucency values at baseline, after the artificial aging procedure, and after polishing with the same procedure as baseline. Statistical analysis was achieved with a two-way repeated ANOVA followed by Bonferroni correction to compare the difference in mean values between groups.

Results At the baseline, the mean surface roughness was not significantly different among the layers of the multilayered zirconia. The mean translucency values were decreased from the incisal to the transitional and cervical layers, respectively. After the aging procedure, each layer of each product might have a significant increase in the mean surface roughness and a decrease in the mean translucency value from the baseline. The Incisal layer might significantly have a lower mean surface roughness than the transitional and cervical layers, respectively. After polishing again, the mean surface roughness might have a significant decrease, and the mean translucent value roughness might have a consequential increase from the aging step and might not be significantly different from the baseline.

Conclusion The aging procedure might affect the surface roughness and the translucency of the zirconia. The 4% Yttria content layer might be more affected by aging compared to the 5% Yttria content layer. The aging procedure might also affect the translucency of all layers of the multilayered zirconia. The polishing protocol might improve the surface roughness and the translucency of the multilayered zirconia.

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Ulna bone variations in Thais compared to Greulich-Pyle and Tanner-Whitehouse references

Chettanapitakkul S*, Thinson V*, Benjavongkulchai S¹, Sinpitaksakul P¹,

¹Department of Radiology, Faculty of Dentistry, Chulalongkorn University

Objective Hand and wrist radiography is one of the most accurate technics for applied for age estimation. However, its accuracy when applied to Thai population is still questionable due to variations among the global population. Previous studies emphasized the ulna as a morphologically variable structure. To propose new developmental staging criteria for ulna bone development and to compare with existing widely accepted classification of Greulich-Pyle atlas and Tanner-Whitehouse 3 methods.

Material and methods This research included hand and wrist radiographs of 188 Thai male and 203 Thai female subjects whose age was between 8 and 18 years old and carries no systemic disease which affects bone formation. For each sample, the chronological age and the ulnar developmental stage were recorded, following the new classification criteria based on Greulich-Pyle atlas and Tanner-Whitehouse 3 methods, as well as documented abnormal variations.

Results The study revealed the developmental trend of the new classification criteria resembled Greulich-Pyle atlas and Tanner-Whitehouse 3 method to an extent. The study also showed noticeably greater correlation between the variations of nodule calcification and the development of ulna than the size of styloid process or the capping of ulna epiphysis. However, the nodule calcification seemed to positively impact the development of ulna whereas the impact trend of the styloid process and the capping of ulna epiphysis was uncertain.

Conclusion The order of the new developmental staging corresponded to the chronological age, as well as to Greulich-Pyle atlas and Tanner-Whitehouse 3 method to an extent. However, the correlation between each variation and the development of ulna is relatively unclear.

Ethical protocol (HREC-DCU 2025-074,) Supported by Dental Research Fund, Dental Research Project 3200502#4/2025, Faculty of Dentistry, Chulalongkorn University

**Relationship between tongue function, health markers, hand grip strength,
and trunk muscle endurance in dental healthcare setting**

Rattanachoksirikul M*, Booranasophone O*, Kaboosaya B¹

¹Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University

Objective To determine whether tongue function, health markers, hand grip strength, and trunk muscle endurance correlate.

Material and methods This cross-sectional study included 34 participants who were aged ≥ 18 years, had results of annual health check-up, had at least one pair of opposing upper and lower central incisors, and had no history of tongue surgery, swallowing disorders, stroke, major chronic diseases, malnutrition, or pregnancy. Tongue pressure was measured using Iowa oral Performance Instrument, and tongue movement was assessed by a clinical tongue movement examination. Body composition was evaluated using a body composition analyzer. Hand grip strength was measured using an electronic hand dynamometer, while trunk muscle endurance was assessed using lumbar trunk muscle flexor and extensor endurance test. Health markers were obtained from blood tests. Statistical analyses were performed using SPSS software, and correlations between tongue function and health-related parameters, hand grip strength, and trunk muscle endurance were analyzed using Pearson's correlation test. A *p-value* < 0.05 was considered statistically significant.

Results Tongue strength (mean = 56.03 ± 11.902 kg) demonstrated significant positive correlations with muscle mass ($r = 0.381, p = 0.026$), bone mass ($r = 0.396, p = 0.020$), left hand grip strength ($r = 0.438, p = 0.010$), and right hand grip strength ($r = 0.373, p = 0.030$). No significant correlations were observed between tongue strength and complete blood count variables, or lipid profile parameters, body mass index, fat mass, trunk muscle endurance.

Conclusion Tongue strength is positively associated with skeletal muscle mass, bone mass, and hand grip strength, suggesting that tongue function may reflect aspects of overall muscular health. However, further study should be investigated in larger sample size.

Ethical protocol (HRDC-2025-38,) Supported by Dental Research Fund, Dental Research Project 3200502#6/2025, Faculty of Dentistry, Chulalongkorn University

**Impact of chewing simulation on the surface roughness
and volume loss of restorative dental materials**

Yorwittaya K*, Boonyarattanasiri S*, Nantanapiboon D¹, Sivavong P¹

¹Department of Operative Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the effect of simulated chewing on the surface roughness and volume loss of different restorative materials.

Material and methods Thirty-two specimens were prepared and divided into four groups (n = 8): nanofilled resin composite (RC), bulk-fill resin composite (BF), glass hybrid restorative material (EQ), and bioactive composite (AC). All specimens were subjected to 120,000 and 240,000 chewing cycles using a chewing simulator. Surface roughness and volume loss were measured at baseline and after each chewing interval using a non-contact profilometer.

Results A significant interaction between material groups and chewing cycles was observed after adjusting for baseline roughness ($p < 0.05$). At 120,000 cycles, all materials exhibited increased surface roughness, with RC demonstrating the highest roughness and a significant difference compared to other groups ($p < 0.001$). Conversely, volume loss exhibited a different trend, with EQ showing the highest volume loss ($p < 0.001$), followed by RC ($p < 0.001$), while AC and BF did not show significant differences ($p > 0.05$). At 240,000 cycles, surface roughness decreased across all materials ($p < 0.05$), except BF ($p = 0.462$), and AC exhibited the lowest surface roughness ($p < 0.001$) among the groups. The volume loss data at 240,000 cycles corresponded with the results observed at 120,000 cycles.

Conclusion Chewing simulation affected the surface properties of restorative materials in a material-dependent manner. The bulk-fill resin composite maintained stable surface roughness, indicating greater resistance to surface degradation, although most of the materials revealed decreased surface roughness with constant chewing. All materials exhibited an increase in volume loss with increasing chewing cycles; however, the extent of wear varied among materials, with EQ showing the greatest volume loss, indicating variations in wear resistance under simulated chewing conditions.

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Evaluation of long-term outcome of successful SABG in Cleft Patients: A quantitative analysis of grafted alveolar bone using pre-operative orthognathic three-dimensional cone beam computed tomography compared to standard radiographic criteria

Srijakarintr T*, Akamanuwatr W*, Panya S¹

¹Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the long-term outcomes of secondary alveolar bone grafting (SABG) in cleft patients by measuring bone quantity at the grafted alveolar site using pre-operative orthognathic three-dimensional CBCT and determining whether the grafting success meets standard radiographic criteria

Material and methods This retrospective descriptive study reviewed medical records and preoperative CBCT images of patients with cleft lip and/or palate who underwent SABG followed by orthognathic surgery at the Faculty of Dentistry, Chulalongkorn University. Standardized CBCT images were used to assess long-term graft outcomes. Bone quantity was evaluated using the Bergland and Chelsea scoring systems and by quantitative measurement of the percentage of bone bridge area relative to the total cleft area using pixel-based image analysis. Cross-sectional bone bridge height and width were also measured. Statistical analysis was performed using SPSS software. Descriptive statistics were reported as mean \pm standard deviation or frequency and percentage, and group comparisons were performed using independent t-tests, Mann–Whitney U tests, or chi-square tests. A value of $p < 0.05$ was considered significant.

Results A total of 31 patients were included in the analysis. The mean percentage of bone bridge area relative to the total cleft area was $49.7 \pm 29.4\%$. The mean width and height of the cross-sectional bone bridge were 6.4 ± 4.3 mm and 9.3 ± 7.3 mm, respectively. According to radiographic criteria, 25.8% of cases were classified as successful based on both the Bergland (Type I–II) and Chelsea (Category A–C) scoring systems. No significant differences ($p \geq 0.05$) in quantitative bone measurements or graft success rates were observed when comparing age group, sex, or cleft diagnosis.

