

McGill University
DEPARTMENT OF DIAGNOSTIC RADIOLOGY

**COMBINED RESEARCH AND CLINICAL FELLOWSHIP IN HEAD AND NECK
IMAGING**

Duration of training: 1 Year Fellowship Program

Head and Neck Imaging Fellowship Director: Dr. Reza Forghani

Name of Program Director: Dr. Jana Taylor

The Department of Radiology at the Jewish General Hospital offers a 1-year Clinical & Research fellowship in Head and Neck Imaging. The fellowship program offers clinical exposure as well as exposure to clinical research in Head and Neck Imaging with a focus on head and neck oncology and advanced imaging techniques such as dual-energy CT. The clinical component of the fellowship will expose the fellow to all areas of head and neck cross-sectional imaging with a special focus on CT and MRI. The fellowship provides an integrated experience of research, multidisciplinary clinical care through participation in tumor boards, and teaching. **To be eligible, applicants must have completed at least one year of clinical fellowship or staff position in Neuroradiology.**

The Jewish General Hospital a 637 bed acute care hospital and is a McGill University teaching hospital. It is the main hospital and referral center in an integrated network of 8 institutions. An estimated total of approximately 180,000 non-interventional radiologic procedures are performed per year. In addition, the hospital is the designated supra-regional ENT oncology centre.

Fellows are based at the Jewish General Hospital for the entire duration of the rotation. The 'academic' year is July 1 to June 30.

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1. CLINICAL FELLOWSHIP - GENERAL GUIDELINES

The following guidelines are designed to clarify the fellow's job description. The duties described are geared towards enriching the fellow's own experience and achievement as well as optimizing the functioning of the Head and Neck section.

The fellowship is dedicated to cross sectional imaging and in particular CT and MRI for evaluation of adult head and neck pathology. Dual-energy CT is routinely performed for evaluation of the head and neck as part of clinical care. As such, the fellows will be exposed to and will be expected to become comfortable with principles of dual-energy CT scanning, as well as routine and advanced dual-energy post-processing. While the main clinical component of training will be CT and MRI, fellows will also be exposed to US scanning, primarily for evaluation of thyroid disease. Participation in image guided thyroid biopsies could be arranged depending on the fellow's level of interest. The emphasis on clinically relevant imaging and overall patient management remains important and is an integral part of the fellow's training. To enhance the fellow's experience and ensure that the fellow is fully immersed in the multidisciplinary patient management, the fellow will attend all relevant multidisciplinary rounds and tumor boards related to management of head and neck pathologies. At the conclusion of the training, the fellow should be able to function autonomously as a Radiology consultant in head and neck imaging and be comfortable in implementing and evaluating advanced imaging platforms for head and neck such dual energy CT.

The fellow functions as a junior attending and as such must be integrated into the *teaching team*. This includes teaching residents and medical students when appropriate, and giving teaching rounds. Furthermore, the presence of the fellow should not interfere with the training of the residents rotating in the head and neck section. In her or his role as a junior attending, the fellow will organize and make sure the workload is appropriately distributed when residents are rotating at the Jewish General Hospital. The fellow is also encouraged to enhance the teaching experience of residents by sharing interesting cases. Other academic and research duties are described separately below.

At the Jewish General Hospital, all outpatient CT and MRI and complex emergency head and neck imaging is only interpreted by radiologists sub-specialized in head and neck imaging. The fellow will be reviewing those cases with specialized head and neck radiologists. For ultrasound and for interventional diagnostic procedures, the fellow may also review with and/or be supervised by other radiologists with specialization in those modalities.

2. THE ROTATIONS

2.0 OVERVIEW

Head and neck imaging fellows spend a maximum total of 3 full day equivalents (6 half days) on the clinical service and the rest of time doing research (see separate section below). Protected time may not be granted for short periods in rare instances when there is a critical shortage of staff radiologists. The clinical rotation in head and neck is not divided into traditional modalities (CT, MRI, etc.). When on clinical duty, the fellow will be responsible for interpreting CT and MRI scans. To ensure good exposure to thyroid imaging and image guided biopsies, the fellow will also perform neck ultrasounds and/or biopsies 1 to 2 half days per week. Finally, the fellow will be involved in supervision and interpretation of modified barium swallows and rarely other barium studies.

