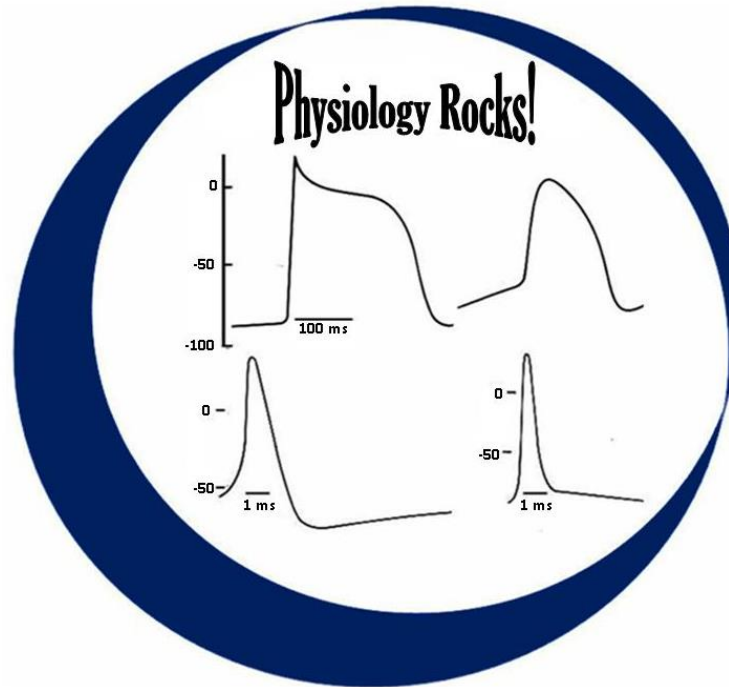


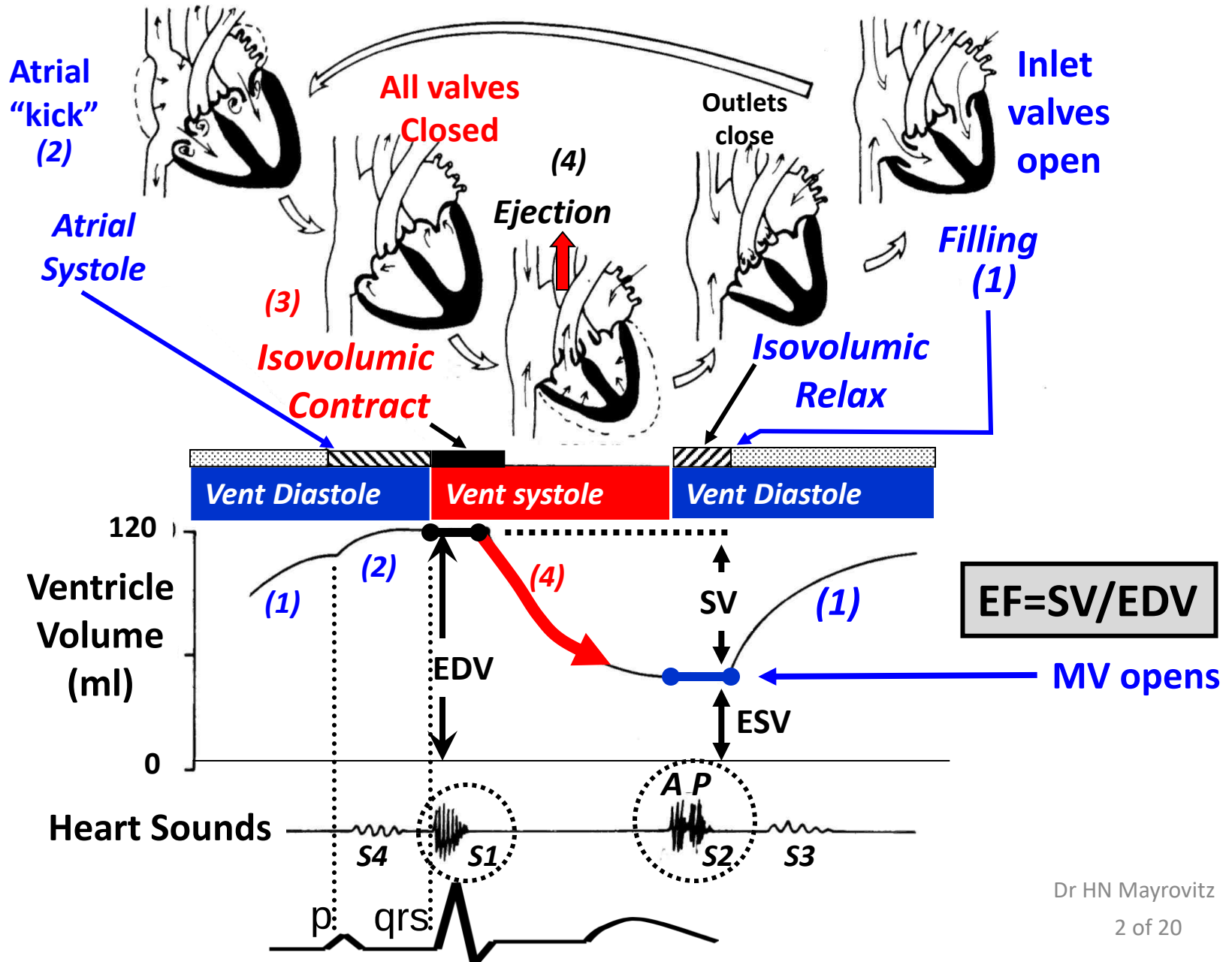
Lecture 25

