

***Pediatric Cardiac Imaging Fellowship – Goals and Objectives***

Cardiac imaging fellowship is dedicated to diagnosis of congenital and acquired heart diseases in children. The training includes teaching on how to acquire and interpret cardiovascular magnetic resonance (MR) imaging and cardiovascular computed tomography (CT) examinations. The fellowship also includes optional training in the interpretation of plain radiography in patients with heart disease and in patients admitted in the Critical Care Unit (CCU) and in the Pediatric Intensive Care Unit (PICU) as well as optional exposure to fetal cardiovascular MR imaging. At the end of the fellowship training, the trainee will have the basic knowledge of pediatric cardiovascular diseases, the skills to perform MR and CT imaging with technologists, the skills to postprocess the image data for 3D reconstruction, blood flow analysis and ventricular volume measurement, and the skills to construct comprehensive reports on MR and CT imaging examinations.

**TRAINING YEAR SPECIFIC OBJECTIVES****1. Medical Expert**

- 1.1 Describe the following basics of pediatric cardiology for imaging
  - 1.1.1 Normal cardiovascular anatomy for imaging and image interpretation
  - 1.1.2 Sequential segmental approach to congenital heart disease and terminology
  - 1.1.3 Pathology of congenital heart diseases
  - 1.1.4 Basics of acquired heart diseases including cardiomyopathies, Kawasaki disease, pericarditis and systemic vasculitis
  - 1.1.5 Hemodynamics and ventricular function
  - 1.1.6 Strengths and limitations of echocardiography, CT, MR, radionuclide imaging and conventional angiography
  - 1.1.7 Cardiovascular surgical procedures and their complications
- 1.2 Acquire cardiovascular MR imaging examinations in conjunction with technologists
  - 1.2.1 Identification of contraindications to MR imaging and requirement of sedation or general anesthesia
  - 1.2.2 Identification of the indications for the MR imaging request and the problems to be assessed

- 1.2.3 Listing of the required sequences according to the identified indications and problems
- 1.2.4 Prescription of the imaging parameters including imaging planes, temporal and spatial resolutions, total scan time, amount, rate and timing of contrast injection
- 1.3 Perform post-processing for assessment of blood flow and ventricular function
  - 1.3.1 Principles and pitfalls of analysis of blood flows and ventricular function
  - 1.3.2 Measurement of ventricular volume and myocardial mass
  - 1.3.3 Measurement of blood flow velocities and volumes
  - 1.3.4 Assessment of blood flow patterns
- 1.4 Interpret the MR images and numeric data
  - 1.4.1 Systematic approach to cardiovascular anatomy
  - 1.4.2 Review of the numeric data for assessment of functional status and for detection of errors
  - 1.4.3 Internal validation of the numeric data
- 1.5 Perform cardiovascular CT
  - 1.5.1 Identification of the indications for the CT request and the problems to be assessed
  - 1.5.2 Decision for ECG-gating. For ECG-gated CT, decision for prospective or retrospective gating
  - 1.5.3 Prescription of imaging volume, image parameters including tube voltage, tube current, gantry rotation time, amount, rate and timing of contrast injection
- 1.6 Reduce the radiation dose
  - 1.6.1 Restrict the imaging volume
  - 1.6.2 Use the optimum tube voltage for contrast medium (80-90 kVp)
  - 1.6.3 Adjust the tube current according to the patient's size
- 1.7 Perform 3D reconstruction
  - 1.7.1 Different advantages of MIP (Maximal intensity projection), MinIP (Minimal intensity projection) and VR (Volume rendering) algorithms
  - 1.7.2 Systematic approach to cardiovascular anatomy

## **2. Communicator**

- 2.1. Explain the procedure to the patient/family, including the risks of possible complications and answering questions

- 2.2. Construct an imaging report
  - 2.2.1. Basic structures of the reports
  - 2.2.2. Contents to be included in the main body text
  - 2.2.3. How to integrate anatomic, functional and hemodynamic findings
  - 2.2.4. How to summarize

### **3. Collaborator**

- 3.1. Consolidate skills for conference presentation and consultations
- 3.2. Obtain the appropriate clinical history to guide decisions regarding the best imaging modality, tailoring examinations and appropriate interpretation of findings
- 3.3. Interact effectively with technologists to optimize examinations

### **4. Leader**

- 4.1. Screen and protocol CT and MR examinations in the pediatric cardiac context
- 4.2. Prioritize studies
- 4.3. Describe the proper steps in imaging investigation of pediatric cardiac pathologies
- 4.4. Become responsible for cardiac imaging examinations, including proper delegation of authority to residents and technologists

### **5. Health Advocate**

- 5.1. Select appropriate tests or follow-up studies from discussion with referring doctors and consultants
- 5.2. Take into consideration the benefits/risks of procedures, in consultation with referring doctors
- 5.3. Guide referring clinicians to the imaging study or studies most appropriate for their patients

### **6. Scholar**

- 6.1. Participate in research activities
  - 6.1.1. Identify research ideas, establish a research plan and perform research projects
  - 6.1.2. Learn the basic statistical analysis of the data
  - 6.1.3. Prepare presentations and manuscripts for publication submission
- 6.2. Integrate new learning into practice

### **7. Professional**

- 7.1. Incorporate ethical practice, professional regulation and high personal standards of behavior