Faculty of Dentistry
Division of Graduate Dental Studies

ENDODONTICS

Residency Training Programme

leading to the degree of

Master of Dental Surgery (MDS)

2021

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2 Introduction

Welcome! The Endodontic Residency Training Programme is a 3-year full-time NUS curriculum comprising didactic, research and clinical training leading to the degree of Master of Dental Surgery in Endodontics. The goal of the training program is to prepare graduates to be proficient endodontic practitioners and competent academics with clinical acumen. At the National University Centre for Oral Health (NUCOHS) where education, clinical service and research activities are housed under one roof, residents are encouraged to hone their clinical skills, challenge accepted norms, apply their knowledge in teaching and conduct meaningful research under the guidance of oral health scientists and clinician scholars.

At the end of the educational training, graduates should possess:

- an in-depth biomedical knowledge and a good foundation relevant to the art and science of Dentistry and Endodontics.
- a sound academic and clinical understanding of physiology and pathology of pulp, periradicular and surrounding tissues so as to achieve advanced diagnostic and clinical skills required of a specialist in endodontics.
- the ability to effectively integrate and interact with other specialists in the provision of patient care requiring differential diagnosis and / or multidisciplinary management.
- an understanding of research methodology and skills to conduct basic research.
- some experience in teaching.
- skills for independent life-long learning including literature critique and research evaluation.

3 Course Content

DIDACTICS

Critical Reading and Literary Pursuits
A hallmark of the Endodontic Residency Training Programme at NUS, residents will spend 40% of their time reading the literature critically and taking part in research activities. Residents are expected to be intrinsically motivated to take responsibility for their own learning as well as that of their peers. Faculty will provide leadership through formal contact time and mentoring opportunities outside of the classroom.

Treatment Conferences
Through critical reviews of treatment plans, residents are trained to develop a biologically sound philosophy and evidence-based rationale for Endodontic Therapy. Regular presentations and engaging in Questions & Answers sessions among peers add value in developing a well-groomed clinician-academician.

Teaching Duties
Residents are trained to teach undergraduate endodontic students in Techniques of Root Canal Treatment on extracted teeth and models; Basic Endodontic Clinical Protocol; and supervising senior students in the Undergraduate Endodontic Clinic.

CLINICS
Pre-clinical surgical and non-surgical courses are conducted in a simulated and safe environment to upskill the first year residents and facilitate mid-career residents' practice of new skills before application in the clinics.

Managing patients' endodontic needs in the NUCOHS and NDCS graduate clinics makes up 60% of the MDS residency programme. The resident will be trained to diagnose, treat and manage patients with endodontic problems with a focus on prevention and preservation. These include deep caries management and vital pulp therapy; treating the infected root canal system with complex morphology, management of procedural errors and emergencies; treatment of traumatic injuries; regenerating the infected immature root; surgical endodontics; and being part of a care team to manage medically and dentally complex patients. At the NUS, team-based Endodontic care is provided with close collaboration with Orthodontics, Pain Clinic, Pediatric Dentistry, Periodontics, Prosthodontics, Oral Radiology and Oral & Maxillofacial Surgery.

RESEARCH

Basic Medical Science Course
This foundational course levels up residents coming from varying background and provides the necessary knowledge for postgraduate training at NUS.

Basic Training in Research Methodology
This course teaches the principles of biostatistics, research design and scientific writing. Residents will understand and be equipped to review the literature and conduct meaningful research.

MDS Research Project & Milestones
Residents will complete a research project, defend the thesis and submit a manuscript of its findings to a reputable journal, as partial fulfillment of the requirements for the MDS degree in Endodontics. Residents are also strongly encouraged to present their research findings at scientific meetings in Singapore and overseas.

Key milestones
Year 1: Literature review, protocol design, grant and ethics application

Year 2: Conduct the research project, share key findings at scientific meetings

Year 3: Write the paper and submit it by April of the year of graduation.

FORMATIVE & SUMMATIVE ASSESSMENTS

Formative assessments are carried out in the classroom and clinics. Feedback is given at the time of engagement. Summative assessments are conducted once a year at the end of Term 4. Residents who have met all the training requirements will be eligible to sit for the Final MDS Exams in May.

4 Examinations

AWARD OF NUS MDS (ENDODONTICS)
The resident who has completed the following to the satisfaction of his/her supervisor will be eligible to sit for the Final MDS Examinations:

1) Completion of a satisfactory number of root canal treatment cases that includes a wide variety of endodontic problems including endodontic surgeries.
2) Satisfactory performance at all continual assessments and end of 1st and 2nd year examinations.
3) Completion of research work and submission of paper.

The degree of Master of Dental Surgery in Endodontics will be awarded to the resident candidate upon passing the Final MDS Examinations.