Cardiac Cycle – PV Loops

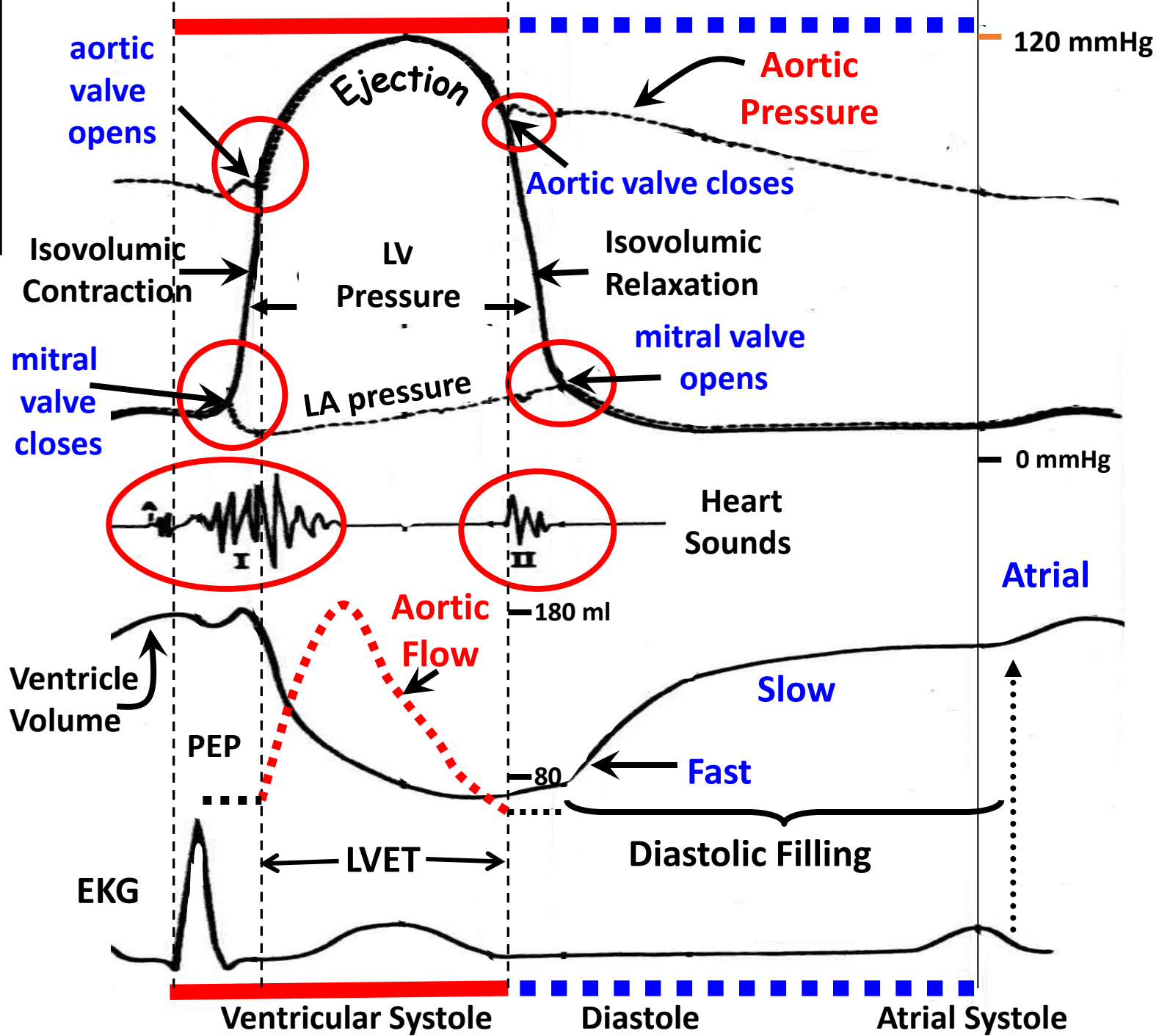


