

**Name of Institution:** McGill University  
**Location:** Montreal, QC  
**Type of Fellowship:** Clinical  
**Number of positions:** 2  
**Length:** 2 years

## **Fellowship in Integrated Cardiac Imaging**

### **APPLICATION FORM FOR FELLOWSHIPS**

Program Information (please append description):

- **Academic affiliation**
  - McGill University
- **Name of hospitals involved in training**
  - Sir Mortimer B. Davis-Jewish General Hospital (Primary site)
  - The McGill University Health Centre

### **Background**

With great strides made in the field of cardiovascular imaging in the past decade, the time has come to introduce new pathways of training emphasizing the multimodality approach and provide for advanced imaging training in 2 years of total fellowship training. This innovative program promotes an approach adapted to the comprehensive and integrated care needed for our patients.

Improvements in existing techniques in echocardiography and cardiac magnetic resonance imaging (MRI) have changed the face of cardiovascular imaging in just a few short years. The future of cardiovascular care rests on the ability for clinicians to rely on future diagnostic specialists with advanced training in several imaging modalities.

### **Current Training Paradigm**

In the current training paradigm, fellows rotate within individual silos of imaging modalities. Within a one-year fellowship, trainees are able to acquire advanced Level 3 training in only one imaging modality because of the time commitment required.

### **Proposed Training Paradigm**

The proposed new training paradigm comprises 2 years of dedicated training in echocardiography and cardiac MRI, including clinical and research/educational components. The fellow must have successfully completed a Cardiology residency training program. The proposed training is designed for fellows to attain:

- (1) Level 3 training in echocardiography
- (2) Level 3 training in cardiac MRI
- (3) Career-building academic output (research and/or education)

The model of training will allow for trainees to learn the 2 modalities concurrently - the purpose of this pedagogical model is to emphasize learning in an integrated and holistic fashion at the clinical, teaching and research levels.

The program will start with 3 months of echocardiography followed by 3 months of cardiac MRI, at which point, following acquisition of the fundamentals in physics and image acquisition/protocols, would lead to the following weekly schedule:

- (1) Two days of training in echocardiography
- (2) Two days of training in cardiac MRI

### (3) One day of training in academia (research and/or education)

Exposure to cardiac CT will also be offered. At this stage of the training design, this component will be optional.

#### **Research activity**

The trainee will be strongly encouraged to design and conduct projects in the field of "Outcomes Research in Cardiovascular Imaging". The fellow will be encouraged to pursue research in the fields of validation and integration of various imaging modalities to advance knowledge in these fields with the overarching aim of improving patient outcomes within the framework of integrated patient care. In January 2016, the Jewish General Hospital moved into a new facility, the Cardiovascular Integrated Practice Unit (Pavilion K), which has provided an environment conducive to the proposed training.

Trainees may also choose to collect primary data and/or explore one of our existing databases (e.g. POSSE; Preoperative Stratification Before Cardiac Surgery Using Echocardiography). The fellow will be paired with faculty to learn the various steps of research methodology in echocardiography, cardiac MRI and epidemiology. The fellow will have access to the resources (including statisticians) of the Centre for Clinical Epidemiology at the Lady Davis Institute / Jewish General Hospital.

Fellows will devote 1 day per week for this activity.

#### **Funding**

This fellowship will be a non-ministry funded program. Funding will be provided internally by the Division of Cardiology of the Jewish General Hospital.

#### **Outline for how intended fellowship will enhance residency training**

The proposed fellowship program will have a positive and synergistic impact on the Cardiology core residency training program. In fact, one of the shortcomings of our core program in Cardiology has been the lack of exposure of our core trainees to cardiac MRI, a field that the Royal College is now encouraging programs to incorporate as part of core training across the country. The creation of (1) our new cardiac MRI facility, and (2) an integrated cardiac imaging fellowship program would address this shortcoming.

Our echo program for cardiology residents continues to be a popular training site for our residents and one of the most popular electives overall in the Cardiology program.

In addition, with up to three fellows enrolled yearly in the advanced echocardiography fellowship program, our echocardiography laboratory is among the largest in the country. Our resources have grown and remain a premiere site for training for cardiology residents and fellows.