Candidates who have performed exceptionally well throughout the Residency Programme and at the Final MDS Examination are eligible for the Society of Endodontists Singapore Medal or Cash Prize.

5 Course Modules

Term 1	July / September	Code	Y1	Y2	Y3
	INTRODUCTION TO ADVANCED ENDODONTICS	**SEM**	√		
1	Orientation / Clinical Protocol				
2	Infection Control Protocol				
3	Microscope – Introduction & Principle Usage				
4	Armamentaria in Micro-Endodontics				
5	Use of Microscope in Non-Surgical Endodontics (I)				
6	Endodontic Problem Solving				
	TEXTBOOK REVIEW	**SEM**	√		
1	Radiology of AP				
2	Expected Outcomes in AP				
3	Stem Cells and Regeneration				
4	Dental Innervation and Response				
5	Pain Pathways and Mechanisms				
6	Pharmacological Control				
7	Pulpal Infections				
8	Pulp and AP				
9	Caries, Restorative Dentistry and Pulp				
	SURGICAL ENDODONTICS	**SEM**		√	
1	Historical and contemporary perspectives				
2	Wound healing and bone biology				
3	Anatomical basis and special considerations				
4	Flap designs and soft tissue management				
5	Microsurgical armamentarium				
6	Prognosis				
7	Corrective surgery				
8	Retrograde filling materials				
9	Practical Aspects of Surgical Procedures				
	2000-word Essay “What is modern endodontic surgery and how different is it from traditional root end surgery?”				
ODD	**SPECIAL TOPIC – RADIOLOGY**	**SEM**	√	√	
1	Radiation Physics, Safety and Protection				
2	Disease development mechanisms & radiographic appearance				
3	Studying the Maxilla – normal anatomy, variation of normality & pathology				
4	Studying the Mandible – normal anatomy, variation of normality & pathology				
5	Studying Dental Structures – normal anatomy, variation of normality & pathology				
6	General interpretations of CBCT – what must be reported				
7	CBCT in endodontics – Challenges and value to patient care; how does it compare with 2D radiography?				
8	PRACTICUM - Manipulating CBCT images				
9	Discussions & Conclusions				
	CLINICAL DENTAL PHOTOGRAPHY (7 WEEKS)	**CORE**	√		
	BASIC COURSE IN DENTAL IMPLANTOLOGY I	**SEM**		√	
	BASIC MEDICAL SCIENCE COURSE (2 WK VACATION TERM)	**CORE**	√		
	PRECLINICAL LABORATORY PRACTICAL	**SEM**	√		
	CURRENT LITERATURE	**SEM**	√	√	√

	TREATMENT CONFERENCE	**SEM**	√	√	√
	RESEARCH	**RES**	√	√	√
	TEACHING	**TCH**			√
Term 2	**October / December**	**Code**	**Y1**	**Y2**	**Y3**
ODD	**ENDODONTICS & DENTAL TRAUMATOLOGY**	**SEM**	√	√	
1	**Classification, Etiology, Epidemiology**				
2	**Crown Fractures – Uncomplicated, Complicated (I)**				
3	**Crown Fractures – Uncomplicated, Complicated (II)**				
4	**Crown Root Fracture – Uncomplicated, Complicated**				
5	**Root Fractures**				
6	**Concussion & Subluxation**				
7	**Luxation**				
8	**Avulsion**				
9	**Review & Discussion**				
ODD	**SPECIAL TOPIC – CARIOLOGY & LASER**	**SEM**	√	√	
1	**Introduction: Epidemiology and Etiological Theories**				
2	**Tooth Structures, Saliva, and De/Remineralization**				
3	**Diet, Microbiology & Immunology**				
4	**Pulpal reactions to laser irradiation: safety issues**				
5	**Laser debridment/disinfection: root canal instrumentation**				
6	**Laser desensitization: approach to root/dentin hypersensitivity**				
7	**Surgical laser application in endodontics**				
8	**Laser sealing/thermoplasticization: coronal and/or apical microleakage**				
9	**Conclusions/presentation**				
EVEN	**MULTIDISCIPLINARY CONSIDERATIONS**	**SEM**	√	√	
1	**Systemic Considerations in Endodontics**				
2	**Antibiotics in Endodontics**				
3	**Vital & Non-vital Bleaching**				
4	**Root Extrusion**				
5	**Prosthodontics & Endodontics**				
6	**Orthodontics & Endodontics**				
7	**Paedodontics & Endodontics**				
8	**OMS & Endodontics**				
9	**Endodontic – Periodontic Interrelationship**				
10	**Prognosis of the Compromised Tooth in Shared Decision-making**				
EVEN	**SPECIAL TOPIC – ISSUES IN ENDODONTICS**	**SEM**	√	√	
1	**Single-Visit Endodontics**				
2	**Practice Management Panel Discussion**				
3	**Separated Instruments Case Discussions**				
4	**Canal Transportation Case Discussions**				
5	**Perforations Case Discussions**				
6	**Iatrogenic Errors**				
9	**Review and Discussion**				
	BIOSTATISTICS & RESEARCH DESIGN	**CORE**	√		
	CURRENT LITERATURE	**SEM**	√	√	√
	TREATMENT CONFERENCE	**SEM**	√	√	√

