

Cardiac Electrophysiology Fellowship

Name of Institution: McGill University Health Centre

Type of Fellowship: Cardiac Electrophysiology Fellowship

Program Information:

Number of fellowship positions: Maximum 2 per year

Academic affiliation: McGill University

Name of hospitals involved in training and % of time spent in each institution:

Montreal General Hospital 90%

Royal Victoria Hospital 10%

Background:

Cardiac electrophysiology is one of the fastest growing subspecialty areas in cardiology. This subspecialty focuses on diagnosis and management of cardiac arrhythmias. It is recognized that the technical and cognitive skills required for performance of cardiac electrophysiology are considerable and take extensive time and training to acquire. Fellowship includes training in appropriate history, investigation and ECG diagnosis of arrhythmia, pharmacologic management of arrhythmias, and catheter ablation, as well as patient selection, implantation techniques, complications and management for pacing, implantable cardiac defibrillator (ICD) and cardiac resynchronization therapy (CRT).

The McGill University Health Centre (MUHC) is the electrophysiology referral centre for several referral hospitals serving a large geographical area covering a population of greater than 1.75 Million. The MUHC has a long history of device implantation at both the Royal Victoria Hospital (RVH) and the Montreal General Hospital (MGH) sites. In 2007, a new electrophysiology device implantation laboratory was constructed at the MGH and dedicated full time to device implantations. In this laboratory, cardiac electrophysiologists implant over 500 pacemakers and 300 defibrillators per year. In 2011, a new fully equipped state of the art biplane electrophysiology laboratory was added to the electrophysiology suite at the MGH. This new biplane laboratory is equipped with 3D mapping systems (CARTO 3, and EnSite Velocity), 3D rotational angiography, a number of ablation systems (including Cryocath and Ablation Frontiers), to perform complex catheter ablation procedures (e.g. atrial fibrillation and ventricular tachycardia ablation). Lead extractions are performed at the MGH electrophysiology laboratory or in the main operating room. Epicardial devices via mini-thoracotomy and surgical ablation are performed in the operating room (MGH or RVH).

Specialized electrophysiology clinics exist at both RVH and MGH sites. Specialized device follow-up clinics also exist at both sites and treat over 5000 patients per year. On call coverage for electrophysiology emergencies is provided 24hr per day throughout the year by MUHC electrophysiologists.

Mission:

Our mission is to be a referral centre of excellence in interventional electrophysiology integrated within the Centre of Excellence in Cardiovascular Sciences at McGill University. Our goal is to provide excellence in patient care, research, and education in interventional electrophysiology.

Research Activity:

Clinical research is an integral part of the MUHC electrophysiology program. Research is performed on implantable devices as well as catheter ablation. A number of trials are ongoing or in the process of being planned. Examples of research studies are listed below:

Clinical Studies with MUHC Principal Investigators:

- 1) BRUISE CONTROL : BRidge or continUe coumadIn for device SurgEry randomized CONTROLled Trial
Funding Source: Canadian Institutes of Health Research (CIHR)
Principal Investigators: David H Birnie and **Vidal Essebag**
- 2) A Randomized Ablation-based atrial Fibrillation rhythm control versus rate control Trial in patients with heart failure and high burden Atrial Fibrillation (RAFT-AF)
Funding Source: Canadian Institutes of Health Research (CIHR)
Principal Applicant: Anthony Tang
Co-Applicants include: **Vidal Essebag**
- 3) A longitudinal study to identify factors that trigger ventricular tachyarrhythmias among persons with implanted cardioverter defibrillators
Funding Source: Canadian Institutes of Health Research (CIHR)
Principal Applicant: Mark S Goldberg
Co-Applicants include: **Vidal Essebag and Tom Hadjis**
- 4) A Population-based Analysis of the Effectiveness and Adverse Effects of Medications in Patients with Atrial Fibrillation
Funding Source: Canadian Institutes of Health Research (CIHR)
Principal Applicant: **Louise Pilote**
Co-Applicants include: **Vidal Essebag**

