جامعة المستقبل
كلية التقنيات الصحية والطبية
قسم تقنيات الاشعة

الفحوصات الشعاعية الخاصة
المرحلة الثالثة

Lecture 8

Cardiovascular imaging and angiography
Cardiac MRI

اعداد

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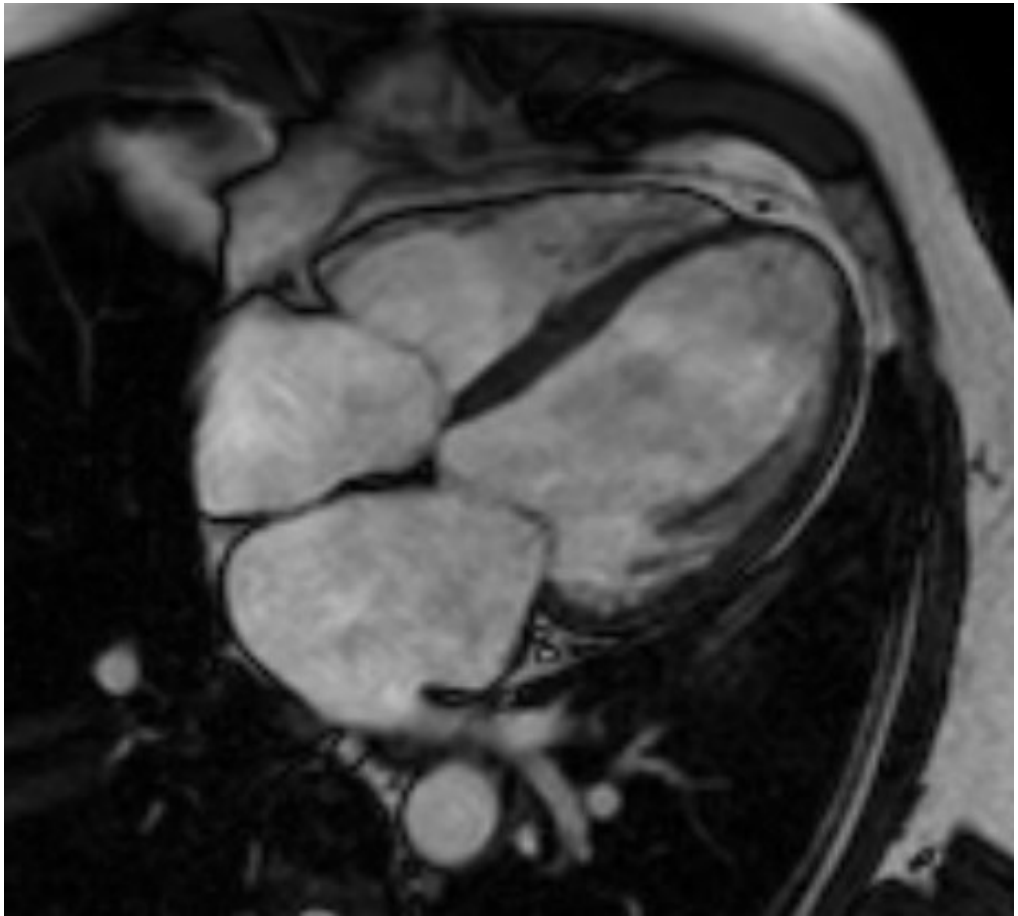
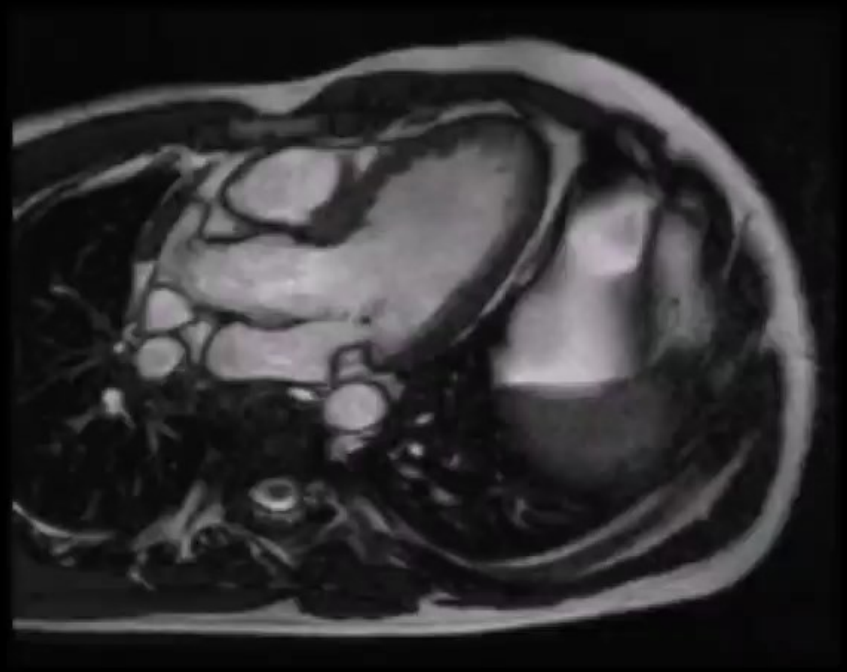
What is cardiac imaging?

- Cardiac imaging, also called cardiovascular imaging, is a broad term that includes several ways to take pictures of your heart and surrounding anatomy.



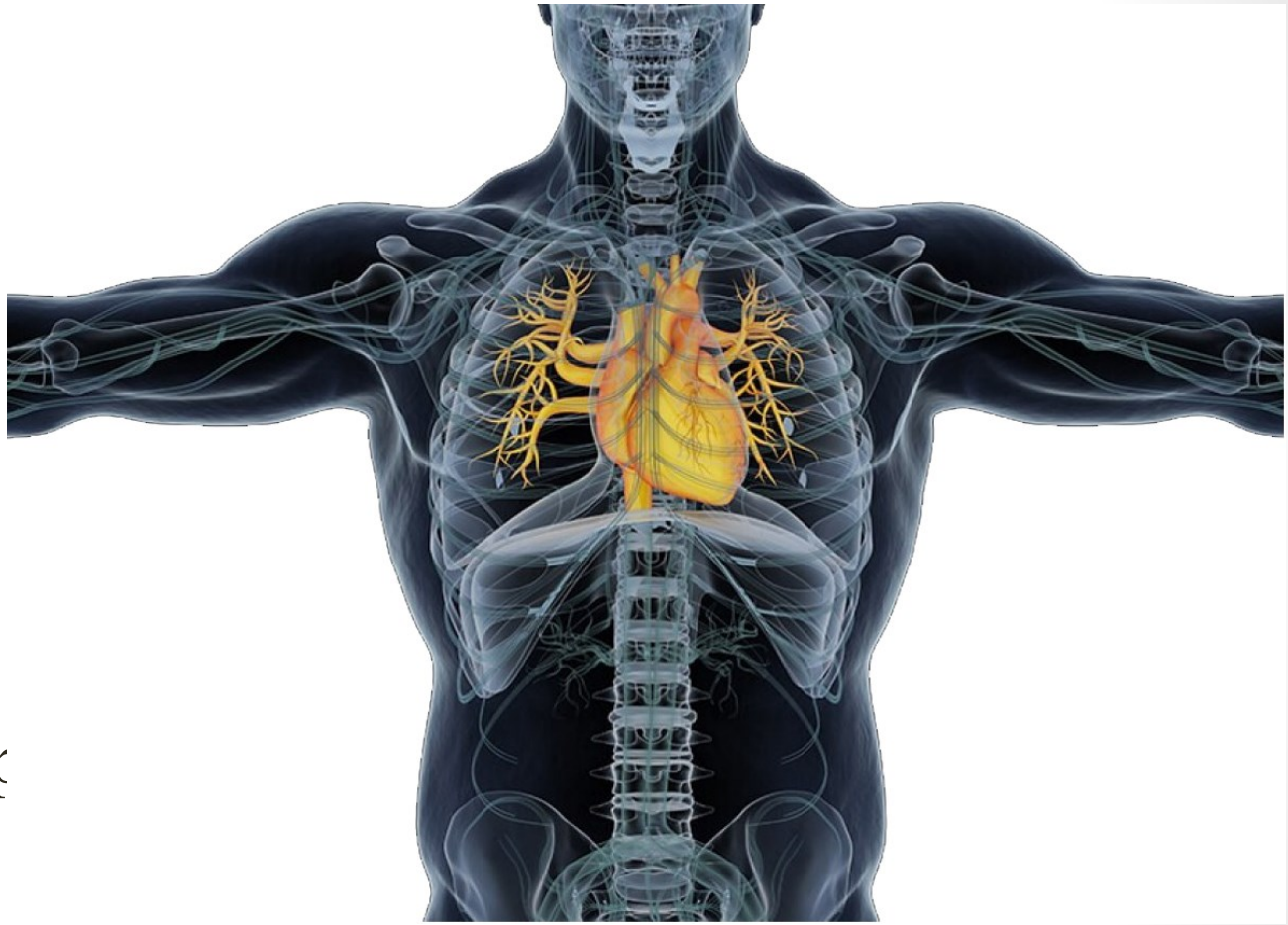
What CMR can really do ?

