

Cardiovascular MR Imaging Clinical Research Fellowship

The CMR Cardiovascular Imaging Research Fellowship is a 2-year clinical research program offered at the McGill University Health Centre and its affiliated hospitals. During the Research Fellowship, the trainee is expected to take primary responsibility for a cardiovascular research project using Cardiovascular Magnetic Resonance (CMR) and related techniques. He will work within the CMR Research Team group, led by Dr. Matthias Friedrich, Chief of Cardiovascular Imaging. Currently, the CMR research at the McGill University Health Centre focuses on visualizing cardiac physiology for identifying novel diagnostic targets in acute and chronic cardiac disease, using novel evaluation and post-processing tools, including multi-parametric tissue characterization and machine-learning supported pattern analyses. They will work within a team with at least one physicist, clinical coordinators, administrative managers, clerical assistants, and other students (MSc or PhD). They will be based in the Departments of Cardiology and Diagnostic. A state-of-the-art MRI system dedicated exclusively to CMR research (3T) is installed. Access is also possible to a 1.5T MRI system and another 3T scanner.

OBJECTIVES

To perform clinical CMR Imaging research, using state-of-the-art methods and tools.

A. Clinical Cardiovascular MR: Fellows are expected to acquire the ability to protocol and supervise clinical CMR scans and to interpret findings that enables them to independently direct a clinical CMR program according to Level III of the [SCMR Training Guidelines](#).

The fellow is expected to develop core competencies in the following areas:

- CMR safety (MR scanner magnetic field, contrast agents, contraindications)
- MRI contrast agents; mechanisms and applications
- Flow imaging and quantitative analysis of velocity-encoded images
- CMR of cardiovascular structure and anatomy
- CMR of right and left ventricular function
- CMR of myocardial infarction, scarring, and viability assessment CMR of myocardial fibrosis and edema
- Pharmacologic stress testing with CMR
- Non-pharmacological stress testing using physical stress (handgrip exercise)
- Non-pharmacological stress testing using breathing maneuvers
- CMR of vascular pathology, including aortic disease
- CMR of valvular heart disease
- CMR of adult congenital heart disease
- CMR in myocarditis, cardiomyopathies and heart failure
- CMR in diseases with arrhythmia (such as atrial fibrillation or ventricular ectopy)
- CMR of pericardial disease
- CMR for cardiac masses and tumors
- CMR for planning of interventional procedures (e.g. ablation in atrial fibrillation, aortic valve implantation/TAVI)

The fellow is expected to develop the skillset to

- a) Based on the information from a requisition for a CMR scan:
 - Identify the diagnostic targets that address the clinical question and provide relevant information that can alter clinical decision-making in order to improve the outcome of patients
 - List the suitable CMR techniques and required images for these diagnostic targets
 - Set up a protocol for the scan including the order of sequences, indication and timepoint for contrast injections, and indications and time of any stress interventions (pharmacological, physical, or breathing maneuver)
- b) Supervise an appropriate preparation of a patient for a CMR scan including
 - Verification of patient identity
 - Verification of the absence of potentially hazardous material such as MR-incompatible metallic material in or on the patient's body
 - Verification of the availability of signed consent, including consent for participating in research, if available
 - Verification of compatibility of medication during the last 12 hours with the scan objectives
 - Verification of the ability of the patient to undergo a CMR scan, including their mental status, body shape and weight, hearing status, comprehension, and language
 - Ruling out severe claustrophobia
 - Verification of iv access, if required
- c) Assist the MR technologist in identifying anatomical structures for planning purposes
- d) Monitoring the patients vital sign status by regular heart rate checks and, in patients with known unstable circulation or in patients undergoing a stress scan, regular blood pressure measurements, as well as by the patient's response to any interaction during the scan.
- e) Understand criteria for interrupting the scan based on
 - Loss of cooperation by the patients
 - Signs or findings indicating hemodynamic instability including severe arrhythmia
 - Severe symptoms of the patient such as anxiety, pain, or sudden dizziness
- f) Assess the quality of the acquired images with respect to their suitability for diagnostic decision-making in the individual clinical setting
- g) Assess available findings in images, that may require adjustment of the protocol

B. Research CMR: Fellows are required to lead at least one research project or more, with the goal of publishing results at conferences and in peer-reviewed journals. Fellows are also encouraged to take advantage of the many opportunities to collaborate with other researchers on CMR and related research projects.

The fellows are expected to

- acquire training in GCP and in the SOPs of the Research Institute of the McGill University Health Centre (see <https://rimuhc.ca/researchers>)
- become familiar with the research projects of the Courtois CMR Research Group
- explain their research project in the clinical context, including the expected impact on outcome

- write the study protocol and IRB application for their project under guidance, including budget
- apply for external funding by writing a grant application to public or private funding institutions
- work with research coordinators and project managers to organize patient/volunteer recruitment, respecting workflow efficiency and safety
- report study progress in weekly update meetings with project teams and on demand to the entire team
- attend meetings with supervisor

C. Teaching: Fellows are expected to teach undergraduate students, Master students, PhD students, and others. This could include general teaching rounds with all other staff members of the faculty, as well as ad-hoc case-based teaching.

D. Clinical conferences: The fellow is expected to actively participate in radiology, cardiology and multidisciplinary conferences such as CVT rounds, TAVI rounds and cardiac imaging rounds. The fellow is also expected to prepare and discuss articles in the regular journal club sessions during the academic year.

Vacation/Conferences: The fellow is granted 4 weeks of vacation and one additional week during either the Christmas or New Year's holiday. The fellow is also granted one week to attend a conference (conferences are selected based on the fit to the research, in agreement with the supervisor). If s/he presents a paper at a major conference, the time of the conference is not counted against his conference or vacation time. In addition, s/he may request funding for expenses incurred to attend the meeting where s/he presents, provided that the research was done in the department of Cardiology at McGill University and if a *written paper has been submitted to an acceptable journal within 3 months of the presentation.*

Fellow Evaluation: The fellow is evaluated on a continuous basis by the attending staff and will meet regularly with the fellowship supervisor for face-to-face feedback, at least every 3 months.

A formal written self-assessment and peer-derived evaluation (360° review) is completed every 12 months.

Provided Facilities

- Computer (desktop or laptop) for research-related work
- Internet access from all workstations and in the research offices
- Access to libraries at RVH and MGH
- Multimedia learning material
- Rooms for small group meetings
- Teleconference rooms
- Lecture rooms

Eligibility

- Clinical or research experience in non-invasive cardiovascular imaging

- Self-funding of the fellowship is encouraged.
- Board-certified license for practicing medicine in their country.
- Two letters of recommendation, including one from their Faculty of Medicine
- Demonstrated interest in research, ideally in the field of cardiovascular imaging
- Self-motivation, ability to work independently as well as in teams
- Problem-identification and problem-solving abilities
- At least basic skills in office software, and statistics; experience with image post-processing software is an asset
- Proficiency in English (spoken and written), proficiency in French is an asset

NOTE: Due to long processing times, it is highly recommended to submit applications at least 12 months in advance.

NOTE: Masculine gender has been used in this document for brevity and includes the feminine gender.