Selected Clinical Studies with MUHC Local Principal Investigators:

- 1) Ventricular tachycardia Ablation vs. eNhanced drug therapy In Structural Heart disease (VANISH)
- 2) Prevention of Arrhythmia Device Infection Trial (PADIT)
- 3) Discerning Symptomatic and Asymptomatic Episodes Pre and Post Radiofrequency Ablation of Atrial Fibrillation (DISCERN-AF)
- 4) A Phase IV, double-blind, placebo-controlled, Canadian multicentre study comparing two treatment strategies of dronedarone administration following ELECTive caRdioversion for prevention of symptomatic Atrial fibrillation recurrence (ELECTRA)
- 5) Resynchronization/Defibrillation for Ambulatory Heart Failure Trial (RAFT)
- 6) First Line Radiofrequency Ablation Versus Antiarrhythmic Drugs for Atrial Fibrillation Treatment (The RAAFT Study)
- 7) Catheter Ablation versus Amiodarone for Shock Prophylaxis in Defibrillator Patients with Ventricular Tachycardia: A Multi-center Randomized Trial (CEASE-VT)
- 8) Substrate and Trigger Ablation for Reduction of Atrial Fibrillation Trial (STAR-AF 2)

Fellowship Program Director: Vidal Essebag MD PhD FRCPC FACC

Teaching Faculty:

Both Dr. Vidal Essebag and Dr. Tom Hadjis were trained in interventional cardiac electrophysiology at Harvard University. Both also have degrees in epidemiology and experience in clinical research. Their clinical expertise includes all aspects of device implantation, ablation, and non-invasive electrophysiology diagnosis and management. Dr. Martin Bernier is another full-time electrophysiology faculty member trained at Harvard who will be starting at MUHC in July 2011. Part time MUHC electrophysiology faculty includes Dr. Teresa Kus, Dr. Giuliano Becker, and 3 other internationally trained electrophysiologists joining our team this year.

Academic Facilities:

The ablation procedures (simple and complex) and device implantation will be performed in the electrophysiology laboratories at the MGH site. Devices may also be implanted occasionally at the RVH site in the biplane cath lab, or in the main OR at the MGH site (generally for emergencies or epicardial cases requiring thoracotomy). Pacemaker clinics and electrophysiology clinics are located at both MGH and RVH sites. A list of recommended books and readings will be provided. Attendance at a national or international conference will be strongly encouraged.

Program Entry Requirements:

Electrophysiology fellows should have completed Cardiology core training at an institution with Royal College certification or equivalent for foreign fellows. Knowledge of diagnosis and management of arrhythmia is considered part of core cardiology training, and the ability to function as a cardiologist is a prerequisite for cardiac electrophysiology training. Patient management issues such as heart failure, ischemic heart disease, hypertension, and stroke prevention all intersect with arrhythmia management. The ability to perform an appropriate history, physical examination and conduct appropriate investigations related to cardiovascular symptomatology or disease is assumed to be integral to cardiology training.

Curriculum:

The 2 year program will provide the fellow with training in advanced noninvasive and invasive arrhythmia management including all aspects of device implantation as well as simple and complex ablation procedures. (NB. Candidates who have or will have already undergone at least 12 months of dedicated cardiac electrophysiology training may be eligible for an exemption from the first year of training and admissible as a second year electrophysiology fellow focusing on more advanced procedures for 1 year duration.) The curriculum will include cognitive skills, technical skills, research, and education.

Cognitive Skills:

Cognitive skills are acquired both by experience in clinical care on the wards, clinic, and in the electrophysiology lab as well as by structured instruction in rounds and other structured sessions. Many of the cognitive skills will be acquired by discussion with staff and colleagues and attendance and presentation at rounds. In addition, participation in a structured research project will develop the skill to critically appraise the science behind clinical guidelines and clinical decision-making.