CMR can assess many different aspects of cardiac structure and function, all in a single imaging study



Imaging modalities of cardiac are:

- Chest x-ray
- Fluoroscopy
- Echo
- Cardiac CT
- CMR
- SPECT
- Cardiac PET
- Angiocardiograp
  catheterization



CMR advantages :

- **No restriction with choice of imaging planes**
- **Can assess many aspect of cardiac structure and function in a single image**
- **No ionizing radiation**
- **Low possibility of adverse reaction to the C.M**
- **High resolution**

Why CMR :

***ACCURACY**

- **Left Ventricular Ejection Fraction (LVEF)**
- **Right Ventricular Ejection Fraction (RVEF)**
- **Viability (the ability to work well functionally)**
- **Morphology (size ,shape)**
- **Ischemia**
- **Etiology of CMP (cause of symptoms)**

CMR indications :

- **Arrhythmias (irregular heart beat)**
- **Coronary Artery Disease (CAD)**
- **Ischemic CMP (Cardiac muscle myopathy)**
- **Dilated CMP**
- **Hypertrophic Cardiomyopathy (HCM) (ventricular septum abnormality)**
- **Heart Failure**
- **Amyloid (stiff heart syndrome)**
- **Masses**
- **Myocarditis (inflammation of the middle layer of the heart wall)**
- **Sarcoidosis (immune cells abnormal function in the heart muscle)**

  Siderosis (accumulation of iron with the heart)
- **Pericardial Disease (inflammation within the heart muscle e.g. effusion)**

Pt. preparations :

- **Remove metal**
- **Fasting 6 hours to the exam**
- **Blood Urea and serum creatinine**
- **Shaving the chest hair**

How is the procedure performed?

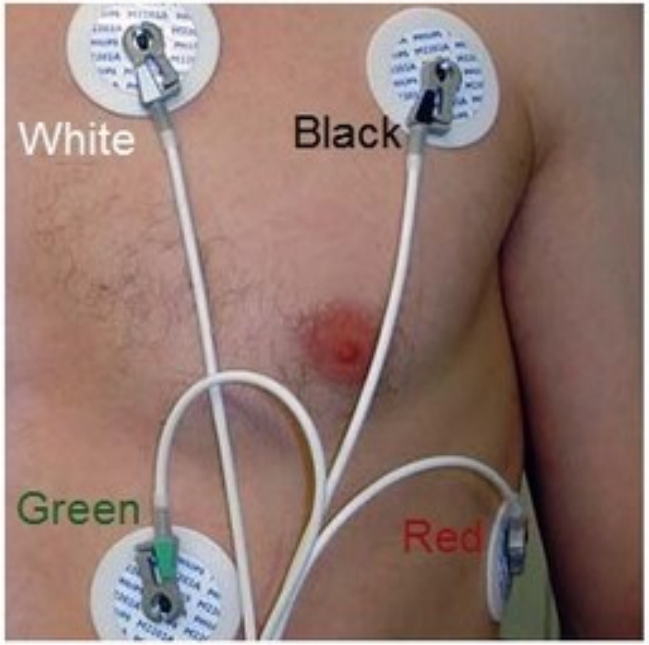
1. Patient position Craniocaudally
2. Chest coil / abdominal coil
3. Place electrocardiogram (ECG) leads to eliminate heart movement.
4. Place a respiratory gating belt around your upper abdomen to eliminate the diaphragm movement.

1. Place a small pulse monitor on your finger to follow blood movement
2. A nurse inserts a cannula into a vein in your hand or arm
3. The patient will be given breathing instructions.
4. If a child receives sedation or anesthesia prior to the CMR exam
5. The patient maybe asked to take a delay imaging

(to check infarctions)

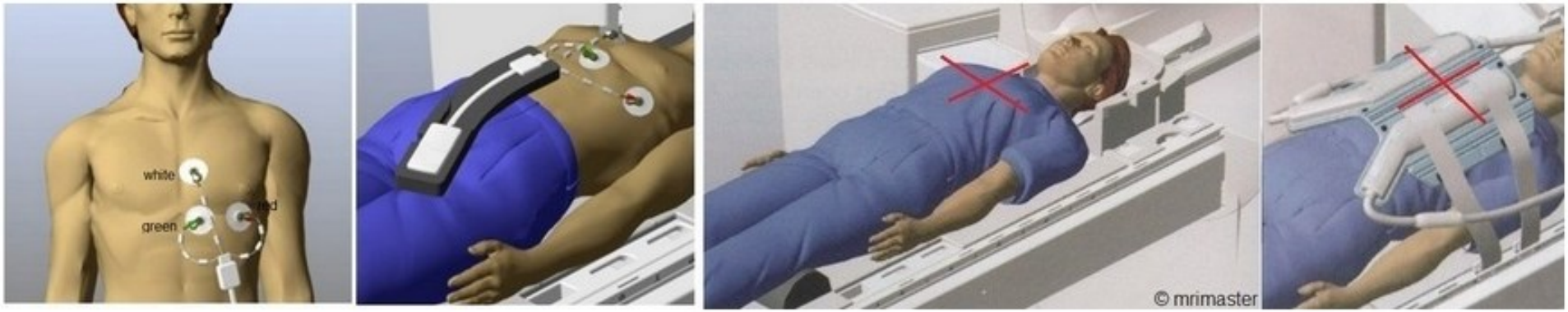
How is the procedure performed?

Philips VCG electrode positioning



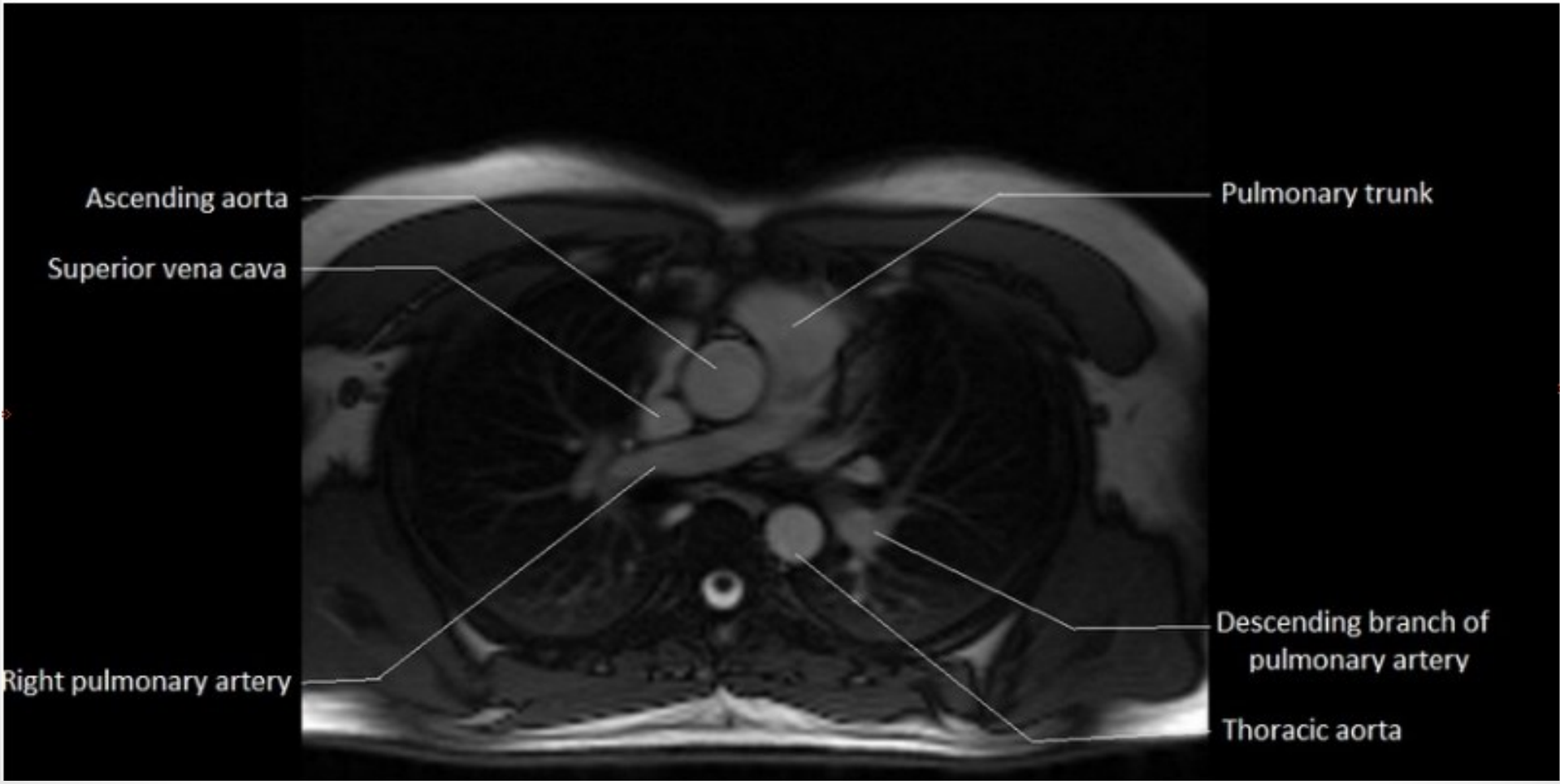
How is the procedure performed?