2.1 CT SCANS

General overview

- Most scheduled contrast enhanced CT scans are performed from 8:00AM to 5:00PM. However, outpatient CT scans, mostly unenhanced studies such as sinus CT scans, are also performed afterhours. There is also a CT scanner located in the emergency department at the Jewish General Hospital and is operational 24 h/day for urgent cases presenting through the Emergency Department.
- Except for thyroid disease, CT is the first line imaging modality for the majority of adult head and neck pathologies and accounts for the majority of the studies interpreted by the fellow. CT scans covering the entire range of malignant and benign head and neck pathologies

will be performed, including contrast-enhanced CT of the soft tissues of the neck, CT of the skull base and sinuses, orbits, and temporal bones. Occasionally, CT scans of the sella will also be performed and are interpreted by the head and neck section. Other, specialized CT scans, including multiphasic “4D” parathyroid CT scans are also routinely performed.

- As discussed above, as a junior attending, the fellow will be responsible for organization of the head and neck imaging service, including assignment of an appropriate workload when residents are rotating on the service. The fellow will protocol cases according to the specific indication and will guide the technologists, when necessary, to make sure that the optimal diagnostic evaluation is performed. The fellow will also act as first line consultant to clinicians for head and neck imaging studies.
- The outpatient department at the Jewish General Hospital is equipped with a dual-energy CT scanner that is in routine clinical use for select head and neck studies, particularly those performed for evaluation of head and neck squamous cell carcinoma. The successful fellow will be familiar with principles behind dual-energy CT, latest clinical applications as well as more advanced image processing using a dedicated workstation.
- The duties are also further described at the end of this section.

Specific objectives

1. Know contraindications to CT scanning.
2. Be familiar with preparation for and treatment of CT contrast reactions.
3. Be familiar with CT acquisition protocols for pathologies located in different head and neck sites.
4. Be familiar with different DECT reconstructions and advanced DECT processing at the dedicated workstation.
5. Be familiar with approaches for reducing artifact (eg dental), including angled image acquisition and high energy DECT reconstructions.
6. Recognize detailed normal head and neck anatomy in different planes.
7. Be familiar with the imaging classification of lymph nodes in the neck.

8. Recognize different benign and neoplastic head and neck pathologies.
9. Be familiar with the AJCC cancer staging system for the head and neck, particularly those affecting patient stage and altering management.
10. Be familiar with general treatment algorithms for different head and neck sites (eg, surgery, radiation/chemotherapy, etc.).

2.2 MRI SCANS

General overview

- Most outpatient head and neck MRI scans are performed between 8:00AM to 5:00PM although, similar to CT, outpatient scans may also be performed afterhours or on weekends. The JGH is equipped with both 3T and 1.5T MRI scanners.
- Although MRI scans are performed for routine evaluation of certain pathologies, in the head and neck, a significant proportion of MRI scans are performed as a targeted adjunctive examination performed to address clinically pertinent questions important for patient staging and management. Therefore, in addition to routine neck MRIs, high resolution skull base MRIs, sinus and orbit MRIs, and high resolution cranial nerve imaging is performed and interpreted in the head and neck section.
- The fellow is required to review the schedule on a daily basis while on clinical duty and actively monitor the acquisition of head and neck MRIs, particularly for non-routine adjunctive examinations. The fellow will also protocol head and neck MRIs and actively monitor special protocols, such as high resolution scanning of larynx. In addition, the fellow is encouraged to be present and watch the technologists program the sequences when possible. This will help the fellow increase her/his familiarity with the various scanning parameters, learn ways to decrease scanning time, improve resolution, and trouble-shoot when necessary to enhance the diagnostic quality of the examination.
- The duties are also further described at the end of this section.