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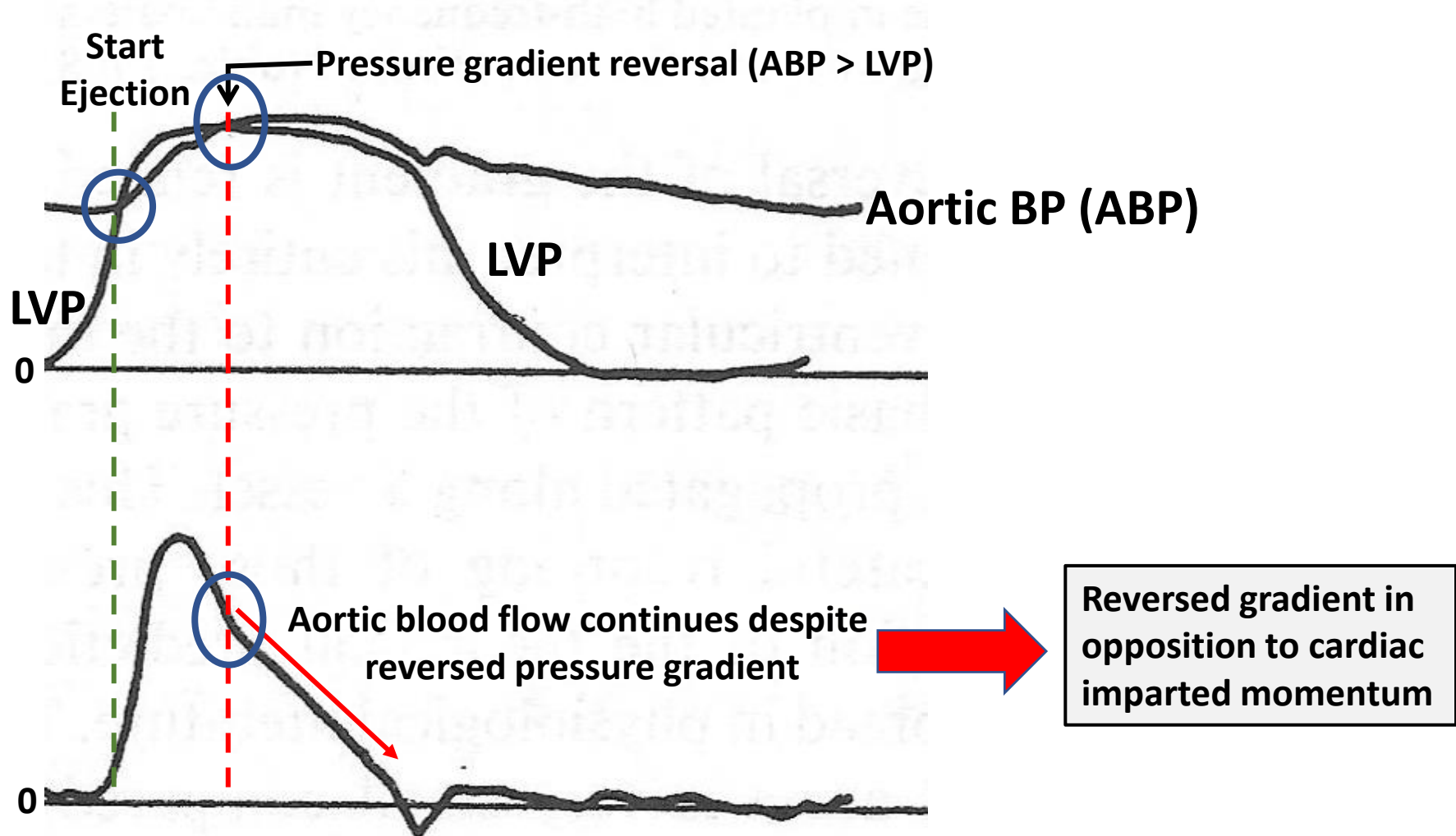
Cardiac Cycle Overview