Positioning in Siemens scanner

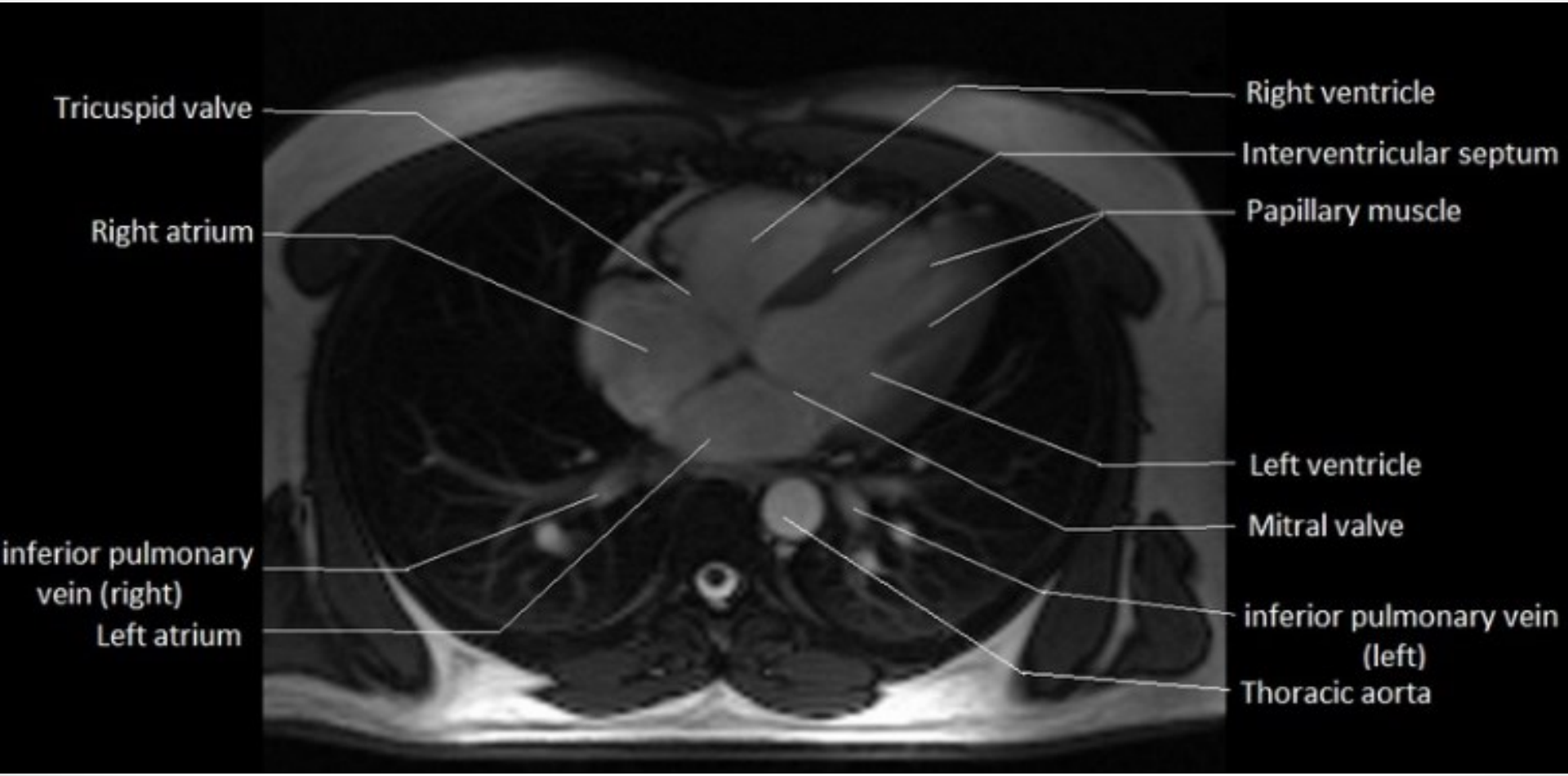


Positioning in Philips scanner

Heart anatomy :