Specific objectives

1. Know contraindications to MR imaging.
2. Be familiar with indications for head and neck MRI, including advantages and disadvantages for evaluation of different head and neck cancer sites and subsites.
3. Be familiar with common adjunctive applications of MRI to supplement other scans to address important staging and management related questions.
4. Be familiar with MRI acquisition protocols for pathologies located in different head and neck sites, including high resolution imaging of the larynx and skull base.
5. Be familiar with basic pulse sequences and their clinical applications. Be familiar with basic imaging artifacts. Be familiar with advantages of fat suppression as well as disadvantages such as potential accentuation of artifacts and how to circumvent or use additional sequences for an optimal diagnostic evaluation.
6. Recognize detailed normal head and neck anatomy in different planes and on different sequences.
7. Be familiar with the imaging classification of lymph nodes in the neck.
8. Recognize different benign and neoplastic head and neck pathologies and their MRI signal characteristics.
9. Be familiar with the AJCC cancer staging system for the head and neck, particularly those affecting patient stage and altering management.
10. Be familiar with general treatment algorithms for different head and neck sites (eg, surgery, radiation/chemotherapy, etc.).

2.3 DIAGNOSTIC ULTRASOUND

General overview

- Elective outpatient head and neck ultrasound (US) scans are performed between 8:00AM to 5:00PM, Monday to Friday with the exception of special holidays.
- In our practice, diagnostic US is mainly performed for work up and follow up of thyroid disease. Invasive procedures are discussed separately.
- The objectives of the US component of the fellowship is to ensure that the fellow is both comfortable in supervising technologists and has the necessary skills in US to directly scan

and serve as back up to the US technologists when necessary for an optimal diagnostic evaluation. As such, the US component will consist of a mix of checking work done by US technologists and directly scanning patients.

- Similar to other modalities, the fellow will be involved in teaching residents.
- The duties are also further described at the end of this section.

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Specific objectives

1. Be familiar with indications for head and neck US. Understand advantages and disadvantages of US for evaluation of head and neck pathology.
2. Be comfortable in performing a systematic and thorough sonographic evaluation of the neck.
3. Be comfortable supervising US technologist and verifying scans performed by technologists.
4. Recognize detailed normal head and neck anatomy on US.
5. Recognize the sonographic appearance of different head and neck lesions and pathologic lymph nodes.
6. Have a systematic approach for evaluation and reporting of thyroid nodules enabling appropriate risk stratification.
7. Be familiar with the latest guidelines for stratification, follow-up and additional work up of thyroid nodules.
8. Be familiar with the AJCC cancer staging system for the head and neck, particularly for thyroid disease.
9. Be familiar with general treatment algorithms for treatment of different pathologies, particularly thyroid cancer.

2.4 BARIUM FLUOROSCOPIC STUDIES

- Barium studies constitute a small percentage of exams performed by the fellow. Nonetheless, they are an important part of clinical care provided to head and neck patients.

- The fellow will be involved in acquisition and interpretation of modified barium swallows. These are performed in conjunction with the speech pathology team. Rarely, the fellow may be involved in performance of other studies directly related to the care of head and neck patients.

2.5 HEAD AND NECK PROCEDURES

General overview

- Image guided head and neck procedures, with few exceptions (see fellow duties' section), are typically elective outpatient procedures performed between 8:00AM to 5:00PM, Monday to Friday, with the exception of special holidays.
- By nature of the disease processes as well as institutional practice, many head and neck lesions will have been biopsied by the otolaryngologists, typically under endoscopy. Nonetheless, image guided biopsies play an important role in evaluation of patients for carefully selected indications. Biopsies are most frequently performed for thyroid nodules but may also be performed for evaluation of lymph nodes or other head and neck lesions.
- During the fellowship, arrangements will be made for the fellow to perform invasive diagnostic procedures, mainly consisting of thyroid nodule biopsies but also other head and neck lesions and lymph nodes. In addition, the fellow will be involved in performance of myelographic procedures, regardless of whether they are performed for evaluation of CSF leaks or spinal degenerative disc disease. The reason behind having the fellow perform all myelographic procedures is that only a relatively small number of total myelographic procedures are performed and this is the best way to ensure that fellow acquires satisfactory exposure and skill at performing these procedures. Lastly, the fellow should participate in occasional CT guided head and neck procedures, if performed. The fellow will not be involved in interventional procedures performed for treatment of head and neck lesions or invasive vascular procedures.

