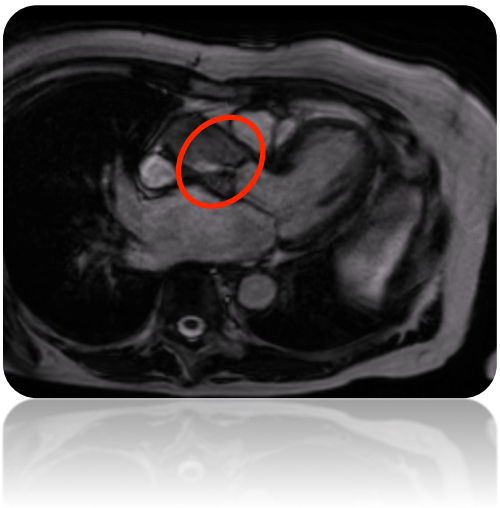
Cardiac MRI Essentials

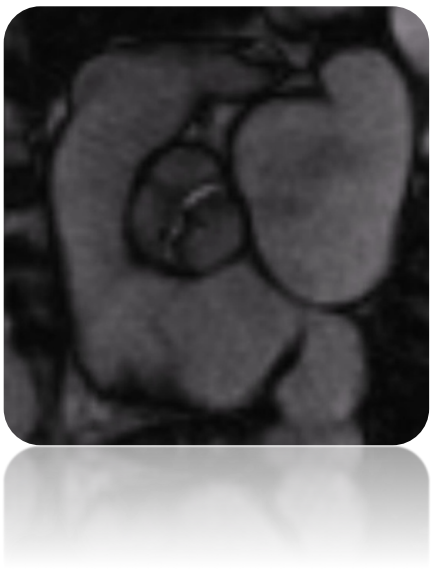
Aortic stenosis

- Echocardiography remains the cornerstone of aortic stenosis assessment
- However CMR offers valuable information regarding aortic valve morphology
- CMR can also provide information on aortic valve flow velocity/gradient
- CMR provides more accurate information about aortic anatomy, left ventricular hypertrophy, and left ventricular systolic function

Aortic stenosis: 3-chamber view

- 3-chamber view cine CMR (still frame)
- Thickened aortic valve cusps (circled) with reduced cusp mobility



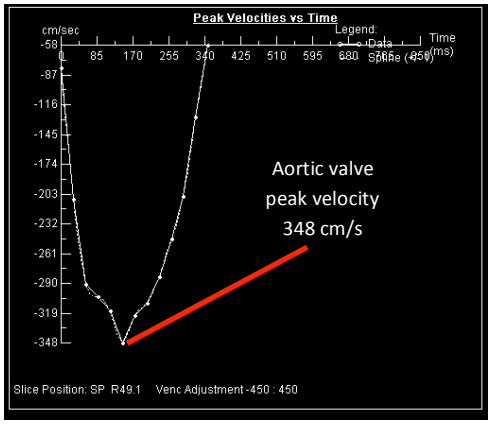


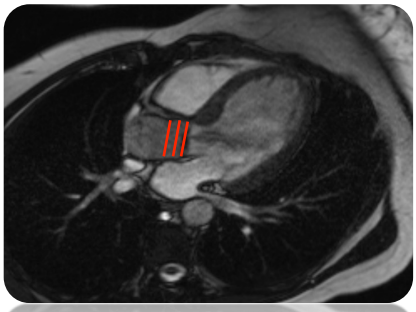
Aortic stenosis: short axis view

- Short axis view cine CMR (still frame)
- Shows aortic valve cusps *en face*
- Allows direct planimetry of orifice area

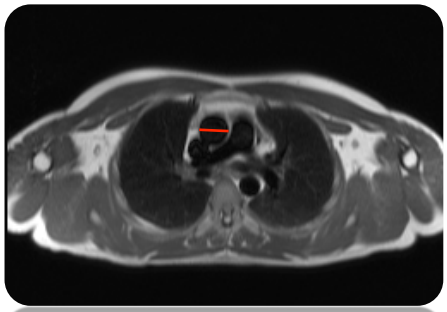
Aortic stenosis quantification

The severity of aortic stenosis can be assessed by direct planimetry of the valve orifice area (severe stenosis if <1.0cm^2). It can also be assessed by using flow CMR to measure peak flow velocity through the valve:





CMR for aortic valve disease should also include assessment of aortic morphology (and aortic diameter) in the 3-chamber view (left) and transverse 'HASTE' view (right)



How do we assess aortic stenosis with CMR?

- Cine CMR – aortic valve anatomy
  - Two orthogonal views through the aortic valve
  - One *en face* view at cusp tips (planimetry)
- Flow CMR – aortic valve hemodynamics
  - Peak velocity/gradient
- Aortic anatomy and dimensions
- Left ventricular size and systolic function
- Left ventricular hypertrophy/mass

Further reading

Cardiovascular magnetic resonance imaging for valvular heart disease. Technique and validation. *Circulation* 2009; **119**: 468-478 [click here to access online]