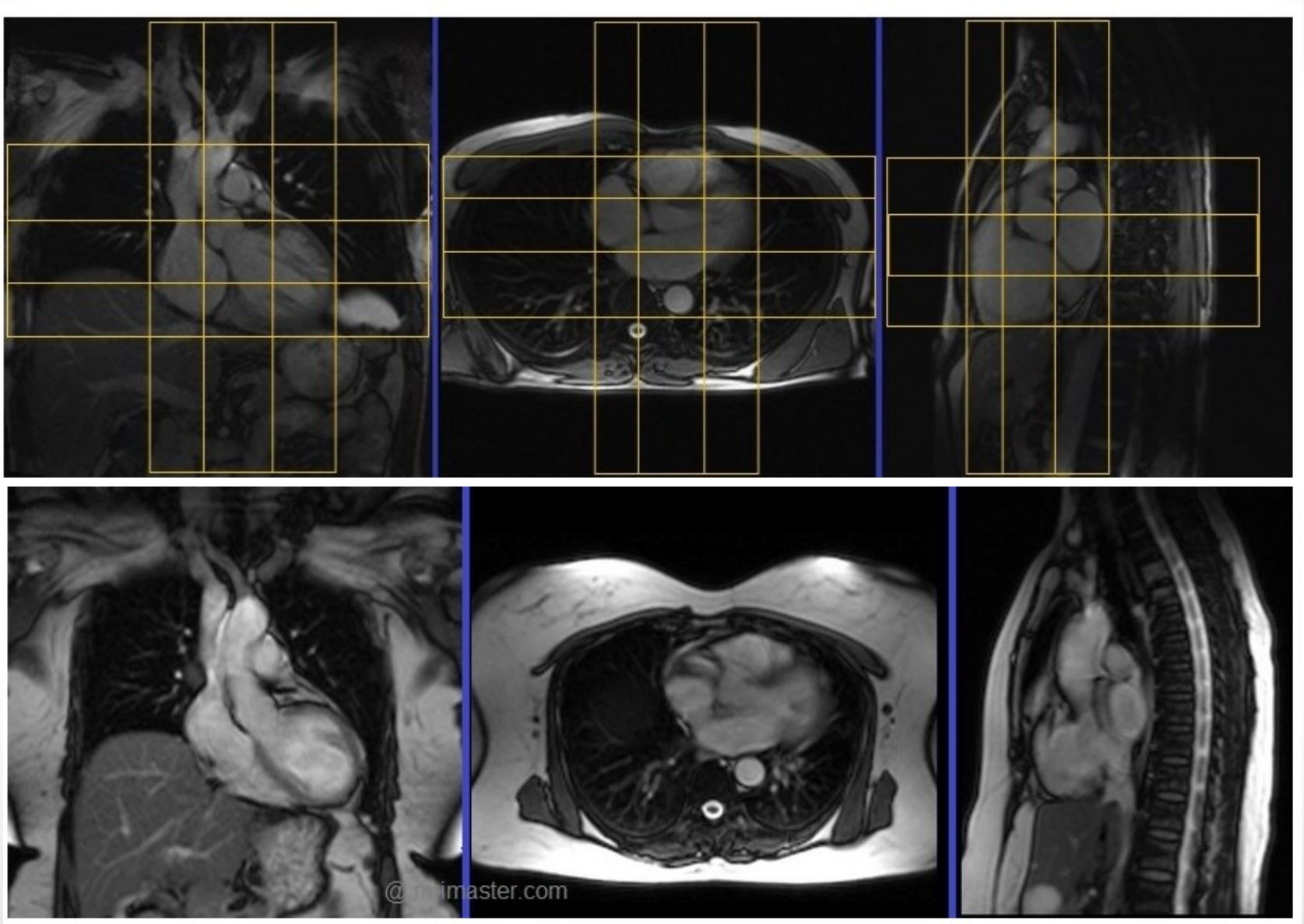


Heart anatomy :



MRI sequences and plans :

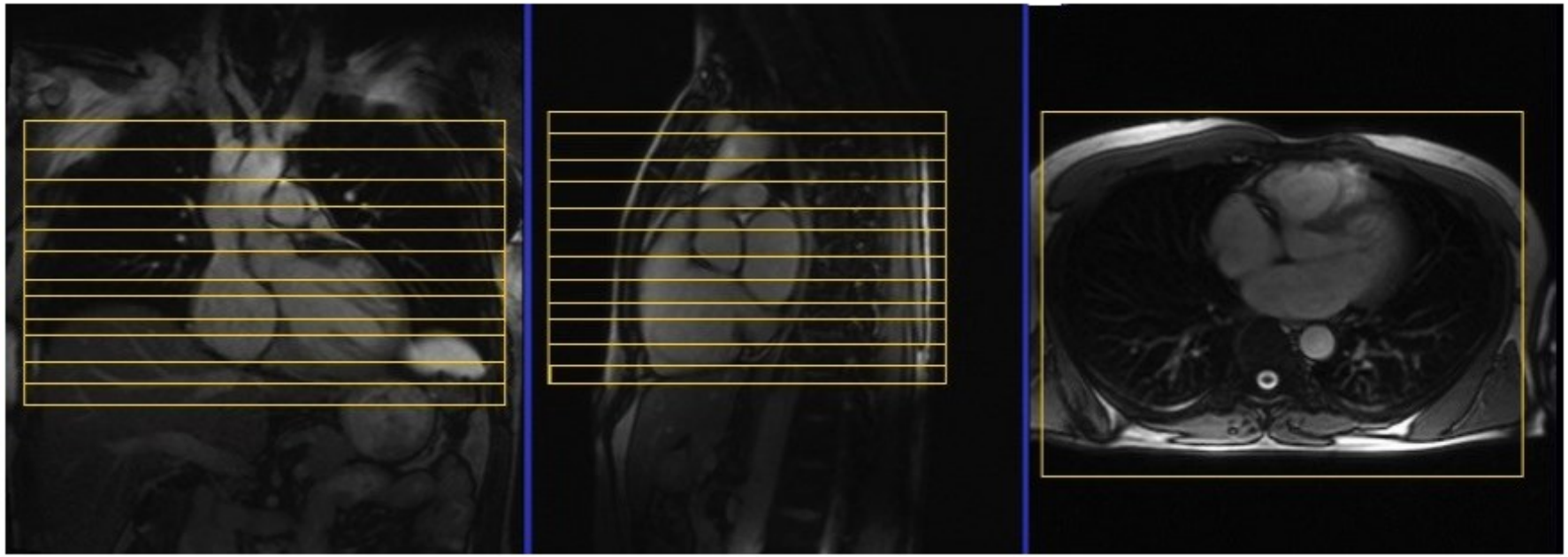
1-Plan localizer



MRI sequences and plans :

2-Dark or bight blood axial

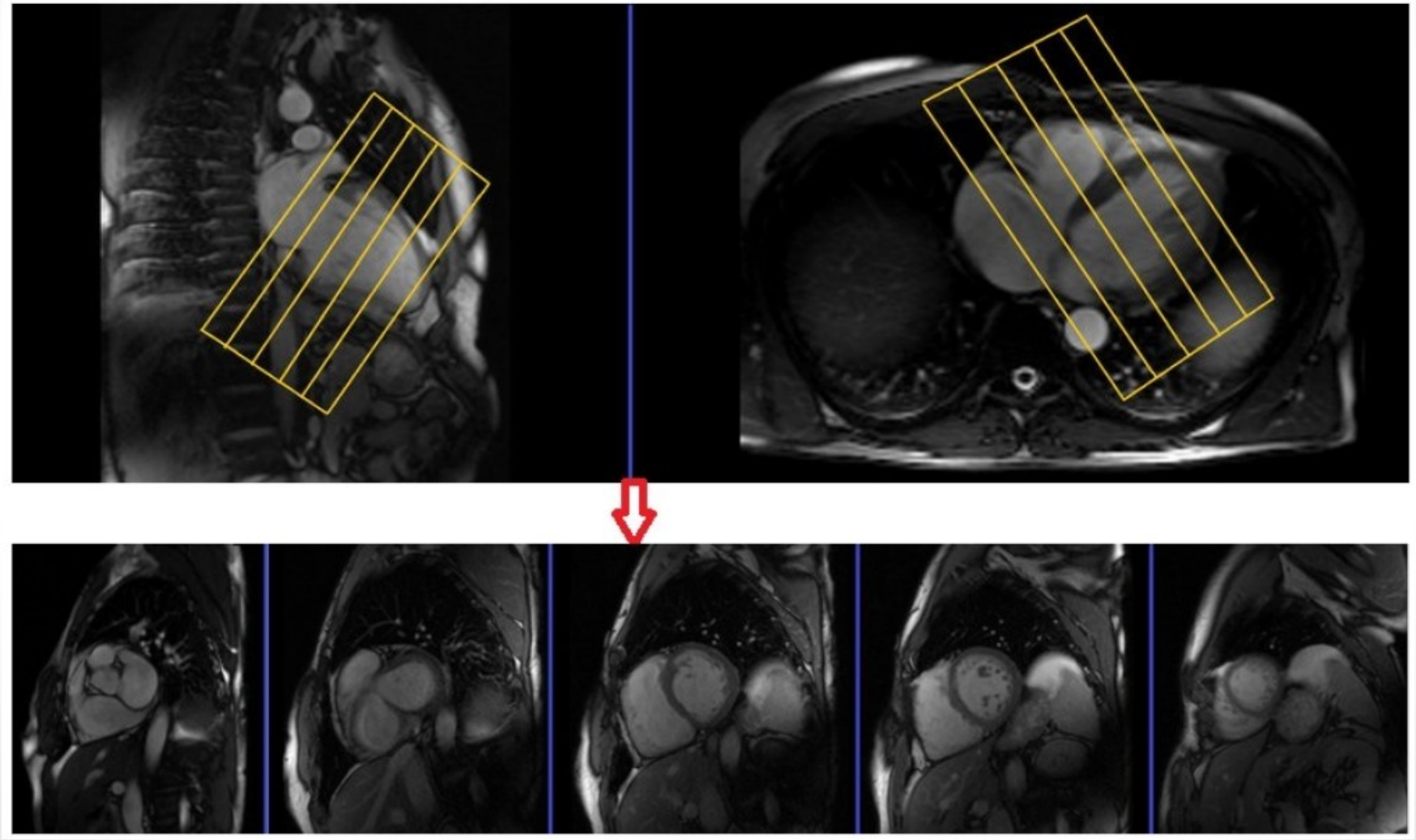
Plan the axial T2 scans on the coronal localizer



MRI sequences and plans :