Conclusion Quantitative bone measurements obtained from pre-operative orthognathic CBCT demonstrated considerable variability despite clinically successful secondary alveolar bone grafting. Standard radiographic assessment criteria, including the Bergland and Chelsea scoring systems, did not consistently align with quantitative CBCT-based bone measurements, suggesting potential limitations of conventional radiographic criteria in reflecting long-term graft bone quantity

Ethical Protocol (HREC-DCU 2025-117) Supported by Dental Research Fund, Dental Research Project 3200502#29/2025, Faculty of Dentistry, Chulalongkorn University

Comparison of the facial soft tissue profile in esthetically acceptable profiles: a study using two-dimensional radiographic analysis versus clinical measurement techniques

Sintupanpratum P*, Roongroje S*, Kamolratanakul P¹

¹Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University

Objective To compare facial soft tissue measurements in esthetically acceptable profiles obtained using clinical measurement techniques with Thai normative values derived from two-dimensional (2D) lateral cephalometric films.

Material and methods This cross-sectional study included 50 Thai adults (25 males and 25 females) aged 18–35 years with esthetically acceptable facial profiles. Facial scans were captured using a 3D camera system and converted into standardized soft tissue profile silhouettes. Profile attractiveness was rated by four observers using a five-point scale, and only profiles with attractiveness scores ≥ 3 were enrolled to the study. Clinical measurements of upper facial height (UFH), upper lip length (ULL), and lower lip length (LLL) were obtained using dental floss and a ruler with participants in natural head position and lip repose. Measurements were independently obtained by two calibrated examiners and compared with those of an experienced faculty advisor. Inter-examiner reliability was assessed using the intraclass correlation coefficient (ICC). Given the good to excellent reliability of averaged measurements, the mean values of the two examiners were used for all subsequent analyses. Descriptive statistics were calculated, normality was assessed using the Shapiro–Wilk test, and one-sample t-tests were used to compare clinical measurements with Thai 2D normative values.

Results Inter-examiner reliability demonstrated good to excellent agreement for all parameters, with ICC values for average measures of 0.919 for UFH, 0.909 for ULL, and 0.948 for LLL. In male participants, mean UFH, ULL, and LLL values were significantly lower than the corresponding Thai 2D normative values ($p < 0.05$). In female participants, mean UFH and LLL were significantly lower than normative values ($p < 0.05$), whereas ULL did not differ significantly from the normative value ($p > 0.05$).

Conclusion In the studied sample of Thai adults with esthetically acceptable profiles, clinically obtained facial soft tissue measurements differed from currently used Thai two-dimensional cephalometric normative values. In males, upper facial height (UFH), upper lip length (ULL), and lower lip length (LLL) measured clinically were significantly shorter than the corresponding normative values. In females, upper facial height (UFH) and lower lip length (LLL) were significantly shorter than normative values, whereas upper lip length (ULL) was comparable to the normative reference. These findings indicate that facial soft tissue measurements observed in clinically acceptable esthetic profiles may differ from currently used Thai two-dimensional cephalometric norms derived from non-esthetic reference groups.

Ethical protocol (HREC-DCY 2025-120) Supported by Dental Research Fund, Dental Research Project 3200502#24/2025, Faculty of Dentistry, Chulalongkorn University

Intermittent mechanical stress enhanced mineralization in hPDL under inflammatory state

Taiwittayakorn N*, Junjaroenwongsa P, Na Nan D¹, Limjeerajarus N², Limjeerajarus C³

¹Center of Excellence in Regenerative Dentistry, ²Office of Academic affairs ³Department of Physiology,
Faculty of Dentistry, Chulalongkorn University

Objective This study aimed to identify the effect of intermittence compressive force (ICF) on estrogen expression in human periodontal ligament (hPDL) cells and determine the effect of ICF under induced inflammation in hPDL cells.

Material and methods hPDL cells were treated with Lipopolysaccharide of *Porphyromonas gingivalis* (PG-LPS) and treated with ICF 1.5 and 2.5 g/cm² in serum free medium for 24 h before osteogenic induction. The gene expression and mineralization were investigated by real time polymerase chain reaction and Alizarin Red S staining.

Results In non-treated LPS conditions the estrogen receptor (ER) on hPDL cells including ER α and ER β was down-regulated under 1.5 g/cm² of ICF. Exclusively, ICF did not alter RUNX2 expression, whereas LPS pretreatment followed by ICF downregulated RUNX2 expression. ICF upregulated ALP, DMP-1 and OSX, but these effects were abolished by LPS pretreatment. Nodule mineralization was increased by ICF at both 1.5 and 2.5 g/cm² and the effect was future enhanced after the LPS pretreatment.

Conclusion ICF, especially at the high magnitude, promotes osteogenic differentiation and mineral deposition in hPDL cells. Moreover, inflammatory conditions further enhanced bone formation-related gene expression responses to mechanical stimulation. This information supports that mechanical stimulation affected the homeostasis of periodontal tissue. Hormonal changes in menopause female may further changes the homeostasis of mechanical force-tissue remodeling in periodontal diseases.

Ethical protocol (HREC-DCU 2025-046) Supported by Dental Research Fund, Dental Research Project 3200502#26/2025, Faculty of Dentistry, Chulalongkorn University

The effect of shear stress on paracrine-mediated immunomodulation of human periodontal ligament stem cells via TGF- β 1 signaling pathway

Pavananont N*,Kujiraprasert P,Viriyasitavat P², Klincumhom N¹, Kornsutisophon C¹

¹Department of Anatomy, Faculty of Dentistry, Chulalongkorn University

²Department of Surgery, Faculty of Veterinary Science, Chulalongkorn University

Objective The paracrine-mediated immunomodulatory properties of human periodontal ligament stem cells (hPDLSCs) can be modulated by shear stress stimulation. Under these conditions, shear stress enhances the secretion of immunoregulatory factors, including TGF- β 1 and kynurenine, from hPDLSCs. However, the specific role of shear stress-induced, hPDLSC-derived TGF- β 1 in regulating T-cell behavior has not been fully elucidated. Therefore, this study aimed to investigate the influence of TGF- β 1 secreted from shear stress-stimulated hPDLSCs on T-cell behavior.

Material and methods Conditioned medium was derived from hPDLSCs subjected to shear stress stimulation (SS-CM). Activated CD4⁺ T-cells were cocultured with CM in the presence or absence of TGF- β 1 inhibitor (SB431542) for 3 days. Cellular proliferation was assessed through resazurin assay and Ki-67 mRNA expression. Regulatory T-cell (Treg) differentiation was evaluated via qPCR analysis of FOXP3 and IL-10 mRNA expression. Cytotoxicity assays were performed to ensure signaling effects were independent of apoptosis and to determine the optimal dose of the TGF- β 1 inhibitor.

Results The SS-CM markedly suppressed the proliferation of activated T cells, as evidenced by a significant downregulation of the proliferation marker Ki-67. Concurrently, SS-CM treatment induced Treg differentiation, demonstrated by the significant upregulation of FOXP3 and IL-10. In contrast, coculture with SS-CM in the presence of 4 μ M SB431542 reversed these anti-proliferative effects, leading to increased T-cell proliferation and a significant attenuation of Treg-associated marker expression compared with the control condition (SS-CM without SB431542).

Conclusion These findings demonstrate that shear stress enhances the immunosuppressive capacity of hPDLSCs through a TGF- β 1-dependent paracrine mechanism. This study underscores the importance of biomechanical cues in maintaining immune homeostasis within the periodontal microenvironment and suggests potential cell-free therapeutic strategies for modulating inflammation in regenerative dentistry.

Ethical protocol (HREC-DCU-2025-132) Supported by Dental Research Fund, Dental Research Project 3200502#31/2025, Faculty of Dentistry, Chulalongkorn University

A comparative evaluation of software tools for quantifying mitochondria morphological changes in irradiated and non-irradiated salivary gland mucoepidermoid carcinoma cells

Ruangpeerakul P*, Ferreira J¹

¹Center of Excellence and Innovation for Oral Health & Healthy Longevity,
Department of Academic Affairs, Faculty of Dentistry, Chulalongkorn University

Objective This study aims to quantify and compare the ultrastructural changes in mitochondrial morphology in salivary gland mucoepidermoid carcinoma (MEC) cells before and after radiation treatment using transmission electron microscopy and holotomography. Additionally, the study aims to evaluate the performance of open-source software tools—Fiji/ImageJ, QuPath, and CellProfiler—in characterizing these alterations.