Specific objectives

1. Be familiar with indications for head and neck invasive diagnostic procedures.

2. Be familiar with indications for myelographic procedures for evaluation of CSF leaks or diseases of the spine.
3. Be familiar with optimal modalities and approaches for performing head and neck invasive diagnostic procedures.
4. Be comfortable performing an ultrasound guided biopsy of head and neck lesions within or outside the thyroid gland.
5. Be comfortable performing fluoroscopically guided lumbar puncture and contrast instillation for evaluation of CSF leaks or diseases of the spine.

2.6 RESEARCH

General overview

- The fellow will be provided with a minimum of 2 full day equivalents (4 half days) protected time to perform research.
- Projects are carried out under the supervision of head and neck radiologists but could involve multiple supervisors or collaborations with other departments.
- Fellow projects must be approved by the Head and Neck Fellowship director.
- It is expected that the research performed by the fellow results in publications describing original contributions in peer reviewed journals and be presented at national and international meetings. By nature, it is difficult to arrive at a specific number of required publications and different factors, including the quality of the publication and impact factor of the journal, will be taken into account. However, as a general guide, it is typically expected that the successful fellow will have 3 articles published based on the research performed during the fellowship, including at least one first author publication.
- During the course of the fellowship, the fellow may be provided with opportunities to participate in the writing of case reports, literature reviews, or book chapters. These could be beneficial to the fellow by providing an opportunity to acquire additional expertise and recognition in a specific topic. However, **THESE WOULD NOT COUNT TOWARDS AND WOULD NOT SUBSTITUTE** for peer reviewed, original contributions to knowledge described in the previous paragraph.

- In order to ensure a successful and productive research experience and given the short duration of the fellowship, it will be mandatory that the fellow has at least one research proposal written prior to joining the start date of the fellowship. This should be coordinated with the supervisor and Head and Neck Fellowship director (if different from the supervisor).
- Presentation of results at national and international meetings and publication of original research in leading peer-reviewed journals is a mandatory component of this fellowship.
- Fellows may also be required to apply for grant funding prior to arriving in the Department. Support will be provided to the fellow for the grant application process.

Specific objectives

1. Be able to design a research project with a clear hypothesis and sound methodology to address the question.
2. Perform a thorough literature search to identify the relevant investigations pertaining to the research question.
3. Be familiar with basic research analysis and statistics.
4. Draft a manuscript describing the original research including a proper introduction providing a concise literature review and the basis for the investigation, well described methods and results section, and a discussion that includes the strengths, pitfalls, and relevance of the investigation.
5. Participate in writing of a research grant (if requested/depending on the project and available grants).

2.7 ELECTIVES

There are currently no planned electives for the one year combined Clinical-Research Head and Neck Imaging Fellowship. Under special circumstances, the fellow may request one or two periods for elective rotations during the fellowship year. This will be considered on a case by case basis depending on the needs of the fellow and staffing of the department, is not

guaranteed in anyway and must specifically be approved by the Head and Neck Imaging Fellowship Director.

2.8 FELLOW RESPONSIBILITIES

The information in this section is meant to complement descriptions and objectives described in earlier sections.

General duties

1. This is an advanced fellowship providing the fellow with the opportunity to function as a junior attending in an academic setting. As such, the fellow is expected to function as a diagnostic imaging expert, patient and quality advocate, manager and organizer, researcher, and teacher.
2. Typical work hours (with the exception of call, below) are between 8:00AM to 5:00PM. Exams performed during these hours are expected to be reviewed and reported on that day. In the case of establishment of an evening shift, the fellow may also rotate on that shift (instead of day shift) depending on the staffing and clinical needs of the department.
3. Optimal management of daily activities is an important function of the fellow and will help ensure optimal clinical care, effective use of the fellow's time, and productivity in research. The Head and Neck Fellowship director will help the fellow in planning and organizing activities. To make sure that the fellow gets optimal exposure to the full range of head and neck imaging cases, clinical half days will preferentially be assigned in the afternoons.
4. There are natural fluctuations in the scheduled cases that may affect the clinical workload. As such, the fellow will be expected to use any "downtime" to attend to other activities, including research projects.
5. Timely reporting is an important component of clinical care provided by the Department of Radiology. All clinical reporting in our department is done using PowerScribe 360 (Nuance Communications, Inc.). As such final signed reports are

available to referring physicians within 5 minutes of completion. Typically, cases referred from the Emergency Department and inpatient units performed during regular hours are expected to be reviewed and reported within 2 hours of completion.