3-*Short axis localizer*

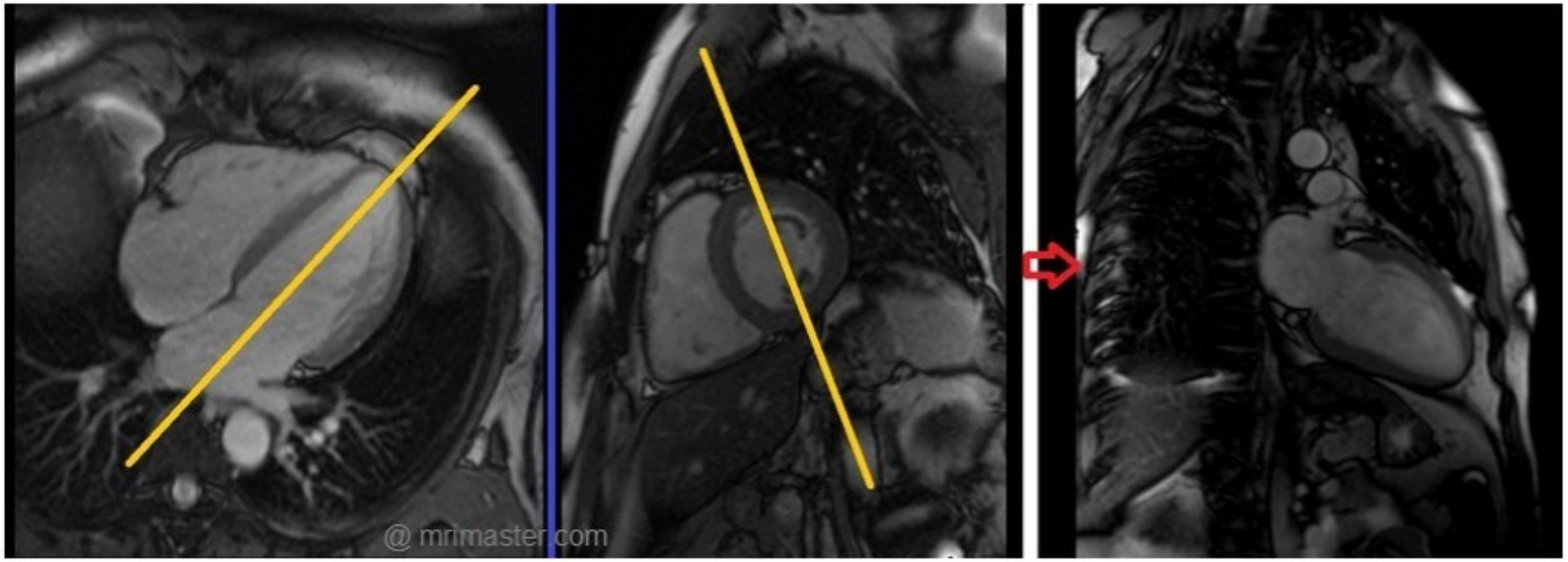
Plan the short axis localizer on the 2 chamber localizer and angle the position block perpendicular to the line along the center of the mitral valve and left ventricular apex



MRI sequences and plans :

5-*Left two chamber cine*

Plan the 2 chamber cine on the 4 chamber localizer and angle the position block parallel to the interventricular septum.



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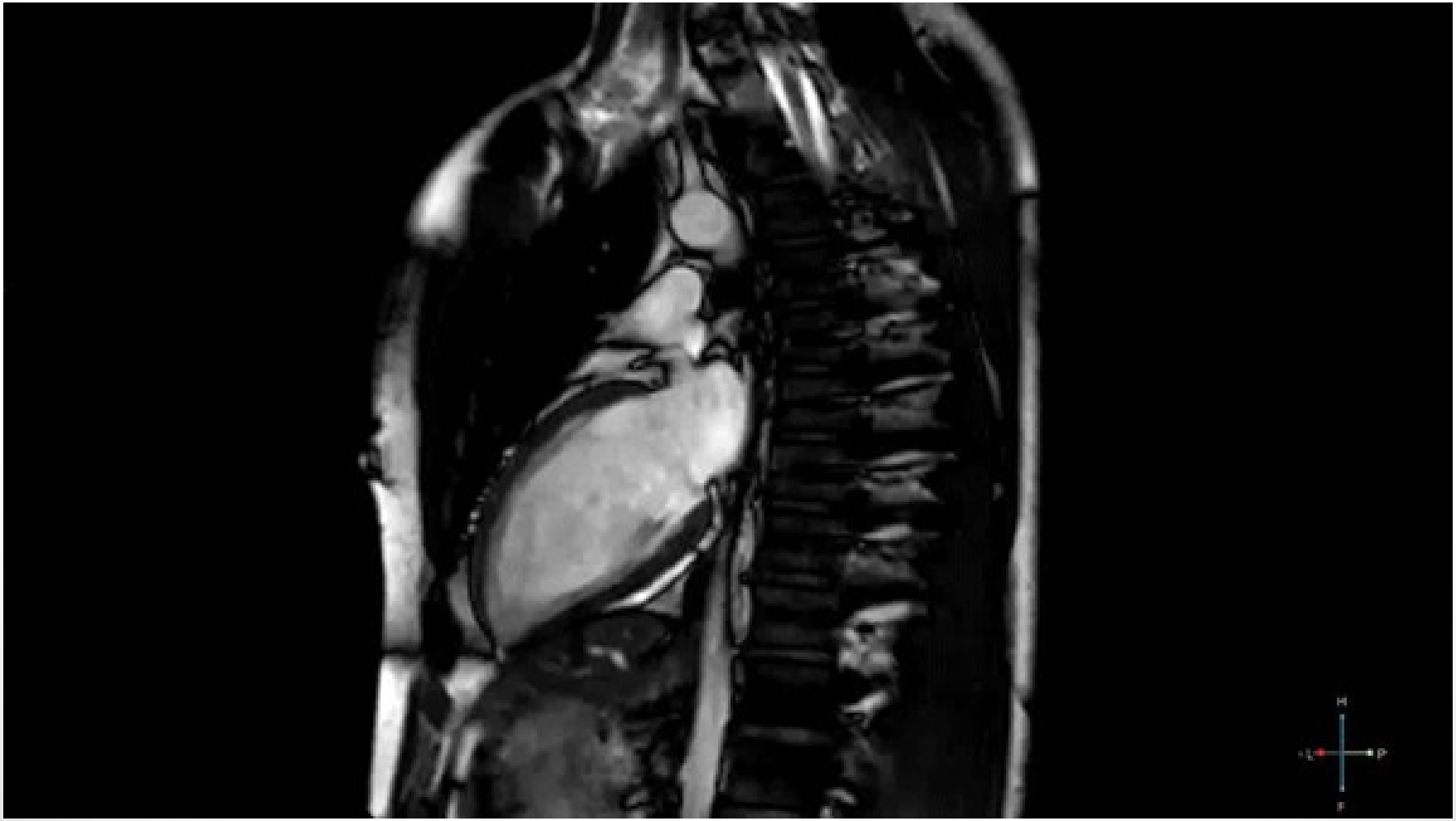
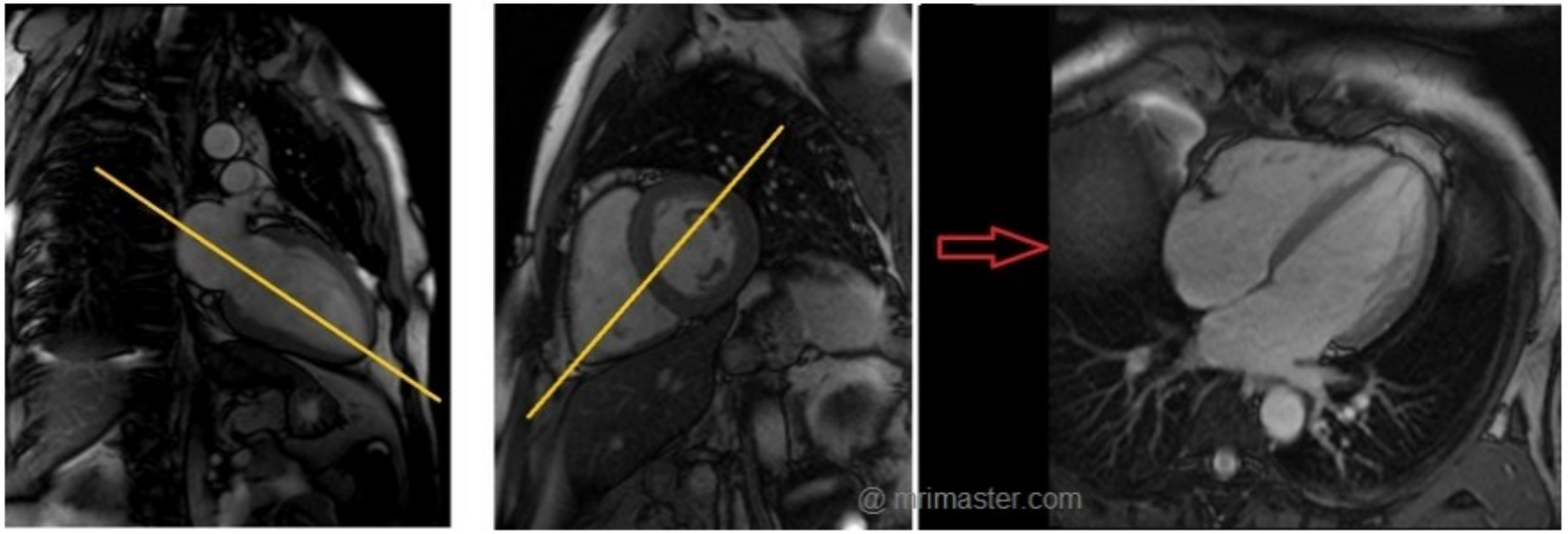
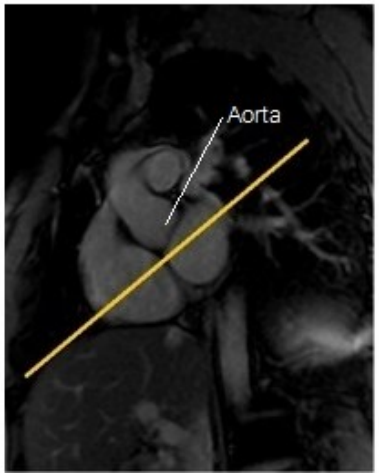