Material and methods The human salivary gland MEC cell line A-253 was utilized for this study. Cells were cultured in DMEM/F-12 supplemented with 10% FBS and divided into a control group (0 Gy) and a single-dose irradiation group (30 Gy). Mitochondrial data were acquired through transmission electron microscopy (TEM) and Holotomography (HT). Mitochondrial parameters including mitochondrial count, area, perimeter, aspect ratio (AR), circularity, solidity and Feret's diameter were quantified using Fiji/ImageJ, QuPath and CellProfiler. Statistical significance was determined using Student's t-tests or Mann-Whitney U tests via GraphPad Prism. A *p*-value of less than 0.05 was considered significant.

Results Quantitative analysis conducted through ImageJ demonstrated that radiation exposure significantly alters mitochondrial morphology. Irradiated MEC cells exhibited a significant decrease in mean mitochondrial area ($p < 0.05$) and perimeter ($p < 0.001$), reflecting a reduction in overall mitochondrial mass and network branching. Feret's diameter, representing the maximum distance between parallel tangents of the organelle, was significantly reduced in the irradiated group ($p < 0.001$), confirming a shift from elongated tubes to shorter structures. Morphological shape descriptors revealed a transition from elongated, healthy tubular networks to fragmented states; specifically, the aspect ratio (AR) decreased significantly ($p < 0.0001$), while circularity and solidity had significant increases ($p < 0.0001$) in the irradiated group. Population analysis indicated a clear shift in mitochondrial dynamics, whereas the percentage of mitochondria in the fusion state decreased, while those in the fission state increased following 30 Gy irradiation. These findings confirm that radiation triggers an imbalance in fission-fusion dynamics, leading to the accumulation of small, spherical mitochondrial fragments.

Conclusion Exposure to 30 Gy radiation induces pronounced mitochondrial fragmentation in MEC cells, characterized by a distinct shift from complex tubular networks to isolated spherical organelles. This was demonstrated by the consistent reductions in Feret's diameter and a population shift toward fission-dominant morphology. Fiji/ImageJ successfully quantified these ultrastructural shifts, providing a robust methodological baseline for the ongoing comparative performance evaluation with QuPath and CellProfiler.

IBC protocol: (DENT CU-IBC 010/2024). Supported by Dental Research Fund, Dental Research Project 3200502#41/2023, Faculty of Dentistry, Chulalongkorn University

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Faculty of Dentistry, Chulalongkorn University

A new word recognition oral health literacy scale for dental caries and gingivitis prevention

Bodharamik P*, Bodharamik P, Pisarntrakit PP¹

¹Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective To develop an oral health literacy scale focused on dental caries and gingivitis and assess its validity and reliability among Thai adults.

Material and methods A self-administered questionnaire was used to collect data from Thai adults aged 20–59 years. Eligible participants were required to be able to read Thai, not be dentists or dental students, and have no self-reported vision or hearing impairments. The questionnaire included demographic information, a 20-item Oral Health Literacy Vocabulary test, and a 23-item Oral Health Literacy Scale previously validated in earlier studies. In the Oral Health Literacy Vocabulary section, participants were asked to indicate whether they understood each of the 20 presented vocabulary words. In the Oral Health Literacy Scale, participants indicated their responses to 23 statements using three response options: Correct, Not correct, and Not sure. The data were analyzed using the Statistical Package for the Social Sciences (SPSS), and the correlation between the Oral Health Literacy Vocabulary scores and the Oral Health Literacy Scale scores was examined.

Results A total of 416 participants were included in the study, comprising 286 females (68.8%) and 130 males (31.2%). The mean age was 39.06 years (SD=11.85), with a range of 20 to 59 years. The study population reflected a diverse range of sociodemographic characteristics, including government and private sector employees, self-employed individuals, retirees, and students from multiple fields of study. Participants were assessed on their recognition of 20 oral health-related terms. The mean Oral Health Literacy Vocabulary score was 12.14 (SD=6.59), with scores ranging from 0 to 20. While The Oral Health Literacy Scale, comprising 23 statements, yielded a mean total score of 13.79 (SD=3.80). To assess the psychometric quality of the instrument, internal consistency was evaluated using Cronbach's alpha coefficient, which demonstrated excellent reliability ($\alpha=.951$). This indicates that the items consistently measured the intended construct. Additionally, the reliability of the vocabulary recognition scale was assessed through a Pearson correlation analysis, revealing a statistically significant positive correlation between the Total Vocabulary Score and the Total Scale Score ($r=0.209$, $p<.001$). This suggests that participants with higher vocabulary recognition also tend to show a greater agreement with correct oral health principles.

Conclusion This 20 words oral health literacy scale indicates good validity and reliability in evaluating oral health literacy for dental caries and gingivitis among Thai adults.

Ethical protocol (HRDC 2025-114), Supported by Dental Research Fund, Dental Research Project 3200502#137/2025, Faculty of Dentistry, Chulalongkorn University

Psychometric properties testing of the Myanmar version of the oral health literacy questionnaire among Myanmar migrant mothers of preschool children

Nanthanon N*, Leedinchud N, Chanpakorn S, Phyo WM, Detsomboonrat P¹

¹Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the validity and reliability of the Myanmar version of the oral health literacy (OHL) questionnaire among Myanmar migrant mothers of preschool children

Material and methods The OHL questionnaire was cross-culturally adapted into Myanmar and administered as a self-completed survey among Myanmar migrant mothers of preschool children recruited from five schools in Samut Sakhon Province, Thailand. The questionnaire assessed sociodemographic characteristics, oral health knowledge (OHK), and OHL. Children's dental caries status (dmft), examined independently by two dentists, was used to assess discriminant validity. Psychometric properties were evaluated using internal consistency, exploratory factor analysis, and test-retest reliability with the intraclass correlation coefficient (ICC).

Results A total of 133 mothers participated (mean age 35.2 ± 5.9 years); 46.2% were of Mon ethnicity, 44.6% had a middle school education, and 55.1% were factory workers. Fewer than half understood key dental terms, with the poorest understanding observed for "periodontal disease", "sealants", and "mottled tooth", whereas "local anesthesia" was the most well understood. Correct knowledge of cariogenic foods, the appropriate age to start toothbrushing, and toothpaste use for preschool children was significantly associated with OHL scores ($p < 0.05$), while knowledge regarding bottle-feeding cessation and fluoride treatment was not. Exploratory factor analysis identified a two-factor structure (Information Literacy and Critical Evaluation). Inter-examiner reliability for caries assessment showed almost perfect ($K = 0.814$). The 25-item OHL questionnaire demonstrated good internal consistency (Cronbach's $\alpha = 0.73$), but test-retest reliability was sub-optimal ($ICC = -0.206$). OHL scores did not differ significantly by children's caries severity ($p > 0.05$).

Conclusion The Myanmar version of the OHL questionnaire showed acceptable construct validity and internal consistency among Myanmar migrant mothers. However, test-retest reliability was sub-optimal, and discriminant validity with respect to children's caries status was not supported.

Ethical protocol (HREC-DCU 2025-075) Supported by Dental Research Fund, Dental Research Project, 3200502#25/2023, Faculty of Dentistry, Chulalongkorn University

**Oral health status of Boys in boarding vs non-boarding schools in Thailand:
a cross-sectional survey**

Thanchanokpong C, Yupas P, Bhuridej P¹

¹Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University

Background Oral health is a key determinant of children's overall health, academic performance, and psychosocial well-being. Poor oral health among school-aged children has been associated with pain, infection, absenteeism, and reduced quality of life. Mobile dental units (MDUs) have been implemented to improve access to dental care and reduce oral health inequalities, particularly in school settings. However, evidence comparing oral health status between boarding and non-boarding school students in Thailand remains limited.

Objective This study aimed to assess and compare oral health status and preventive care needs among boys in a boarding school (Vajiravudh College) and a non-boarding school (Chulalongkorn University Demonstration Schools).

Material and methods A retrospective cross-sectional analytical study was conducted using secondary data obtained from oral health surveys carried out by the King's Mobile Dental Unit in 2023. Oral health was evaluated across nine indicators: overall oral health status, number of decayed primary teeth, number of decayed permanent teeth, need for scaling, need for pit and fissure sealant, need for orthodontic treatment, need for oral health education and care, need for fluoride therapy and six-monthly dental check-ups, and other identified dental needs.

Results Boarding school students demonstrated significantly poorer oral health outcomes compared with non-boarding school students. They had significantly higher prevalence of dental caries in both primary and permanent teeth, greater need for scaling, fluoride therapy, and oral health education ($p < 0.05$). Preventive care recommendations were significantly more frequent among boarding school students.