	RESEARCH	**RES**	√	√	
	TEACHING	**TCH**		√	

Term 3	**January / March**	**Code**	**Y1**	**Y2**	**Y3**
ODD	**PULP BIOLOGY IN HEALTH AND DISEASE**	**LIT**	√	√	
1	Pulp Embryology / Hereditary Diseases				
2	Pulp as Connective Tissue				
3	Pulp Circulation				
4	Pulp Innervation				
5	Dentin Morphology & Histology				
6	Dentin-Pulp Complex				
7	Anatomy of Periapical Tissues				
8	Pulp Physiology				
9	Dentin Pulp Changes – Physiological Ageing				
10	Dentin Sensitivity				
EVEN	**PRINCIPLES OF ENDODONTICS I – TREATING THE PATIENT**	**SEM**	√	√	
1	Clinical Classification of Pulp and Apical Disease				
2	Pulp Diagnostic Tests				
3	Correlation of Clinical Pulp Status with Radiography & Histology				
4	Differential Diagnosis of Apical Lesions of Endodontic Origin				
5	Dentine Sensitivity and Pain Theories of Pulp Origin				
6	Incomplete Crown Fractures & Transillumination				
7	Orofacial Pain				
8	Neuropathic Pain				
9	Flare-up and Persistent Apical Periodontitis				
10	The concept of Functional Retention				
11	Anaesthesia in Endodontics				
12	Review and Discussion				
ODD	**PRINCIPLES OF ENDODONTICS II – TREATING THE TOOTH**	**SEM**	√	√	
1	Contemporary Access Cavity				
2	Root Canal Debridement				
3	Root Canal Debridement Armamentarium				
4	The Apical Constriction				
5	Endodontic Obturation & Materials				
6	Bacterial Entombment				
7	Intracanal Medicaments				
8	Restoration of the Endodontically-treated Tooth				
9	Non-vital Bleaching				
10	Procedural Errors				
11	Retrieval of Separated Instruments				
12	Endodontic Treatment Outcome				
	TREATMENT CONFERENCE	**SEM**	√	√	√
	RESEARCH	**RES**		√	√
	CURRENT LITERATURE	**SEM**	√	√	√
	TEACHING	**TCH**		√	√

Term 4	**April / June**	**Code**	**Y1**	**Y2**	**Y3**
ODD	**REGENERATION IN ENDODONTICS**	**SEM**	√	√	
1	Apexification & Apexogenesis				
2	Tissue Engineering				
3	Dental Pulp Regeneration I				
4	Dental Pulp Regeneration II				

5	Periodontal Regeneration				
6	Review & Discussion				
EVEN	**MICROBIOLOGY AND OROSYSTEMIC LINK**	**SEM**	√	√	
1	Virulence Mechanisms of Endodontal / Periodontal Pathogens				
2	Cytokines Network				
3	Deep Carious Lesions				
4	Pulpal Responses to Infection				
5	Periapical Responses to Pulpal Infection				
6	Systemic Effects of Pulpal Infection				
7	Review & Discussion				
8	Focal Infection Theory				
9	Anachoresis & Bacteremia				
	IMMUNOLOGY WORKSHOP (2 WEEKS)	**WKSP**	√		
	A review of basic microbiology	LECT			
	Methods in molecular biology (DNA)				
	Bacterial virulence				
	Host-pathogen interaction in oral infection				
	Host response				
	Methods in molecular biology (RNA & Protein)				
	Basic bioinformatics				
	Journal Club	SEM			
	Basic microbiology techniques	WKSP			
	PCR & Agarose gel electrophoresis				
	Antibiotic susceptibility testing				
	Cell seeding				
	Cell infection & viability assays				
	ELISA				
	TREATMENT CONFERENCE	**SEM**	√	√	√
	RESEARCH	**RES**	**(√)**	√	√
	CURRENT LITERATURE	**SEM**	√	√	√
	TEACHING	**TCH**		√	√
	END OF YEAR SUMMATIVE ASSESSMENT	**EXAM**	√	√	
	FINAL MDS EXAMINATION	**EXAM**			√