MRI sequences and plans :

4-*Four chamber view localizer*

Plan the 4 chamber localizer on the 2 chamber localizer and angle the position block parallel to the line along the center of the mitral valve and left ventricular apex.

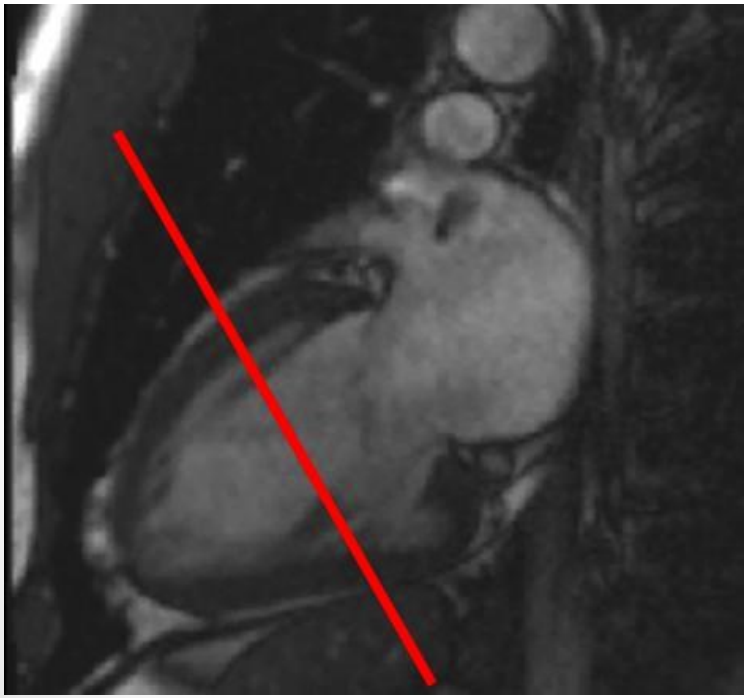


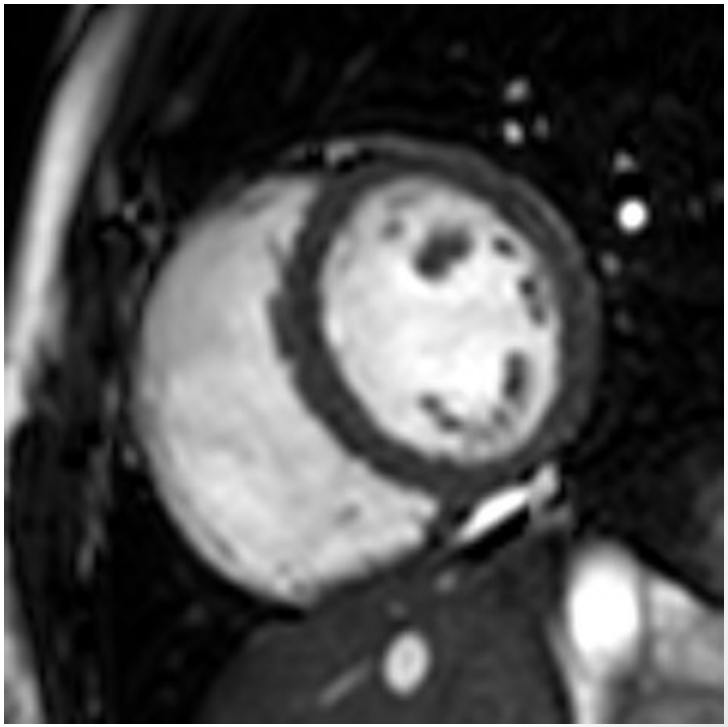


MRI sequences and plans :

7-Short axis cine

Plan the short axis cine scans on the 2 chamber cine and angle the position block perpendicular to the line along the center of the mitral valve and left ventricular apex Short axis cine scans must be planned on the end-systole (maximum ventricular expansion) slice on 2chamber and 4 chamber cine.





MRI sequences and plans :