Conclusion Boys attending boarding schools exhibited significantly poorer oral health status and greater preventive care needs than those in non-boarding schools. These findings support the expansion of mobile dental services and school-based preventive programs, particularly in boarding school settings, to reduce oral health inequalities.

Ethical protocol (HRDC-2025-159.) Supported by Dental Research Fund, Dental Research Project 3200502#54/2023, Faculty of Dentistry, Chulalongkorn University

The influence of preoperative information type (illustration video, instruction sheet) on anxiety during third molar surgery: a randomized controlled trial

Sutthisoonthorn S, Prachammuang A, Jiranuchart S¹

¹Department of Oral and Maxillofacial Department, Faculty of Dentistry, Chulalongkorn University

Objective To compare the effectiveness of different instruction methods in reducing patient anxiety during surgical removal of impacted third molars.

Material and methods This single-blind, prospective randomized controlled trial included patients scheduled for impacted third molar surgery. Participants were randomly assigned to one of three groups: an illustrative video group, an instruction sheet group, or a control group receiving verbal instructions from dentists. Written informed consent was obtained. Demographic data (age, sex, and education level) were recorded. Anxiety was assessed using the Modified Dental Anxiety Scale (MDAS) before (T1) and after (T2) viewing the video or reading the instruction sheet, and after completion of treatment (T6). Blood pressure, pulse rate, and oxygen saturation were recorded at T1, T2, before local anesthesia injection (T3), 1 minute after injection (T4), during bone removal (T5), and at T6.

Results A total of 15 participants were equally allocated to the three groups. The illustrative video group showed a reduction in MDAS scores between T1 and T2, whereas a slight increase was observed in the instruction sheet group; however, these changes were not statistically significant. No significant differences were found among groups for other variables.

Conclusion Different instruction methods did not significantly affect anxiety levels compared with verbal instruction alone. These findings highlight the importance of direct verbal communication. The results should be interpreted with caution due to the limited sample size.

Ethical protocol (HREC-DCU 202-105) Supported by Dental Research Fund, Dental Research Project 3200502#22/2025, Faculty of Dentistry, Chulalongkorn University

Smile aesthetic preferences among Bangkok laypeople, general practitioners, and orthodontists in 2025

Nakasiri K, Wisaruetapa P, Angkhanawiriyarak S¹, Namano S¹

¹Division of Academic Affairs, Faculty of Dentistry, Chulalongkorn University

Objectives This exploratory study investigated smile aesthetic preferences among three groups in Bangkok: laypeople, general practitioners (GPs), and orthodontists. The primary objectives were to identify perceptual differences between professionals and the public, establish internal preference rankings within each group, and define "Bangkok Smile Aesthetic Preferences" to guide clinical treatment planning.

Material and methods A cross-sectional study was conducted via a digital questionnaire (N = 185), consisting of 81 laypeople, 73 GPs, and 31 orthodontists. Participants evaluated 11 digitally modified images using a 0–10 Numerical Rating Scale (NRS) across three parameters: Upper Lip Curvature (Upward, Straight, Downward), Smile Arc (Parallel, Straight, Reverse), and Gingival Display (+4 mm, +2 mm, 0 mm, -2 mm, and -4 mm). As the data were non-parametric, results are reported as Median and Interquartile Range (IQR). Statistical analysis included Kruskal-Wallis tests with Bonferroni-adjusted pairwise comparisons for between-group differences and Friedman tests for within-group preference rankings ($p < 0.05$).

Results Between-group analysis revealed that all groups identified straight upper lip curvature (Median: 7.00), parallel and straight smile arcs (Median: 7.00), and 0 to +2 mm gingival display (Medians: 7.00–8.00) as the most attractive variations. However, significant differences emerged regarding aesthetic deviations: Upper Lip Curvature: Laypeople were significantly more tolerant of both upward and downward curvatures than GPs and orthodontists ($p < 0.05$). Smile Arc: A highly significant difference was found regarding the reverse arc ($p < 0.001$), with professionals providing significantly lower ratings than laypeople. Gingival Display: Orthodontists were significantly more critical of +4 mm and -2 mm displays than laypeople ($p < 0.05$). Both professional groups rated the -4 mm display significantly lower than laypeople. Within-Group Analysis: A significant hierarchy of preference was confirmed for all categories ($p < 0.05$). Orthodontists demonstrated the strongest agreement (IQR = 1) in rejecting non-parallel arcs.

Conclusion Bangkok Smile Aesthetic Preferences are characterized by a straight upper lip, a straight-to-parallel smile arc, and 0 mm to +2 mm of gingival display. While there is a general consensus on the "ideal" smile, Bangkok laypeople are significantly more forgiving of deviations than dental professionals. Practitioners should consider these aesthetic thresholds—particularly regarding gummy smiles and smile arcs—to avoid overtreatment and align clinical outcomes with patient expectations.

Ethical protocol (HERE-DCU 2025-187) Supported by Dental Research Fund, Dental Research Project 3200502/2023, Faculty of Dentistry, Chulalongkorn University

Association between sleep quality, self-rated oral health status, and academic performance among dental students at Chulalongkorn University: a cross-sectional study

Jintakanon J*, Cheevasit R, Sermsuti-anuwat N¹

¹Academic Affairs Division, Faculty of Dentistry, Chulalongkorn University

Objective This study aimed to investigate the association between sleep quality, self-rated oral health status, and academic performance among dental students at the Faculty of Dentistry, Chulalongkorn University.

Material and methods An analytical cross-sectional study was conducted among 140 undergraduate dental students. Data were collected using a self-administered online questionnaire that included demographic characteristics, sleep quality, self-rated oral health status, and self-rated academic performance. Descriptive statistics were used to summarize participant characteristics. Group differences were analyzed using the Mann-Whitney U test and Kruskal-Wallis test. Multivariable logistic regression analysis was performed to identify factors associated with poor sleep quality. Statistical significance was set at $p < 0.05$.

Results The mean age of participants was 20.63 ± 1.98 years. Poor sleep quality was reported by 46.4% of students. Poor sleep quality was significantly associated with poorer self-rated oral health status and lower self-rated academic performance ($p < 0.05$). In multivariable logistic regression analysis, clinical-year students were more likely to report poor sleep quality than pre-clinical students (adjusted OR = 4.96; 95% CI: 2.12-11.62). Students with poor self-rated oral health status also had higher odds of poor sleep quality (adjusted OR = 4.84; 95% CI: 2.05-11.44).

Conclusion Poor sleep quality was common among dental students and was significantly associated with self-rated oral health status and academic performance. Sleep quality should be considered an important, modifiable factor for promoting student well-being and supporting educational outcomes in dental education.

Ethical protocol (HREC-DCU 2025-048) Supported by Dental Research Fund, Dental Research Project 3200502#7/2025, Faculty of Dentistry, Chulalongkorn University

Comparison of airway size in Non-OSA Thai females with sleep bruxism and healthy controls using published normative data

Tharachan T*, Chua-intra S, Nalamliang N¹

¹Department of Occlusion, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the airway dimensions in Thai female dental students aged 18-25 years without OSA who exhibit bruxism activity and to compare it with reference data from previous studies.

Material and methods In this descriptive cross-sectional study, Thai female dental students aged 18-25 years with a low risk for OSA (STOP-BANG score 0-2) were recruited. Sleep bruxism was assessed using the BruxChecker, worn for four consecutive nights. Airway size was measured through the Posterior Airway Space (PAS) on lateral cephalometric radiographs, defined as the distance between the posterior pharyngeal wall and the base of the tongue along the Go-B point line.

Results Preliminary data were obtained from 21 participants identified with sleep bruxism. Analysis of lateral cephalometric radiographs demonstrated a mean posterior airway space (PAS) of 9.89 ± 2.84 mm in this group. Initial observations of the BruxChecker appliances revealed group guidance as the predominant wear pattern. Comparison with airway dimensions reported in previous studies of non-OSA healthy Thai females demonstrated no statistically significant difference ($p > 0.05$) in airway size between the two groups; however, the mean airway size observed in the present study was smaller than the normative value of 11.1 ± 3.3 mm reported in healthy Thai females.

Conclusion These preliminary findings provide initial insights into the airway characteristics of young female bruxers without OSA. This finding offers contextual understanding of the possible association between airway size and sleep bruxism.

Ethical protocol (HREC-DCU 2025-119), Supported by Dental Research Fund, Dental Research Project 3200502#14/2025, Faculty of Dentistry, Chulalongkorn University

Comparison of occlusal force distribution between orthodontically retention-phased patients using wrap-around retainers and vacuum-formed retainers

Akkara-areesuk P*, Jaruvattrakul Y, Nalamliang N¹

¹Department of Occlusion, Faculty of Dentistry, Chulalongkorn University

Objective Orthodontic retention is essential for preserving treatment outcomes and ensuring long-term functional stability. Wrap-around retainers (WAs) allow posterior occlusal settling, whereas vacuum-formed retainers (VFRs) provide full-arch coverage that may restrict vertical settling. However, their effects on anteroposterior occlusal force distribution remain unclear.