Outpatient cases should typically be reviewed and reported on the same day. Elective cases performed on weekends are typically reviewed and reported on the following Monday.

6. The fellow is responsible for protocolling and reviewing cases to ensure that the correct and optimal protocol has been performed. A number of preset protocols are already in place to facilitate and enhance the quality of care (including automatic acquisition of angled views by the technologists for patients with dental fillings, and site-specific protocols, etc). When appropriate, the fellow should actively monitor scan acquisition and adjust the protocol (for example, additional sequence acquisitions in MRI, etc). The fellow is responsible for reviewing the outpatient schedule on a daily basis to identify the cases that may require more close and active supervision. This includes gathering of pertinent clinical information and indications for the study as well as relevant prior imaging.

Duties – invasive diagnostic procedures

1. Appropriate preparation and planning is an essential part of any successful invasive procedure. At the time of booking, the fellow will be approached by the administrative staff to evaluate contra-indications and review patient medications that may have to be stopped prior to the procedure. When necessary, the fellow should contact the patient to provide specific instructions on stopping medications. In certain cases, such as stopping anti-coagulation, the fellow may also have to contact the referring physician for discussion of risks versus benefits and approval. The attending head and neck radiologist should be made aware of the discussions and plan.
2. Before any planned invasive procedure, ideally the day before for complicated procedures, the fellow should review the pertinent previous studies.

3. Patient's blood work, such as platelets and coagulation factors must be verified, and informed consent should be obtained by the fellow. Before starting the procedure, the fellow must discuss the clinical indications, planned approach etc. with the staff, and obtain adequate supervision. As part of his/her teaching responsibilities, the fellow must also teach the residents basic skills in US-guided biopsies.
4. After a procedure has been performed, it is the fellow's responsibility to ensure that the appropriate microbiology, pathology and cytology requisitions are completed. A note in the chart must be written outlining the procedures and the patient's tolerance to it as part of standard practice. In certain cases, additional routine follow-up and monitoring of patients is required and the fellow must oversee and such follow-up and evaluate all outpatients before leaving the department as part of routine standard of care. If a patient is admitted to Day Surgery after a procedure or requires assessment before discharge of care from the Department of Radiology, the fellow must evaluate the patient in order to discharge them.

Duties – Research

1. Complete a research proposal and plan PRIOR to the start of the fellowship with the assistance of research supervisor; apply for funding/grants when appropriate.
2. Actively participate in design and execution of research projects.
3. Take initiative to improve research design or propose new topics of interest to research supervisor and/or Head and Neck Imaging Fellowship Director.
4. Be familiar with advanced post-processing functions, including advanced dual energy CT analysis.
5. Ensure appropriate back-up and storage of spectral CT datasets.
6. Help train other investigators/trainees in advanced image processing, including spectral dual-energy CT analysis.
7. Identify journals suitable for manuscript publication. Prepare draft manuscript in near publication format for review by research supervisor.
8. Oversee coordination with different authors, completion and submission of manuscripts.

9. Be involved, draft, and submit IRB proposals and/or administer consent forms when appropriate.
10. Participate, prepare, and submit grant proposal(s) when appropriate.
11. Plan for hand-over of incomplete research projects. Ensure completion of and publication of manuscripts resulting from research projects.
12. The assignment of authors is based on merit and work done by each individual, and typically key author positions, in particular the first author position and the last/senior author position are predetermined. However, the privilege of holding a first author position is contingent on the appropriate contribution in all aspects of the research project. This includes timely completion, drafting, and submission of the manuscript.

Other Academic Duties

1. Contribute to teaching file.
2. Share recent interesting articles and guidelines.
3. Prepare and participate in multi-disciplinary head and neck rounds.
4. Present at ENT teaching rounds.
5. Present case rounds to the residents.
6. Participate and present in journal club.