7-Short axis cine

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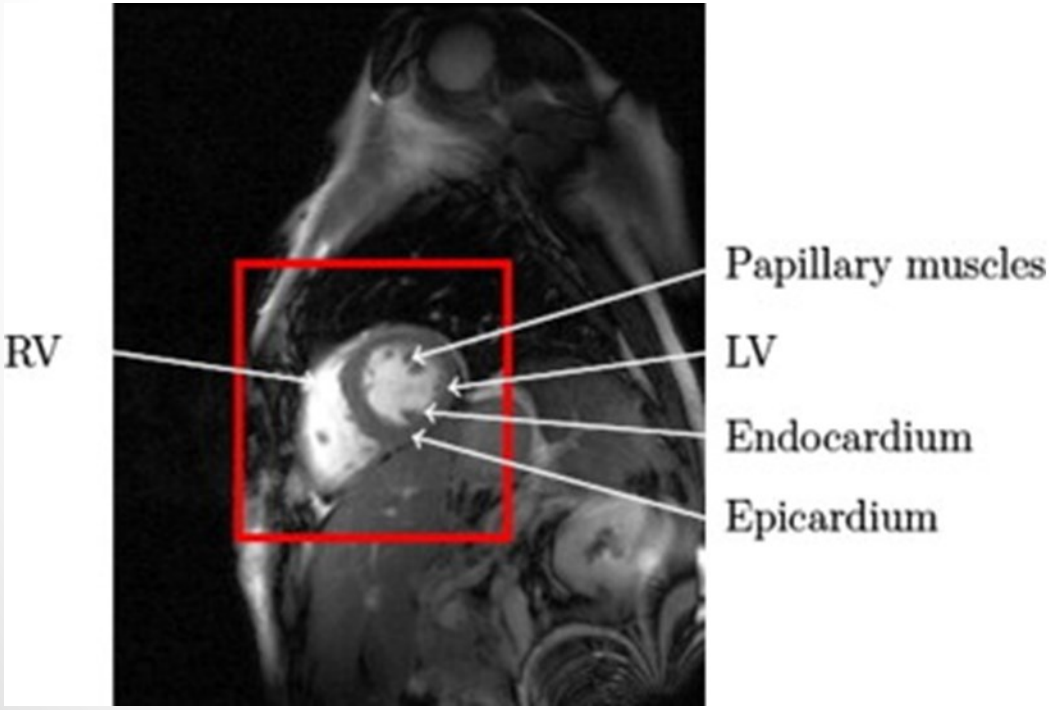
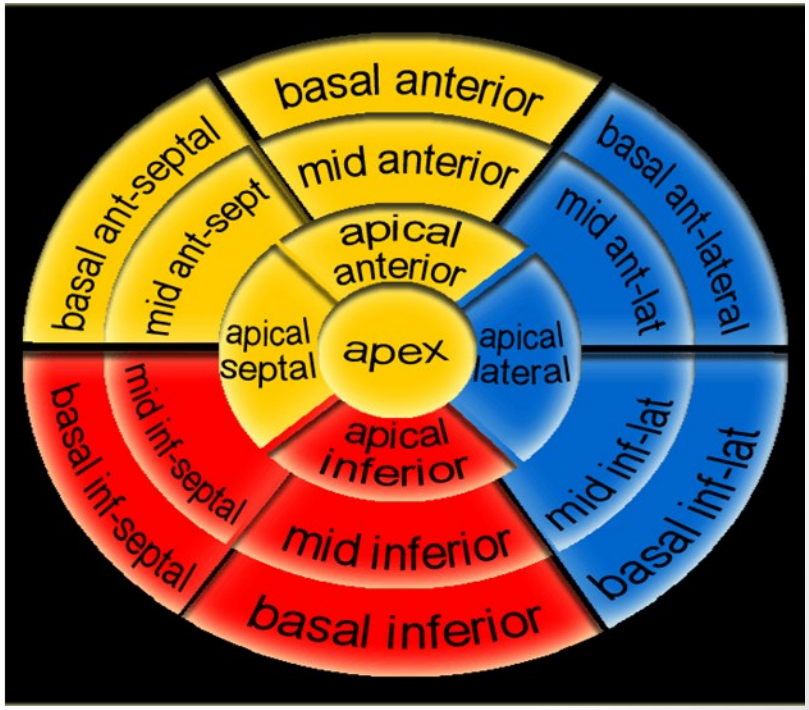
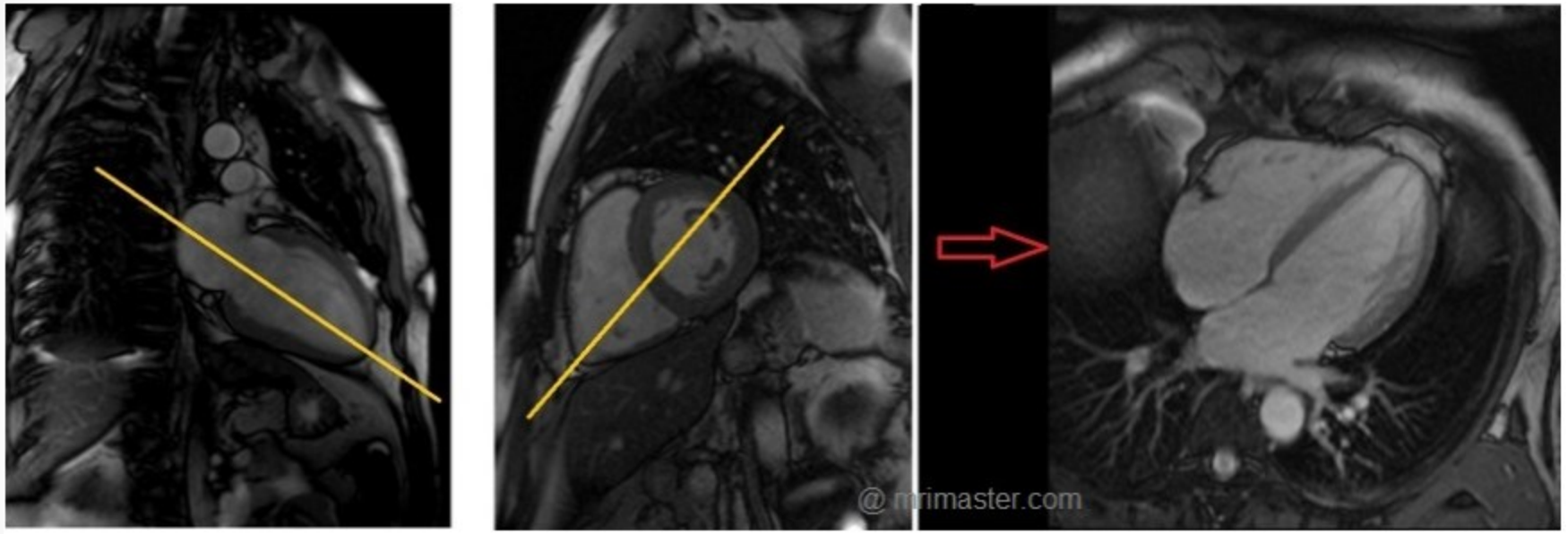




MRI sequences and plans :

6-*Four chamber cine*

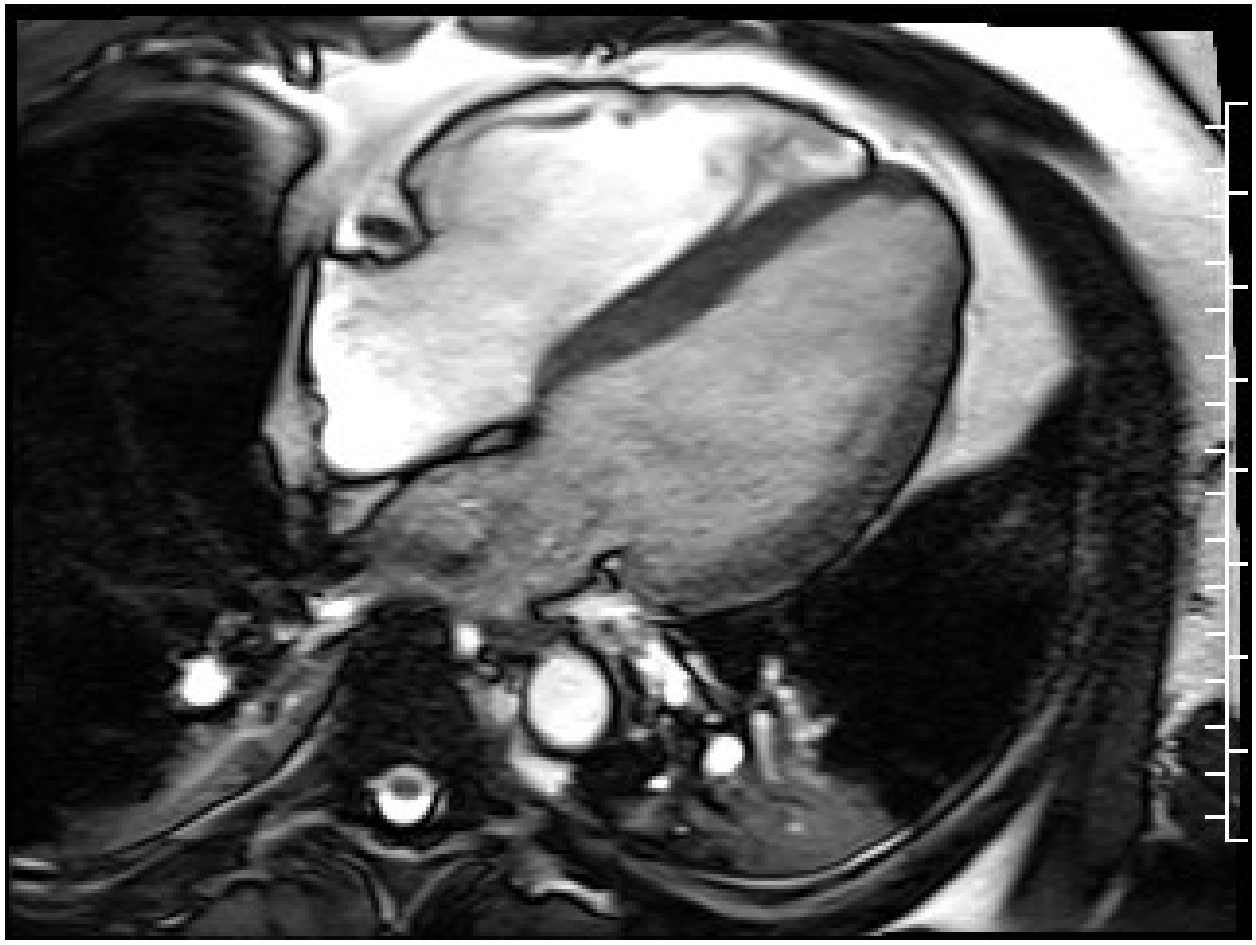
Plan the 4 chamber cine on the 2 chamber localizer and angle the position block parallel to the line along the center of the mitral valve and left ventricular apex.