Material and methods This cross-sectional preliminary study included 16 post-orthodontic patients who had worn either WAs or VFRs for at least one year (n = 8 per group). Occlusal force distribution was recorded using the T-Scan digital occlusal analysis system during maximum intercuspation. The percentage of posterior occlusal force was compared between groups using independent-samples t-tests ($\alpha = 0.05$).

Results There was no statistically significant difference in the percentage of posterior occlusal force between the VFR group ($95.21 \pm 4.37\%$) and the WA group ($91.08 \pm 5.65\%$) ($p = 0.123$).

Conclusion Although no statistically significant difference was detected in this preliminary analysis, data collection is ongoing and the sample size remains limited; therefore, further studies with larger cohorts are warranted to confirm these findings.

Ethical protocol (HREC-DCU 2025-113), Supported by Dental Research Fund, Dental Research Project 3200502#18/2025, Faculty of Dentistry, Chulalongkorn University

Oral findings associated with obstructive sleep apnea - A systematic review and meta-analysis

Chonlathee T, Lertruangpunyavut T, Changsiripun C¹

¹Department of Orthodontics, Faculty of Dentistry, Chulalongkorn University

Objective Obstructive sleep apnea (OSA) is a common sleep disorder where the airway repeatedly collapse, partially or completely, resulting in oxygen desaturation during sleep. Although numerous studies have reported craniofacial and dental characteristics associated with the risk of OSA, the pooled results and statistical effect sizes across the existing literature have not yet been synthesized. The aim of this study was to perform a systematic review and meta-analysis to combine data on the association between adults OSA and oral findings from relevant studies, thereby increasing the reliability and generalizability of the evidence.

Material and methods An electronic search of the Scopus, Embase, PubMed, and CENTRAL databases was performed from inception to 9 July 2025. Observational studies, including cohort, case-control, and cross-sectional designs, that compared oral findings assessed by clinical examination between adults with OSA (≥ 18 years, diagnosed with polysomnography or a validated questionnaire) and healthy adults were included. Study selection and data extraction were performed by two independent reviewers, with disagreements resolved by a third reviewer. The quality of the included articles was assessed using appropriate tools according to the study design. Review Manager software (version 5.4) was used to conduct the meta-analyses.

Results Of the 4,327 studies identified, 2,991 studies were screened, 102 full-text articles were assessed for eligibility, and 59 studies were ultimately included. Meta-analyses showed that Angle's Class II malocclusion (OR 1.84 [1.27, 2.66], $p = 0.001$), maxillary arch constriction (OR 1.91 [1.11, 3.27], $p = 0.02$), Mallampati score ≥ 3 (OR 4.55 [3.17, 6.52], $p < 0.00001$), large tongue size (OR 6.70 [3.30, 13.59], $p < 0.00001$), deep palatal vault (OR 5.21 [2.09, 12.98], $p = 0.0004$), periodontitis (OR 1.98 [1.67, 2.34], $p < 0.00001$), and mouth breathing (OR 6.64 [4.82, 9.15], $p < 0.00001$) were significantly associated with OSA. The overall quality of the included studies was mostly fair, primarily due to a lack of sample size justification and insufficient follow-up to reassess exposure.

Conclusion This systematic review and meta-analysis indicates that adult patients with OSA tend to be associated with Angle's Class II malocclusion, maxillary arch constriction, Mallampati score ≥ 3 , large tongue size, deep palatal vault, periodontitis, and mouth breathing. These findings may help dentists serve as effective screeners for patients at risk of OSA.

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**Utilizing generative AI for personalized dental care recommendations:
enhancing oral health management and patient referrals in clinical dentistry**

Klaykaew P*, Champreeda T, Ruangareerat K, Osathanon T¹

¹Department of Anatomy, Faculty of Dentistry, Chulalongkorn University

Objectives The aims of the study were to develop and determine effectiveness of a generative AI model for patient care recommendation and clinical referral systems

Material and methods The study employed a “Design Thinking” method to develop an AI-based system for personalized dental care recommendations and clinical referrals. The first phase of the study included observations and in-depth interviews of five private dental clinics. Dentists, dental staff, and patients were interviewed using open-ended questionnaires. Data obtained during the previous phase were defined into pain points. The researchers then ideated potential solutions and developed a prototype chatbot system. After refinements, the chatbot was implemented in clinical settings, where dental professionals used the system for a 2-weeks trial period, and patients interacted with the chatbot for approximately 20 minutes prior to completing satisfaction questionnaires. Data were collected through online survey forms and analyzed using descriptive statistical methods to evaluate user satisfaction and system performance. Satisfaction scores obtained from Likert-scale questionnaires were treated as ordinal data and presented as median with interquartile range (IQR). Statistical analysis will be performed using the SPSS statistics.

Results The developed AI system is expected to demonstrate the potential to provide accurate and personalized patient oral care recommendations, including guidance for dental problems and treatment steps, and pre- and post-operative care advice. The system is anticipated to support clinical referral processes by improving clarity and efficiency in clinical decision-making. The effectiveness of the AI model is expected to depend on patient experience, engagement, and trust in the system, as well as on clinicians’ compliance, acceptance, and appropriate integration of the AI recommendations into routine practice.

Conclusion The study suggested that generative AI has the potential to enhance patient oral care recommendations and clinical referral system by improving access to dental care information and assisting clinical workflows. The developed AI system may serve as a supplementary tool for dental professionals, contributing to improved patient education and satisfaction while maintaining essential clinical oversight. As the study has not yet been completed, further research is required to validate the findings, assess long-term effectiveness, and evaluate real clinical outcomes.

Ethical protocol (HRDC-2025-070,) Supported by Dental Research Fund, Dental Research Project 3200502#141/2025, Faculty of Dentistry, Chulalongkorn University

Comparison between ChatGPT and Gemini in the histopathological diagnosis of ameloblastoma

Lapsomjai N*, Phattarataratip E¹, Siricharoen P²,

¹Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University

²Department of Computer Engineering, Faculty of Engineering, Chulalongkorn University

Objective This study aimed to compare the diagnostic accuracy and reliability of ChatGPT and Gemini in the histopathological diagnosis of ameloblastoma.

Material and methods A total of 100 representative histopathological images were captured from 50 whole-slide images, comprising 25 cases of ameloblastoma and 25 cases of other jaw tumor types. Each image was independently uploaded onto ChatGPT and Gemini using three distinct prompts: zero-shot recognition of ameloblastoma with and without assigning a specific role as a pathologist, and chain-of-thought-guided recognition. The process was repeated 3 times for each image. Diagnostic accuracy is analyzed using Cochran's Q test, with pairwise McNemar's test as a post-hoc comparison. Reliability was assessed using Fleiss's Kappa.

Results Overall, Gemini demonstrated superior diagnostic accuracy (0.64-0.75) and sensitivity (0.82-0.94) across all prompts. In contrast, ChatGPT exhibited higher specificity (0.96-0.98) but lower sensitivity (0.04-0.12), resulting in lower accuracy (0.50-0.54) and inferior F1-scores (0.07-0.21). These trends were consistent across all three prompts. Notably, Gemini achieved the best performance using the chain-of-thought-guided recognition, demonstrating the highest accuracy (0.75) and F1-score (0.77), along with high sensitivity (0.82) and moderate specificity (0.68). Significantly, Gemini outperformed ChatGPT using zero-shot recognition without role assignment ($p < 0.05$) and chain-of-thought-guided recognition ($p < 0.01$). Despite the lower overall performance, ChatGPT exhibited superior reliability with greater Fleiss's Kappa scores than Gemini across all prompts.

Conclusion Upon refined prompting, Gemini demonstrated moderate diagnostic accuracy in identifying ameloblastoma, attaining the highest accuracy of 0.75. The superior sensitivity of Gemini may be advantageous for diagnostic screening, while ChatGPT is a more reliable tool with higher specificity. The findings highlight a diagnostic trade-off between the two large language models, which may limit their use as stand-alone diagnostic tools. Their overall performance remains insufficient to serve as an adjunctive diagnostic tool. Further development of specialized, pathology-focused AI systems is necessary for the integration of AI tools into the oral pathology diagnostic workflow.