#### **Name of the Fellowship Director**

Igal A. Sebag, MD, FRCPC, FACC, FASE  
Associate Professor of Medicine, McGill University  
Director of Echocardiography and Non-Invasive Cardiology,  
Fellowship/Teaching Director in Echocardiography.

#### **Name of the Fellowship Co-Director**

Jonathan Afilalo, MD, MSc, FACC, FRCPC  
Associate Professor of Medicine, McGill University  
Associate Member, Departments of Epidemiology and Experimental Medicine  
Co-Director of Research, McGill Cardiology Training Program

### **Teaching Faculty**

Over the last 5 years, our teaching faculty has increased by 50% to include 9 full-time Level III echocardiographers and 7 full-time sonographers.

Four members of the teaching faculty received their advanced training in echocardiography at Massachusetts General Hospital, Harvard Medical School, one member received her training at the Texas Heart Institute and four other members obtained their advanced training at McGill University affiliated hospitals. Several members of the faculty serve as leaders in their field at the national and international levels.

The JGH echo lab is a nationally recognized facility having trained 50 cardiologists in advanced echocardiography since 1989. The strengths of the program include a strong faculty with a strong tradition and commitment to teaching in basic and advanced echocardiography.

The cardiac MRI component of this fellowship program is led by Dr. Jonathan Afilalo, who completed a 2-year level III fellowship in cardiac MRI and advanced echocardiography at Harvard University (Massachusetts General Hospital and Beth Israel Deaconess Medical Center). Dr. Afilalo is an active teacher within the cardiology training program, and since 2012, has developed a cardiac MRI curriculum consisting of didactic lectures and interactive workshops. In addition to presenting these sessions to cardiology trainees at their academic half day, Dr. Afilalo has been invited on an annual basis by the radiology training program to present at their half day.

Dr. Bojan Kovacina, radiologist at the Jewish General Hospital, completed fellowship training in cardiac MRI and cardiac CT at the Massachusetts General Hospital.

Dr. Matthias Friedrich, cardiologist at the McGill University Health Centre, is a pioneer in the field of cardiac MRI and has a track record of having grown academic cardiac MRI programs at the University of Alberta, Montreal Heart Institute, and most recently at McGill.

### **Collaboration between the Jewish General and the McGill UNiverstiy Health Centre (MUHC)**

In echocardiography, fellows from the Jewish General have been invited to seek exposure in complex congenital and interventional echocardiography at the MUHC. With advanced techniques in echocardiography (such as 3-D and speckle-tracking echocardiography) being practiced at both sites, fellows from the MUHC continue to be invited at the JGH for exposure in how these emerging techniques are practiced at the JGH by various practitioners with different approaches. As per the feedback received, this has broadened and enriched the trainees' experience.

### **Academic Facilities**

Our equipment includes 10 state-of-the-art echocardiographic scanners, 9 of which have 3-D capabilities. We have capabilities in trans-esophageal echocardiography and stress echocardiography (treadmill exercise, supine bike and pharmacological (dobutamine, dipyridamole))

We have state-of-the-art physical resources with new, fully renovated premises with designated areas for our trainees such as a fellows' viewing room (for interpretation of studies), dedicated rooms for residents to perform patient studies, and another residents' room for fellows to mingle and socialize during lunch time or after hours.

Our fellows' room has an updated library of textbooks in the field of cardiac imaging, as well as a library of recorded two hundred cases of pedagogical value. Our division has also integrated a standardized simulation-based teaching curriculum.

As a result, our lab has increased its training capacity over recent years and, in addition to training a maximum of 3 fellows, has trained an average of two cardiology residents per period.

These facilities in cardiac MRI include a 3-Tesla Siemens MRI scanner with the fully-equipped cardiac acquisition and analysis package, as well as dedicated workstations with the latest cvi42 software package and reporting platform. For the first 6 months, cardiac MRI volume will be limited and focus mainly on optimization of protocols. The volume of cases analyzed during this time will be approximately 20-25 per month, including cases scanned at outside facilities. Thereafter, in Q1/Q2 of 2016, cardiac MRI services will ramp up to a DPS-approved volume of 500 cases per year.