MRI sequences and plans :

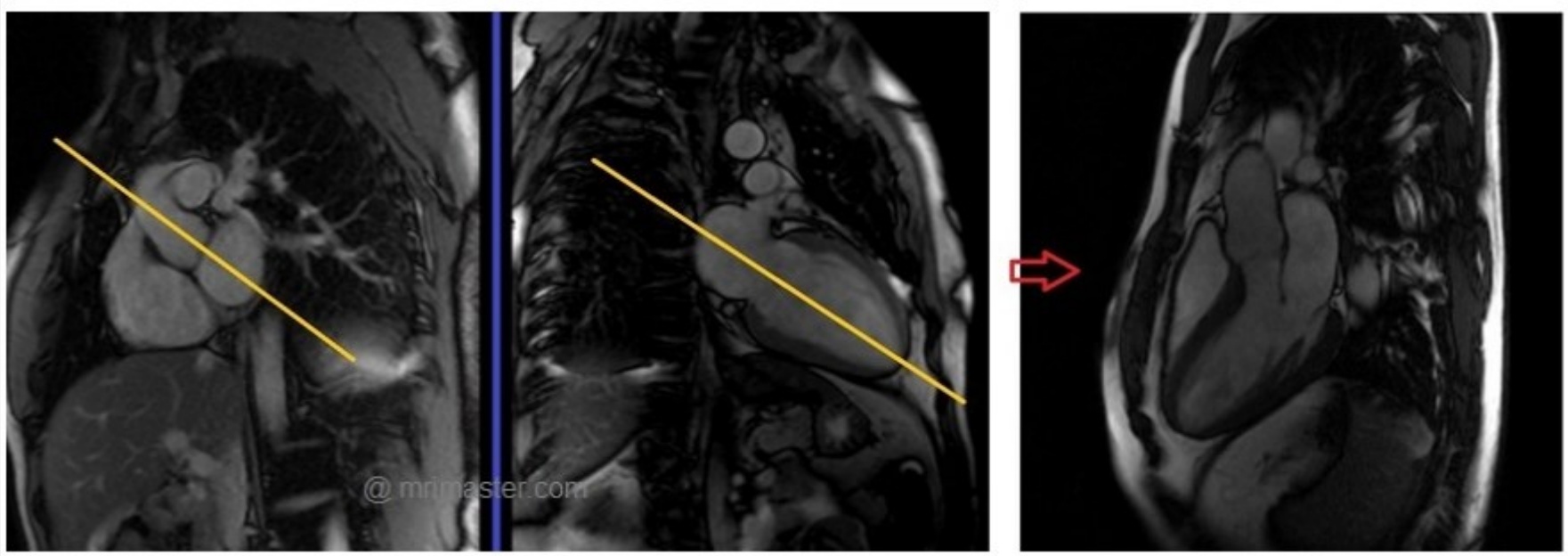
6-Four chamber cine

Plan the 4 chamber cine on the 2 chamber localizer and angle the position block parallel to the line along the center of the mitral valve and left ventricular apex.



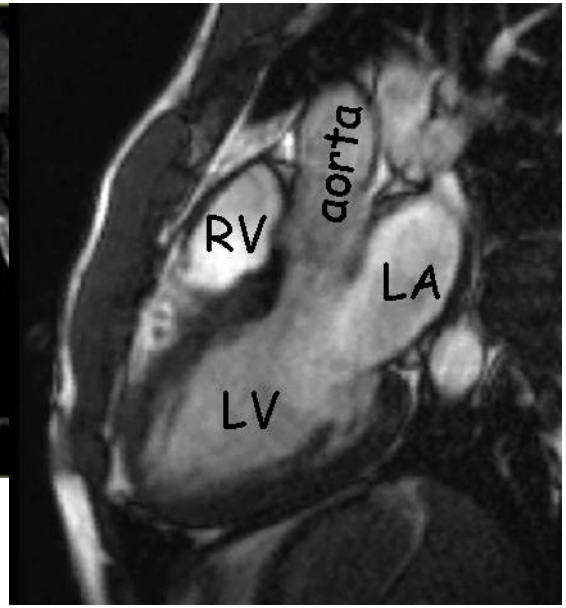
MRI sequences and plans :

8-Three chamber cine (Left Ventricular Outflow Tract LVOT) Plan the 3 chamber cine on the short axis localizer and angle the position block parallel to the line along the center of the aortic valve and left ventricle .



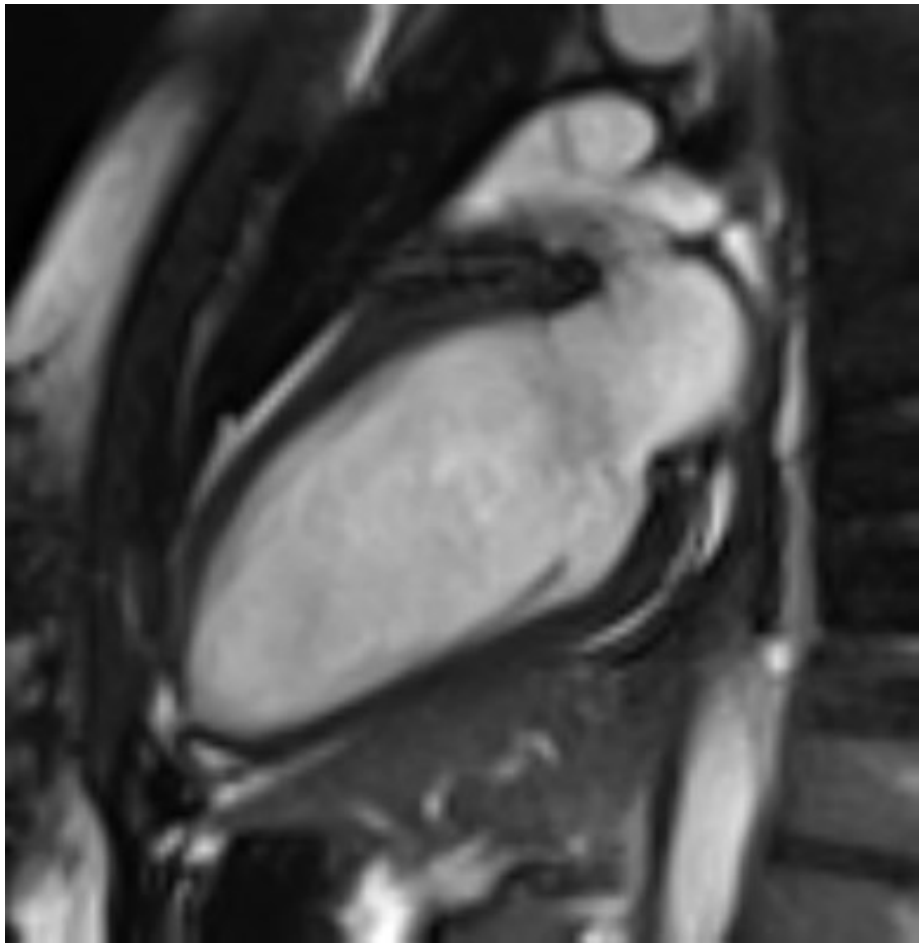
MRI sequences and plans :

8-***Three chamber (Left Ventricular Outflow Tract LVOT)cine*** **Plan the 3 chamber cine on the short axis localizer and angle the position block parallel to the line along the center of the aortic valve and left ventricle .**



What are cine Sequences?

Cine sequences are used for the assessment of cardiac function. During cine acquisition several individual images are acquired in different phases of the cardiac cycle. these are then played as a movie to provide the user with a 'video' of the cardiac activity.




The End