Ethical protocol (HREC-DCU-2025-175), Supported by Dental Research Fund, Dental Research Project 3200502#46/2025, Faculty of Dentistry, Chulalongkorn University

Co - design oral health curriculum for visually impaired children using design thinking

Sintavanurak D*, Wangthavorn N, Kaewkamnerdpong I¹

¹Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective Visually impaired (VI) children face significant challenges in accessing traditional, visual-based oral health education (OHE), contributing to poorer oral hygiene and health status compared to their sighted peers. Despite this disparity, there is a lack of specialized OHE curricula designed for blind schools that can be implemented long-term without constant healthcare personnel assistance. This study aimed to co-design and evaluate a specialized oral health curriculum for VI students using the Design Thinking methodology to enhance Oral Health Literacy (OHL).

Material and methods This quasi-experimental study was conducted at the Bangkok School for the Blind with students in grades 4 to 9. The curriculum was developed using the five-stage Design Thinking framework: Empathize, Define, Ideate, Prototype, and Test. Data were collected through observations and qualitative interviews with students, teachers, caregivers, and healthcare personnel to understand user needs. The curriculum was co-designed with teachers and piloted in classrooms, with feedback used for iterative improvements. The Test of Functional Health Literacy in Dentistry for Primary School Children (P-TOFHLiD) was used to evaluate students' OHL before and after participation in the curriculum.

Results The Empathize stage revealed that teachers possessed expertise in special education, but lacked a specific oral health curriculum. Despite gaps in dental health literacy, visually impaired students exhibited stronger proficiency in alternative senses, specifically auditory and tactile functions, to compensate for their visual deficits. The Define phase identified the core problem as a gap in sustainable education and literacy. During the Ideate stage, a multi-modal curriculum with peer-assisted learning between low-vision and blind peers was conceptualized. The Prototype stage developed educational materials including tactile models representing dental plaque texture and AI-enhanced audio materials utilizing text-to-speech and voice cloning. The Test phase focused on refining the curriculum through feedback from classroom implementation. Among 30 students, P-TOFHLiD pass rates increased from 5 (16.7%) to 25 (83.3%) after the intervention ($p < 0.001$).

Conclusion Design Thinking proved to be an effective framework for developing an OHE curriculum for VI children, successfully enhancing the learners' OHL.

Ethical protocol (HREC-DCU 2025-096) Supported by Dental Research Fund, Dental Research Project 3200502#34/2025, Faculty of Dentistry, Chulalongkorn University

**Evaluating the effectiveness of UpRight Go 2 in tracking posture among dental students:
a clinical study**

Apisakulchat N*, Chollapan T, Kongthong P, Torrungruang K¹, Suprongsinchai W²

¹Department of Microbiology, ²Department of Physiology, Faculty of Dentistry, Chulalongkorn University

Objective The aim of this study was to assess the efficacy of the UpRight Go 2 in determining the angles of the sitting posture of dentists during dental procedures, in comparison with the gold standard, and its usability for improving the posture of dentists during dental procedures.

Material and methods Six right-handed fifth-year dental students participated in this experimental study. Two experimental conditions were conducted. The first experiment assessed the accuracy of the UpRight Go 2 by comparing its ability to detect improper posture with posture deviations detected through video motion tracking software as the gold standard. The second experiment compared participants' sitting postures during dental procedures performed with the UpRight Go 2 vibration feedback mode activated and deactivated, with a washout period of at least one week between conditions. Postural data were collected during a standardized cavity preparation procedure on a dental phantom head. Video recordings from lateral and posterior perspectives were analyzed using predefined anatomical landmarks to assess sagittal and frontal plane postural deviations.

Results The results tend to show that the Upright Go can only detect 34.60 percent of all improper postures detected by a video movement tracker software. On top of that, the upright go seems to have no help in improving the subject's posture with the vibration mode, with the results of -6.42 percent. Moreover, the average neck flexion angle, trunk flexion angle, neck lateral excursion angle, and trunk lateral excursion are 30.65 ± 11.00 , 4.74 ± 4.46 , 17.30 ± 14.94 , and 1.91 ± 11.00 degrees respectively before and 26.62 ± 9.92 , 5.46 ± 5.17 , 14.09 ± 11.13 , and 1.71 ± 1.60 degrees after the use of the vibration mode of UpRight Go.

Conclusion The UpRight Go appears to have no effect on practicing to achieve better posture and is suggested to be inadequate for accurately detecting the operator's posture throughout a dental procedure.

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**Development and evaluation of a serious game to enhance oral diagnosis
and treatment planning skills in dental students**

Prichayangkun P*, Thanatkulroj N, Thinyu C, Prueksrisakul T¹

¹Department of Oral Medicine, Faculty of Dentistry, Chulalongkorn University

Objective To develop *Tooth and Truth*, an online simulation-based serious game designed to enhance dental students' diagnostic reasoning, sequential thinking, and treatment planning skills for patients with dental problems. The game was structured in the format of Modified Essay Questions (MEQ) comprising three clinical case scenarios. In addition, this study aims to evaluate dental students' interest and satisfaction of gameplay experience.

Material and methods Thirty-eight fifth year dental student of the Faculty of Dentistry, Chulalongkorn university participated in this study. The study was conducted over an eight-day period. On day one, all participant completed a pre-test knowledge assessment. From day two to day seven, participants engaged with the *Tooth and Truth* online game. On day eight, all participant completed a post-test knowledge assessment in the form of short answer questions with a maximum score of 10, and provided feedback on their gameplay experience. The paired T-test was performed to compare pre-test and post-test score.

Results There was significant improvement in the post-test scores (mean = 6.52 ± 2.59) compared to the pre-test scores (mean = 1.97 ± 1.01) with paired t-test analysis demonstrating statistical significance ($p < .001$). Overall, students reported a high level of satisfaction across multiple aspects of the game, such as usefulness, level of difficulty, with median ratings exceeding 8.5 out of 10 in nearly all categories. The only exception was enjoyment, which received a slightly lower median rating of 7.5 out of 10.

Conclusion The simulation-based serious game considerably improved students' diagnostic scores This suggests that *Tooth and Truth* can be used as an effective learning tool for dental students to enhance their diagnostic skills. Furthermore, the game received high satisfaction ratings across most aspects while enjoyment remained the aspect that could be further improved.

Ethical protocol (HRDC-2025-138) Supported by Dental Research Fund, Dental Research Project 3200502#09/2025, Faculty of Dentistry, Chulalongkorn University

Exploring the use of dentistry-related social media content among undergraduate dental students

Ditthanathiwat N*, Limpuangthip N¹, Chuenjitwongsa S²

¹Department of Prosthodontics, ²Department of Biochemistry, Faculty of Dentistry, Chulalongkorn University

Objective To explore patterns of social media use among undergraduate dental students and to examine how dentistry-related content is consumed in terms of platforms, formats, purposes, and engagement behaviors.

Material and methods Participants were undergraduate dental students across all academic years. Data were collected using an online-based questionnaire consisting of three sections: demographic characteristics (academic year, age, and gender), general social media use (platforms used and duration of use), and dentistry-related content consumption (frequency of viewing, platforms, content topics, formats, purposes of viewing, and engagement behaviors such as sharing and reading comments). Participants were divided into 3 groups based on novice-expert continuum; novice (1st to 3rd year), advanced beginner (4th to 5th year), and nearly competence (6th year) student. Descriptive and inferential statistics were used to summarize the data, and comparisons were conducted to examine differences in content consumption patterns among the three groups.

Results Most participants reported daily use of social media, with YouTube and TikTok being the most frequently used platforms across all groups. Dentistry-related content was commonly viewed among students in all academic years. Preclinical students (Years 1-3) more frequently reported viewing content for general knowledge and curiosity, while early clinical students (Years 4-5) and final-year students (Year 6) more often reported viewing content for learning reinforcement and preparation related to clinical practice. Short-form video was the most commonly consumed content format in all groups. Differences in content purposes and viewing patterns were observed across academic-year groups. Engagement behaviors, including reading comments and sharing dentistry-related content with fellow dental students, were more frequently reported among students in Years 4-5 and Year 6.

Conclusion Undergraduate dental students widely engage with dentistry-related content on social media, with variations in viewing purposes and content characteristics across academic years. These findings suggest that students' stage of training influences how social media content is used and highlight the importance of considering academic level when examining the educational role of social media.

Ethical protocol (HREC-DCU2025-127) Supported by Dental Research Fund, Dental Research Project 3200502#39/2025, Faculty of Dentistry, Chulalongkorn University

**Assessing antibiotic prescribing patterns among Thai dental professionals:
a study of rational use and misconceptions**

Sirisuth S*, Rummaneethorn Y, Sooampan S, Issaranggun Na Ayuthaya B¹

¹Department of Pharmacology, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate trends in antibiotic prescription patterns from 2019 to 2023 at the Faculty of Dentistry, Chulalongkorn University, and determine the proportion of irrational antibiotic prescriptions.