Quality initiatives

1. The fellow will be expected to keep up to date with the latest management guidelines and suggest and oversee implementation or changes to practice, as appropriate, and after approval of the section and department chief
2. The fellow is expected to participate in quality programs required of other attending Radiologists, such as peer-review and other continuous quality improvement initiatives

Fellow responsibilities and relation to the residents

The fellow's responsibilities are separate from those of the residents, and the fellows positively impact residency training. There is no negative impact of the fellowship on residency training.

3. ON CALL

The fellow is expected to be on call 1 week in four, for a total of 13 weeks per academic year. The fellow will rotate in the Neuroradiology component of the call. The fellow will cover the Jewish General Hospital and will be on-call, at home with a pager. The fellow will be a resource person for the residents on-call. Their expertise is typically required for CTs and MRIs but may rarely be requested for other modalities or procedures such as myelography. Whenever they are requested to perform a procedure, they must contact the staff radiologist on call prior to performing the procedure. In addition to the pager call, the fellows are responsible for reading all emergency and inpatient neuroradiology CT scans and MRIs, including those of the spine, as well as emergency and inpatient head and neck studies, beginning at 5:00PM Friday evening until 8:00AM Sunday. The hours of coverage and overall call schedule are subject to change depending on the clinical needs of the department and general changes in evening and/or call coverage.

4. VACATION/CONFERENCES/OTHER TEACHING ROUNDS

The fellow is granted 4 weeks of vacation plus an additional week during either the Christmas or New Year's holidays. The fellow is also granted two weeks to attend a conference. Typically this time is used to present the fellows' research at national and international meetings but unused time could be used to attend meetings in which the fellow is not presenting (proof of paid registration required). In addition, the fellow is entitled to 9 days personal/sick leave. If he/she presents a paper at a major conference, the time of the conference is not counted against her/his conference or vacation time for up to 2 conference presentations. For conferences outside of Montreal, 3 days will be provided (2 days for travel and 1 day for presentation) and will not be counted against the fellow conference days or vacation. For conferences in Montreal, one day will be provided. In addition, she/he may request funding for expenses incurred to attend the meeting where the fellow presents,

provided that the research was done in the department of Radiology at the Jewish General Hospital. Advanced approval for all vacation, conferences, and funding is required by the director of the Head and Neck Imaging Fellowship.

The rounds in which the fellow is expected to participate were described in earlier sections. When a *Visiting Professor* is received at McGill whose subspecialty is in head and neck imaging, the fellow may request to attend the sessions. The program will do its best to accommodate these requests, depending on staffing and clinical needs of the department. If there are no dedicated head and neck imaging visiting professors during that academic year, similar consideration will be provided for any visiting professor sub-specialized in neuroradiology. If the fellows want to attend other Visiting Professor sessions, they can use their conference or vacation time to do so.

5. FELLOW EVALUATION; MISCELLANEOUS

Fellow evaluation

The fellow is evaluated on a daily basis by the attending staff and will meet regularly with the fellowship supervisor for face-to-face feedback. A formal written evaluation is completed every three months, using the CanMEDS roles scheme, submitted electronically via One45.

Expected caseload (per half day)

The expected case load will vary depending on the modality. Typically, the minimum expected case load are 10-15 cross-sectional imaging cases per half day. The expected number of procedures will vary depending on the scheduling and standard practice and will be balanced by the diagnostic studies being performed.

Academic Facilities

- Internet access from fellow's (shared) office
- Access to libraries at the Jewish General Hospital, McGill University Health Center sites, and McGill University
- Multimedia learning materials available
- Free online journal access via McGill portal

6. SELECTED READING MATERIALS/REFERENCES

- A) Head and Neck Imaging - 5th Edition (Eds Som and Curtin), Elsevier 2011.
- B) Diagnostic Imaging: Head and Neck, 2nd Edition (Harnsberger), Amirsys 2010.
- C) Head and Neck Radiology (Mancuso and Hanafee), Wolters Kluwer 2010.
- D) Selected review articles (fellows are expected to obtain most up to date information and guidelines from recently published review articles)