Cognitive skills required in cardiac electrophysiology training

Roles:	Strategies	
	Clinical Care	Structured Instruction
Medical expert/ Clinical Decision-Maker	<ol style="list-style-type: none"> 1. Knowledge of current indications and contraindications for an electrophysiology study. 2. Knowledge of potential complications with EP studies and management of such complications. 3. Knowledge of various methods of programmed electrical stimulation. 4. Ability to measure conduction intervals and refractory periods; knowledge of their significance in normal and pathological states. 5. Knowledge of the predictive value of EP-testing in patients with various arrhythmias and clinical syndromes. 6. Ability to interpret data derived from EP testing. 7. Knowledge of the indications for and complications of therapy with antiarrhythmia devices. 8. Knowledge of the indications for and complications of ablative therapy. 9. Detailed knowledge of recent clinical trials that affect the selection of patients for EPS. 10. Indications for ICD therapy. 11. Indications for CRT. 12. Review of implant techniques, including coronary sinus lead placement. 13. Knowledge of performance, complications of and contraindications to defibrillation threshold testing. 14. Knowledge of external defibrillation/cardioversion techniques. 15. Programming and troubleshooting of ICD's and CRT devices. 16. Knowledge of ICD emergencies. 17. Knowledge of indications and contraindications of tilt-table testing – protocol of administration and interpretation of results. 18. Knowledge of radiation safety protection for staff and patients. 	<ol style="list-style-type: none"> 1. Know normal and abnormal cardiac anatomy and electrophysiology. 2. Know anatomy and physiology of the normal atrioventricular conduction system and accessory pathways. 3. Understanding of intracardiac electrocardiographic signals. 4. Understand the pathogenesis of cardiac arrhythmias including primary electrophysiology abnormalities and secondary causes of rhythm disturbances 5. Know the pharmacology of antiarrhythmic drugs and of sympathetic and parasympathetic antagonists 6. Know the causes of syncope 7. Understand the basic concepts of artificial pacemaker function 8. Understand the concept of proarrhythmia 9. Be able to interpret Holter Recordings 10. Be able to interpret intracardiac device interrogation including electrograms. 11. Understand the advantages and limitations of genetic testing in patients and families with inherited arrhythmia syndromes of sudden death 12. Understand the investigations and management of inherited arrhythmia syndromes in patients and their families.

Communicator	<ol style="list-style-type: none"> 1. Be able to inform the patient and their family about their problem, its prognosis, management and plans for follow-up 2. Communicate with the health care team regarding the patient management plan 3. Be able to write consultation/ discharge letters to referring physicians 4. Prepare the final EP study reports 	<ol style="list-style-type: none"> 1. Participate actively in teaching sessions 2. Prepare and present rounds as scheduled
Collaborator	<ol style="list-style-type: none"> 1. Work with the house-staff team in the care of patients 2. Participate in the performance of the EP study 3. Understand and support the roles of allied health professionals (nurse, EP technologist) in the EP lab 	<ol style="list-style-type: none"> 1. Contribute to organized rounds
Scholar	<ol style="list-style-type: none"> 1. Recognize gaps in knowledge regarding patient problems and develop strategies to fill the gap through reading and consulting other members of the health care team 2. Contribute knowledge learned to service rounds 	<ol style="list-style-type: none"> 1. Read the articles provided 2. Critically review relevant published material at Journal Club 3. Participate in and understand arrhythmia research project
Professional	<ol style="list-style-type: none"> 1. Deliver care with integrity, honesty and compassion 2. Understand the professional, legal and ethical codes to which physicians are bound 	

Technical Skills:

Basic technical skills required for performing electrophysiology studies include the following:

- 1) Operational skills to perform right and left heart catheterization with percutaneous techniques via femoral and other venous and arterial access sites.
- 2) Manual dexterity to safely place and manipulate electrode catheters in the appropriate chambers for the arrhythmia under study.
- 3) Ability to obtain appropriate recordings from various locations.
- 4) Ability to safely perform programmed electrical stimulation.
- 5) Ability to recognize and manage procedural complications.
- 6) Proficiency in the use of external defibrillation and intravenous cardiac medications.
- 7) Proficiency in the appropriate use of sedation including airway management
- 8) Proficiency on anticoagulation issues in cardiac arrhythmia, affecting risk of strokes and hemorrhagic complications of the invasive procedures
- 9) Proficiency in the testing, interrogation, and programming of implantable antiarrhythmia devices, including pacemakers and defibrillators
- 10) Technical knowledge of electrical safety and pertinent radiation-related issues

It is recognized that different fellows may acquire technical skills at somewhat different rates. As a result, the evaluation of technical skills will not be based simply upon the number of procedures performed. Ultimately, the Program Committee and Program Director will be responsible for evaluation of technical skills acquired by each trainee. Nevertheless, there are a certain minimum number of procedures required in order to have adequate exposure to techniques and complications of electrophysiology procedures and device implantation. The expected minimum experience for these procedures is outlined below:

- 1) Primary operator and analysis of 100-150 diagnostic electrophysiology studies, of which 50 involve patients with supraventricular arrhythmias.
- 2) Performance of at least 75 ablations for supraventricular tachycardia (SVT)
- 3) Primary operator of at least 100 ICD/PPM implantations and at least 30 revisions
- 4) Performance of at least 15 coronary sinus (LV) lead placements
- 5) Supervised performance of at least 20 transseptal punctures
- 6) For left sided procedures, at least 15 procedures using the retrograde aortic approach
- 7) For training in atrial fibrillation (AF) ablation, 30-50 supervised ablations
- 8) For training in scar-related ventricular tachycardia (VT) ablation, 15-20 procedures

Research:

Although the ultimate career goal of fellows is highly variable, all fellows will be expected to participate in research:

- 1) During the course of a year, each fellow should identify at least one project. Ideally this would be a prospective project that would include a full research cycle of data collection, abstract preparation and completion of a manuscript.
- 2) Fellows should also avail themselves of the opportunity to i) do a retrospective study, ii) write a review article, or iii) write a book chapter with one of the consultants.
- 3) Fellows are expected to actively participate in all ongoing clinical trials in electrophysiology including the screening and follow-up of patients enrolled in such trials.
- 4) Fellows are expected to present their research progress at rounds on a quarterly basis, and annually at Cardiology Resident Research Day.

Fellow Duties and Responsibilities:

- 1) Responsibility for supervision of the inpatient electrophysiology service including admission and discharge of patients admitted under the electrophysiology service for elective device implantation or ablation procedures.
- 2) On call (from home) for cardiac electrophysiology: generally one weekend and 3 weeknights per calendar month, under supervision of on call electrophysiologist.
- 3) Supervision and teaching of cardiology residents in pacemaker clinics.
- 4) Teaching of cardiology residents during CCU teaching sessions or academic half-days
- 5) Pre-procedure evaluation of patients in outpatient clinics referred for interventional electrophysiology procedures and device implantation.
- 6) Participation in academic activities involving the residents including organization and presentation of rounds.
- 7) Attendance at least at one national or international electrophysiology/device conference.
- 8) Participation in ongoing research activities with supervised participation in protocol development and manuscript preparation.
- 9) The fellow is encouraged to prepare for and perform the **International Board of Heart Rhythm Examiners (IBHRE) Cardiac Rhythm Device Therapy Examination for the Physician** following the completion of training (the examination is held annually in July). For more information see website: <http://www.ibhre.org/ExamInformation/ExamInformation.htm>
- 10) The fellow is strongly encouraged to become a member of the **Heart Rhythm Society**. Affiliate Membership during training is complimentary. For more information see website: <http://www.hrsonline.org/About/Membership/Benefits/index.cfm>