Material and methods Five years of outpatient dental data (1 January 2019 - 31 December 2023) from a hospital panel at the Faculty of Dentistry, Chulalongkorn University were analyzed. Information including patient demographics, medical history, dental diagnoses, dental procedures, and details of antibiotic prescriptions. Antibiotics evaluated included amoxicillin, amoxicillin with clavulanic acid, clindamycin, doxycycline, and dicloxacillin, prescribed by both general practitioners and dental specialists. Prescription patterns were assessed in relation to dental procedures and patient systemic conditions. Rational antibiotic use was determined based on evidence-based guidelines, including those of the American Dental Association (ADA), considering systemic disease, systemic signs of infection, spreading of infection, or indications for infective endocarditis prophylaxis.

Results From 2019 to 2023, amoxicillin was the most frequently prescribed antibiotic. The dental procedure that most commonly associated with antibiotic prescription was the surgical removal of permanent teeth with partial bony impaction. The systemic disease that most frequently associated with antibiotic prescription was diabetes mellitus.

Conclusion From 2019 to 2023, there has been no significant change in antibiotic prescription patterns at the Faculty of Dentistry, Chulalongkorn University.

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QuPath-Histological assessment of a drug-loaded hydrogel biocompatibility in a rat model

Benjavitayakul N*, Kongpool P*, Singhatanadgit W¹, Lapthanasupkul P², Chaisuparat R³

¹Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Thammasart University,

²Department of Oral and Maxillofacial Pathology, Faculty of Dentistry, Mahidol University,

³Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the biocompatibility of a drug-loaded hydrogel in a rat model using QuPath-based quantitative histological analysis.

Material and methods Thirty-one female Sprague Dawley rats were allocated into control (C), carbon-based nano-adsorbent, and composite drug-loaded hydrogel groups (H) and evaluated at 7 and 42 days following tooth extraction. Histological sections of extraction sockets were digitally analyzed using QuPath to quantify inflammatory cells, connective tissue components, and bone-related parameters. Regions of interest were standardized, and quantitative assessments were performed using cell detection and pixel classification tools. Statistical significance was set at $p < 0.05$.

Results At 1 week, the H group demonstrated significantly reduced inflammatory response, compared with the C group. Concurrently, this group exhibited significantly higher osteocyte counts and increased immature bone formation, indicating a favorable early tissue response. At 6 weeks, the H group showed mature bone architecture with stable osteocyte density and no evidence of persistent inflammation or foreign-body reaction, supporting long-term tissue compatibility. Although the C group exhibited higher osteoblast counts at this time point, this finding was interpreted as ongoing active remodeling rather than superior biocompatibility.

Conclusion Our findings reveal that the drug-loaded hydrogel demonstrated good biocompatibility in a rat extraction socket model, with minimal inflammation, no foreign-body reaction, and support of normal bone healing, indicating favorable tissue tolerance and compatibility.

Ethical protocol (ARAC 1/65) Supported by Dental Research Fund, Dental Research Project 3200502#15/2025, Faculty of Dentistry, Chulalongkorn University

Clinicopathological analysis of periapical granuloma and radicular cyst in the Thai population

Arssiri C*, Premnond C*, Chantarangsu S¹

¹Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University

Objective To investigate and compare clinicopathological features of periapical granuloma and radicular cyst in the Thai population.

Material and methods Biopsy reports submitted to the Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University from January 2015 to December 2024 and diagnosed as periapical granuloma and radicular cyst were retrospectively reviewed. The data collection composed of demographic data including sex, age, location as well as histopathological features including the presence of hyaline body, Rushton body, odontogenic epithelial rests, cholesterol crystal, foamy histiocytes, dystrophic calcification, bacterial colonies, and type of inflammation. The data were analyzed using IBM SPSS statistical software version 30. The *p*-value < 0.05 was considered a statistically significant difference. Differences between participants with radicular cyst and periapical granuloma were done using an independent *t*-test, chi-square test or Fisher exact test. Multivariate logistic regression was used to identify factors associated with the occurrence of radicular cysts.

Results A total of 236 cases was analyzed, including 118 radicular cysts and 118 periapical granulomas. The study population comprised 147 females (62.3%) and 89 males (37.7%), with an average age of 43.79 years old (range 9-86 years). Age, sex, location, the presence of hyaline body, Rushton body, odontogenic epithelial rests, dystrophic calcification, and bacterial colonies did not differ significantly between periapical granulomas and radicular cysts (*p* > 0.05). The presence of cholesterol crystals and chronic inflammation was significantly higher in radicular cysts, whereas foamy histiocytes and mixed inflammation were significantly more frequent in periapical granulomas. In multivariate logistic regression analysis, the presence of cholesterol crystal (adjusted OR 3.416; 95% CI 1.606–7.263; *p* = 0.001) and chronic inflammation (adjusted OR 5.515; 95% CI 2.952–10.303; *p* < 0.001) was associated with approximately threefold and fivefold increased odds of radicular cysts compared with periapical granulomas, respectively. Conversely, foamy histiocytes were associated with significantly lower odds of radicular cysts (adjusted OR 0.336; 95% CI 0.159–0.709; *p* = 0.004).

Conclusion Periapical granulomas and radicular cysts in the Thai population showed similar demographic characteristics, whereas certain histopathological features differed between the two lesions, underscoring the importance of histopathological evaluation.

Ethical protocol (HREC-DCU 2025-029) Supported by Dental Research Fund, Dental Research Project 3200502#12/2025, Faculty of Dentistry, Chulalongkorn University

The 38th
38th Research day
25th February 2026

Faculty of Dentistry, Chulalongkorn University

Iodinated resin device development for dental unit waterline decontamination

Pinyopasakul P*, Kertsomboon T¹, Thananon K², Chirachanchai S¹, Soottitantawat A³, Ampornaramveth R⁴

¹Center of Excellence in Bioresources to Advanced Materials (B2A-CE), The Petroleum and Petrochemical College,

²Department of Biochemistry, Faculty of Dentistry, ³Department of Chemical Engineering, Faculty of Engineering,

⁴Center of Excellence on Oral Microbiology and Immunology, Department of Microbiology, Faculty of Dentistry, Chulalongkorn University

Objective Microbial contamination in Dental Unit Waterlines (DUWLs) presents a significant challenge to infection control. This study aimed to develop an affordable, in-house iodinated resin device, characterize its iodine release profile, evaluate its antimicrobial efficacy against DUWL bacteria, and assess its cytotoxicity on human gingival fibroblasts

Material and methods An iodinated resin capable of releasing free available iodine was fabricated using a sequential chloride-to-iodide ion-exchange process followed by elemental iodine (I₂) loading. The iodine release profile was characterized by submerging varying weights of the resin in water and quantifying free and total iodine levels using the DPD-colorimetric method and an ion-selective electrode. Antibacterial efficacy was assessed by exposing planktonic bacteria recovered from dental unit water samples to iodinated water at various concentrations. Bacterial counts were determined using R2A agar plates incubated at 35°C for 4 days. Cytotoxicity was evaluated via an MTT assay on Human Gingival Fibroblasts (HGF) obtained from two donors. Briefly, gingival fibroblasts were exposed to iodinated water at concentrations of 2.5, 5, and 10 ppm. Cell viability was calculated relative to a DMEM negative control and compared against a Normal Saline Solution (NSS) vehicle control. Further evaluation of compatibility with dental material bonding and clinical testing shall be conducted.

Results The developed resin demonstrated an iodine release profile dependent on resin mass. Planktonic bacteria recovered from DUWL exhibited high contamination levels ranging from 1.4×10^4 - 9.5×10^4 CFU/mL. Exposure to iodinated water at concentrations ≥ 1.5 ppm demonstrated significant antimicrobial activity, reducing bacterial contamination to levels consistent with DUWL safety standards (< 500 CFU/mL). In the cytotoxicity evaluation, HGFs from both donors exhibited high viability across all tested concentrations. The pooled mean cell viability was $92.83\% \pm 1.28$, $94.77\% \pm 7.70$, and $99.60\% \pm 12.78$ for 2.5, 5, and 10 ppm, respectively. These values were comparable to the NSS vehicle control (88.25%) and showed no statistically significant cytotoxicity compared to the DMEM negative control.

Conclusion The in-house developed iodinated resin effectively releases free iodine with potent antimicrobial activity against DUWL contaminants while being biocompatible. This device presents a promising, safe, and cost-effective solution for DUWL decontamination, supporting its potential for future clinical application.

