

# Introduction to Project 2: Cardiac ejection fraction

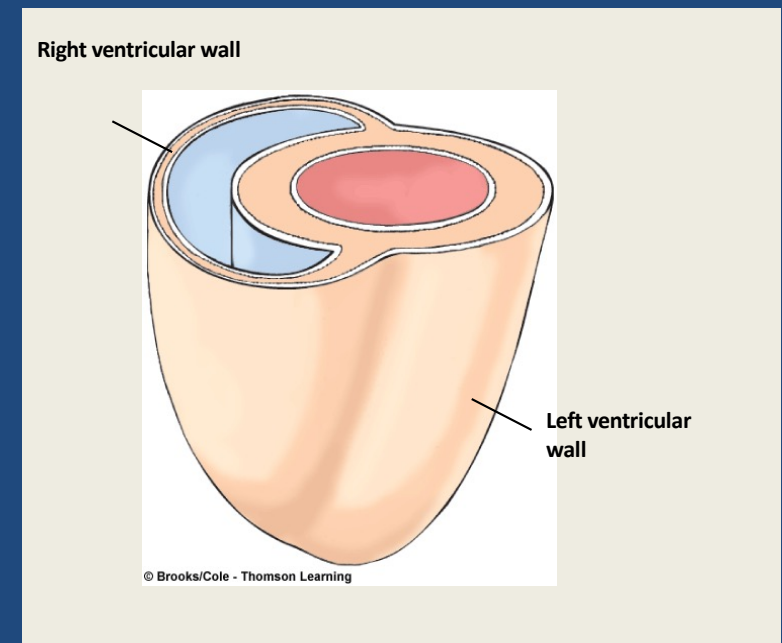
Quantitative and Functional Imaging

BME 4420/7450

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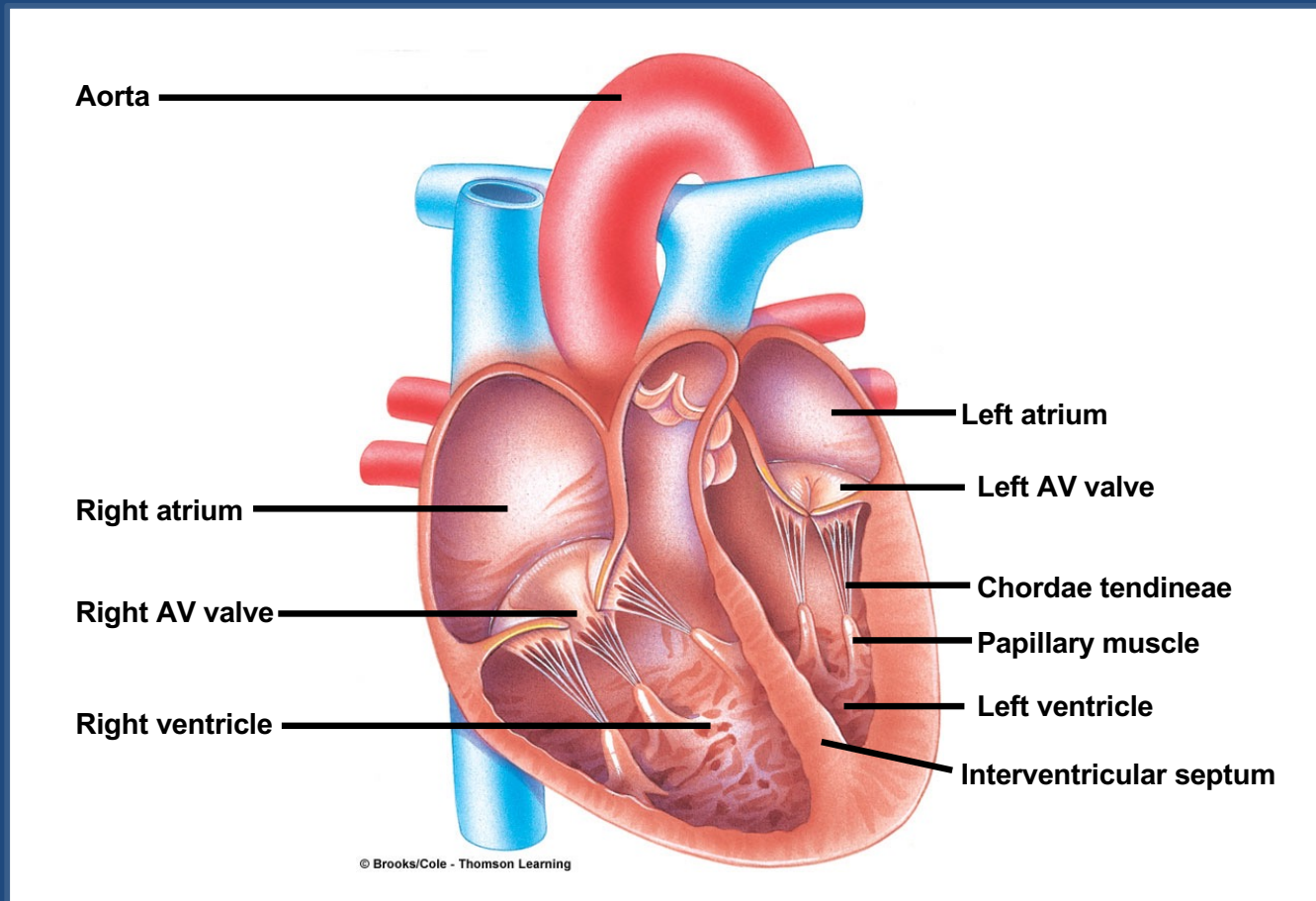
# Project 2