## **Curriculum and Fellow Duties/Responsibilities**

### **I. Echocardiography:**

The goal is to provide the trainee with the organizational structure and educational experience to fulfill and achieve Level 3 competency requirements in echocardiography (the highest level of expertise in the field). In essence, this level confers the ability to move beyond the independent performance and interpretation of echocardiography and become a “diplomate of echocardiography”. The various modalities of echocardiography include trans-thoracic, trans-esophageal and stress (exercise, dobutamine) echocardiography. The goals and objectives of the training program are set according to recommendations for training in adult echocardiography endorsed by the Canadian Society of Echocardiography (Can J Cardiol 2011;27:862-4) and the American Society of Echocardiography (J Am Coll Cardiol 2008;51:361-67).

The teaching and supervisory work during the trainee's fellowship will cover three aspects of clinical echocardiography: (1) image acquisition, (2) image interpretation, and (3) study reporting.

During the first 3 months of his/her training, the fellow will focus on image acquisition, mainly in "abnormal" hearts (where the fellow is taught to adapt image acquisition and quantification measures to the abnormalities detected and/or the referring physician's question). The trainee will scan two full days a week (with devoted time to the simulation-based teaching curriculum), interpret two full days a week and devote one day to academic activities.

Following this three-month period, the trainee will focus on study interpretation and reporting, and review every study interpreted with the attending staff.

Throughout the training, the fellow has reading assignments. At the six-month mark, the trainee is expected to have read all the chapters of the leading textbooks in the field (The Echo Manual and the Otto book), as well as seminal papers which staff will have further discussed with them.

Four months into the fellowship, the trainee is expected to start performing specialty echo (transesophageal and stress [exercise, dobutamine] echo), which staff will demonstrate and supervise.

### ***Call Responsibilities***

For the duration of the fellowship, the trainee will take on-call duty (home call) in echocardiography, covering one weekend and 6 week-night calls per month in echocardiography, supervised by an attending echocardiographer. The Fellow may be called upon, in times of extreme need, to perform a night or weekend General Cardiology resident level call at the JGH. This is expected to be very rare and all efforts will be made to minimize its occurrence.

## **II. Cardiac MRI:**

On the cardiac MRI service, the responsibilities of the fellow will involve: reviewing requisitions and accordingly specifying scan protocols, actively participating in image acquisition at the scanner alongside the MRI technologist, analyzing images as the primary reader (including detailed quantitative analyses), generating preliminary reports, reviewing cases with the attending staff, and presenting cases during the bi-weekly open readout session. Moreover, the fellow will play a lead role in presenting cardiac MRI cases during weekly clinical rounds, and in presenting to cardiology residents during their teaching sessions.

## **III. Scholarly activities:**

Clinical seminars in cardiac imaging are organized weekly and attended by the fellows. Rounds in echocardiography and cardiac imaging occur every week and are given by fellows, staff and technicians. The Fellowship Director organizes these rounds and takes the opportunity to define a learning agenda for the fellow.

This multimodality track will emphasize noninvasive multimodality imaging conferences and didactic lectures with topics that are comprehensive, for instance, viability assessment and the detection of coronary disease.

In accordance with the CanMEDS Scholar competency, the fellow is mentored in the preparation of a lecture he is asked to give every 6 to 8 wks to the group of echocardiographers, cardiac imagers, cardiology residents, sonographers, general cardiologists and cardiac surgeons of our institution. These lectures also enhance the general education of our Cardiology residents. The fellow is also trained to become a teacher of cardiac imaging by serving as a resource person for Cardiology residents rotating in our lab, and by reviewing in-patient studies from the CCU and Cardiology Step-Down Unit with the Cardiology residents within the CTU team.

The fellow also attends general conferences organized within the Division of Cardiology, such as weekly clinical rounds (where the Fellow is expected to demonstrate the findings by echocardiography and cardiac MRI pertinent to the cases being presented), Cardiology lectures (usually given by outside Speakers), journal clubs and morbidity and mortality rounds.

## **IV. Administrative activities:**

In accordance with the CanMEDS Manager competency, further into the fellowship, the trainee will be expected to manage the laboratory by working closely with the echocardiography and cardiac MRI technicians to screen indications (examining appropriateness) and prioritize cases. He will also be involved in a quality assurance exercise (to be presented to the group monthly), focusing on multimodality imaging.