Ethical protocol (HRDC-2025-091) supported by Dental Research Fund, Dental Research Project 3200502#19/2025, Faculty of Dentistry, Chulalongkorn University

The 38th
Research day
25th February 2026

Faculty of Dentistry, Chulalongkorn University

Dry mouth and denture retention: a clinical perspective on xerostomia in denture wearersSupanpaiboon N*, Siripraphapornchai S*, Komin O¹, Chaiteerapapkul P¹¹Department of Prosthodontics, Faculty of Dentistry, Chulalongkorn University

Objective To determine the correlation between severity of xerostomia and its effects on removable denture prostheses in Thai older adult denture-wearing patients in Chulalongkorn University Special Dental Clinic (CUSDC), Bangkok, Thailand.

Material and methods This cross-sectional study recruited 62 participants (aged ≥ 60 years) at CUSDC with at least three months of prostheses use. Data collection followed a two-examiner protocol: Examiner 1 collected general health information and administered the Thai Summated Xerostomia Inventory (SXI-Thai) and the Dietary Diversity Score (DDS). Examiner 2 performed clinical assessments, including objective mucosal wetness using Mucus®, Oral Moisture Checker (Life Co., Ltd., Saitama, Japan), soft tissue health via the Oral Health Assessment Tool (OHAT), and denture retention using the conventional Kapur method. Statistical analysis was performed using SPSS version 29.0, utilizing Spearman's rho coefficients at 5% significance level.

Results Among the study population ($n = 62$), the majority of participants used partial dentures, with 46.77% ($n = 29$) wearing metal-frame and 43.54% ($n = 27$) using acrylic-base. Ten participants (16.13%) used bimaxillary complete dentures, while three (4.83%) used single complete dentures. Fifty-three participants (85.48%) presented with fewer than 20 natural teeth. No instances of mucositis were observed in any participants. The average denture retention score was 2.32 ± 1.28 . The mean oral moisture value was 31.20 ± 0.83 , reflecting a normal moisture level. Despite this average, ten participants (16.13%) were identified with suspected oral dryness based on moisture checker readings below 27.0. The mean SXI score was 6.13 ± 1.30 , which indicated the absence of xerostomia, as it fell below the established cut-off value (> 11). Statistical analysis revealed no significant correlation between oral moisture values and denture-related complications, including eating difficulty ($r = 0.192$, $p = 0.135$), speaking difficulty ($r = 0.107$, $p = 0.409$), and tissue irritation ($r = 0.067$, $p = 0.604$).

Conclusion Among older Thai denture-wearing patients at the CUSDC, ten participants were identified as suspected cases of xerostomia; however, no significant correlations were between oral moisture levels and complications related to denture prostheses.

Ethical protocol (HREC-DCU 2025-115) Supported by Dental Research Fund, Dental Research Project 3200502#23/2025, Faculty of Dentistry, Chulalongkorn University

Hematinic and nutritional deficiencies profiles in patients with recurrent aphthous stomatitis, burning mouth syndrome, and atrophic glossitis

Tularatruengnam D*, Eiampaiboonphan P, Piboonratanakit P¹, Chantarangsu S²

¹Department of Oral Medicine, ²Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University

Objective To evaluate the association between hematinic and nutritional deficiencies and recurrent aphthous stomatitis (RAS), burning mouth syndrome (BMS) and atrophic glossitis (AG).

Material and methods This retrospective study included 272 patients comprising RAS (92 patients), BMS (134 patients) and AG (46 patients). Demographic data, medical history, clinical information and blood test data including complete blood count (CBC), serum ferritin, serum iron, serum vitamin B₁₂, serum folate and red blood cell (RBC) folate were collected. One-way ANOVA and chi-square tests were performed to determine differences among three groups. Pearson correlation was used to evaluate the correlation between hematinic and nutritional indices. A p -value < 0.05 was considered statistically significant.

Results The proportions of patients with low Hb ($p = 0.009$) and low Hct ($p = 0.038$) in the RAS and AG groups were significantly higher than those in the BMS groups. Among the groups, the frequencies of low serum vitamin B₁₂ ($p < 0.001$), low serum folate ($p = 0.001$) and low RBC folate ($p = 0.039$), but not low serum iron and low serum ferritin, were significantly different. Statistically significantly higher frequency of low serum vitamin B₁₂ was observed in the AG group, while low serum folate was more frequent in the RAS group. However, the frequency of low RBC folate was statistically significantly higher in the RAS group than in the BMS group. Serum iron, serum ferritin and serum folate were statistically positively correlated with several RBC indices. RBC folate was weakly positively correlated with serum folate and serum vitamin B₁₂. In contrast, serum iron and serum vitamin B₁₂ had weakly negative correlations with RDW.

Conclusion The frequencies of low Hb and low Hct were significantly found in the RAS and AG groups. The prevalence of low serum vitamin B₁₂ was highest in the AG group, while low serum folate and low RBC folate were most prevalent in the RAS group.

Ethical protocol (HREC-DCU 2025-077) Supported by Dental Research Fund, Dental Research Project 3200502#27/2025, Faculty of Dentistry, Chulalongkorn University

Cost analysis of the mobile dental units of the Faculty of Dentistry, Chulalongkorn University

Sunanthakhantharot K, Mekvichai P, Bhuridej P¹

¹Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University

Objective To ensure that the Mobile Dental Units (MDUs) of the Faculty of Dentistry, Chulalongkorn University are providing high-quality, accessible, and affordable dental care services to the community and serves as an investigation of cost components to identify potential areas for cost optimization and resources allocation.

Material and methods This cross-sectional study is an analysis on expenses of the MDUs during October 2024-October 2025, the expenses are categorized into 8 fields of work: (1) Initial examinations, (2) Operative works, (3) Periodontal works, (4) Preventive works, (5) Oral Surgery works, (6) Pediatric works, (7) Radiographic examinations, and (8) Miscellaneous expenses. Each expense group is presented under 23 Community Dental projects throughout the duration of the study, along with statistics of the quantity of patients and treatments the Department of Community Dentistry, Chulalongkorn University provided. The analysis calculated and compared the cost per treatment and the cost per patient.

Results Department of Community Dentistry, Chulalongkorn university spent 674,426.25 Baht on only materials and equipment needed for the operation of MDUs throughout the year excluding external variables such as employee travel, administrative salaries, and oil and gas. The MDUs have provided treatment for 6,722 patients and the average expenses incurred to treat a single patient is 100.33 Baht without differentiating variable costs based on procedural complexity or the specialized materials and equipment required for individual interventions.

Conclusion N/A

Ethical protocol (HRDC-2025-197,) Supported by Dental Research Fund, Dental Research Project 3200502#42/2023, Faculty of Dentistry, Chulalongkorn University

Effect of HMGB1 Box-A on the phenotype of aged gingival fibroblasts: a pilot *in vitro* study

Borisutprasit N*, Subbalekha K¹, Matangkasombut O², Rattanaprakul K³

¹Department of Oral and Maxillofacial surgery, ²Department of Microbiology,

²Center of Excellence on Oral Microbiology and Immunology, ³Department of Periodontology,
Faculty of Dentistry, Chulalongkorn University

Objective This study aimed to investigate the effects of HMGB1 Box A on cellular senescence and proliferation in aged versus young gingival fibroblasts.

Material and methods Primary gingival fibroblasts were harvested from healthy gingival tissues of young donors (18-30 years old) and aged donors (≥ 60 years old). The recombinant HMGB1 Box A was used to treat aged fibroblasts by using transfection method with Lipofectamine 3,000 with proper condition in varies concentration. Aged fibroblasts treated with recombinant HMGB1 Box A were compared to untreated aged fibroblasts and young fibroblast controls. Senescence was assessed using SA- β -gal staining. Proliferative capacity was evaluated using MTT assay and Ki-67 immunostaining. This was an *in vitro* pilot study.

Results Primary gingival fibroblast was cultured from young and aged individuals. Aged gingival fibroblast cells were transfected with HMGB1 box A by using Lipofectamine 3,000 with 600 ng of DNA per 50,000 cells died after observing under microscope 1 day. Next procedures are trying the new condition for transfection at 100, 200, and 400 ng of DNA and evaluate senescence cells by SA- β -gal staining and proliferative capacity by using MTT assay and Ki-67 immunostaining.

Conclusion N/A

Ethical protocol (HREC-DCU 2025-176) Supported by Dental Research Fund, Dental Research Project 3200502#2320042000/2025, Faculty of Dentistry, Chulalongkorn University