- Simple example of dynamic volume measurements
- Left ventricle (LV) pumps blood out of the heart
  - What volume of blood is ejected each beat?
- Measure ejection volume and volume fraction with MRI



Sherwood (2006)

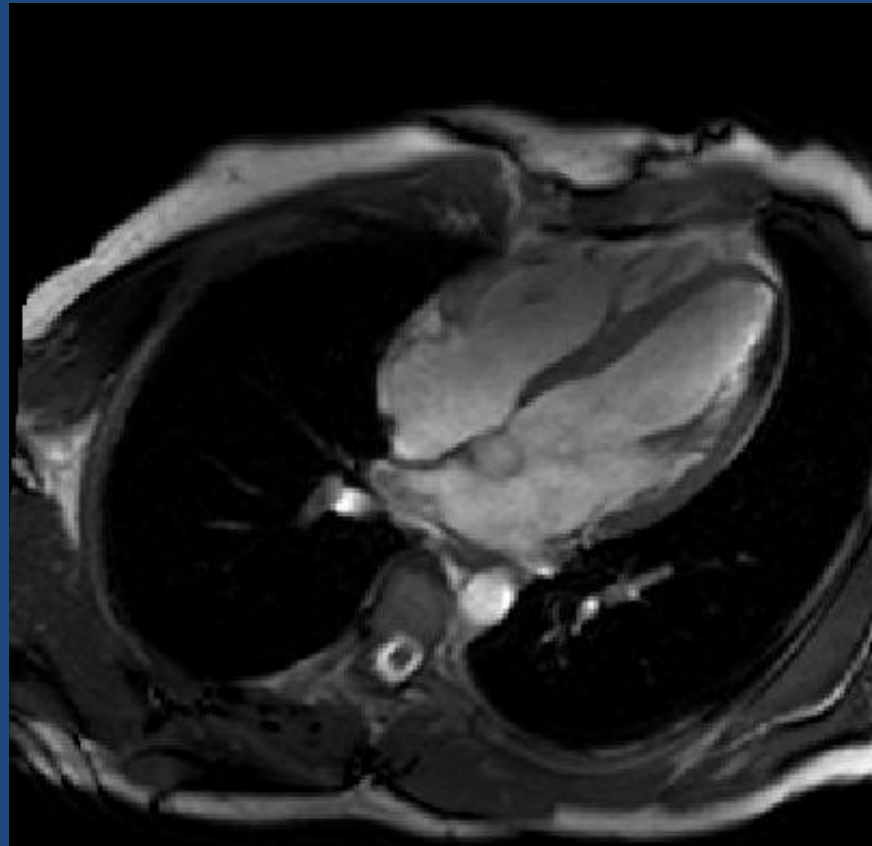
# Cardiac anatomy



Sherwood (2007)

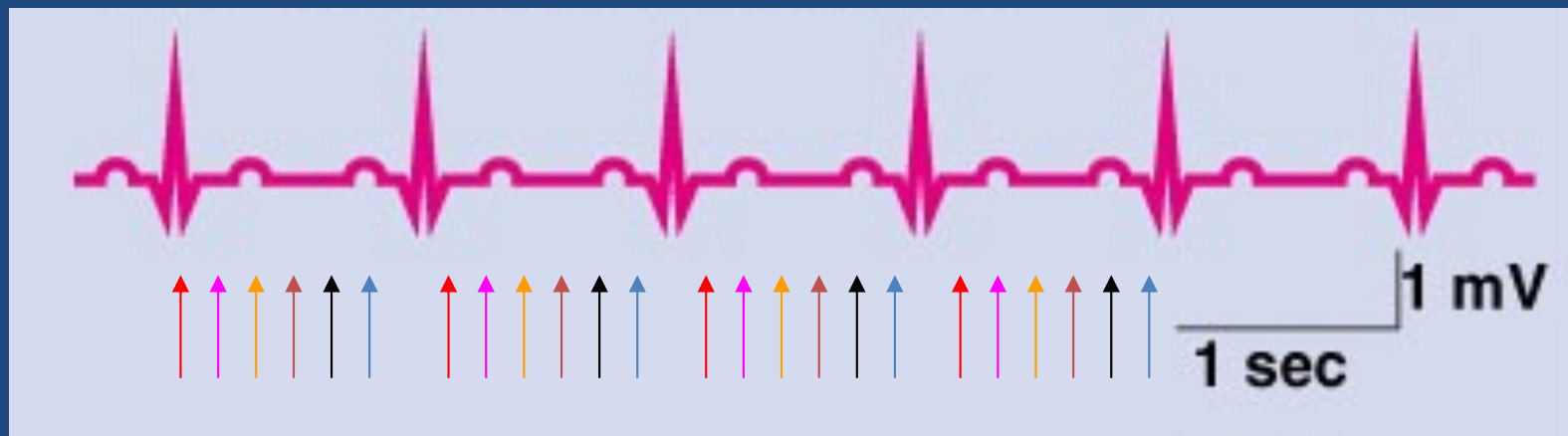
# Cardiac MRI

- A high resolution image takes several minutes to acquire
  - Why isn't it blurred by motion?



# Cardiac gating

- Data acquisition for an image takes ~1 minute normally
- 60 or more heart beats in that time
- 'Freeze' motion by triggering acquisition in cardiac cycle



- Data captured at each red arrow contributes to 1 image, etc.

# Cardiac MRI

- Long-axis images at 30 time points ('phases') over the cardiac cycle
- Goals of project
  - Measure left ventricle (LV) dimensions as a function of cardiac phase
  - Use a simple geometrical model to estimate LV volume
  - Estimate ejection fraction