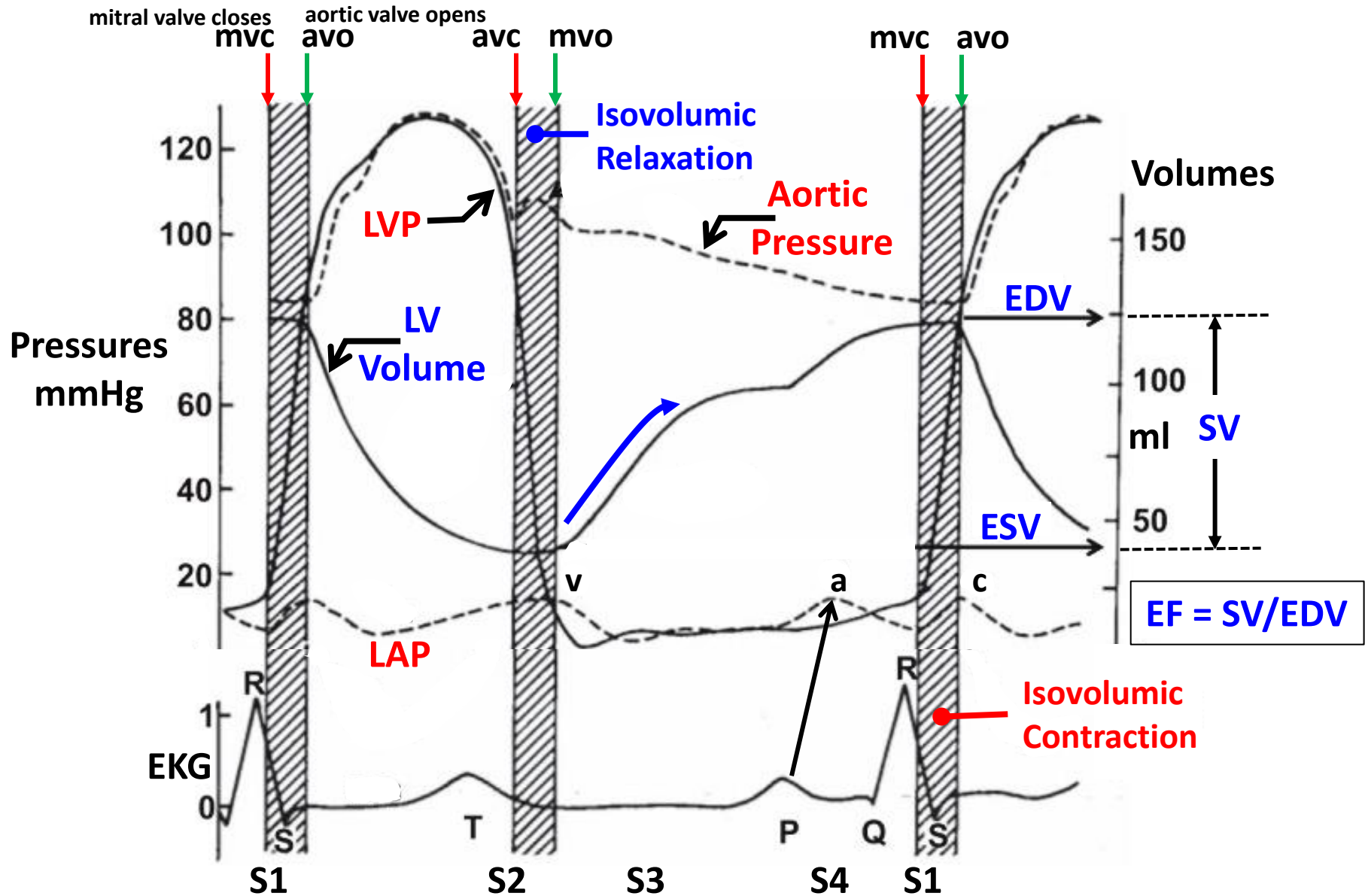
**Cardiac Cycle:
Carl Wiggers's
Diagram**



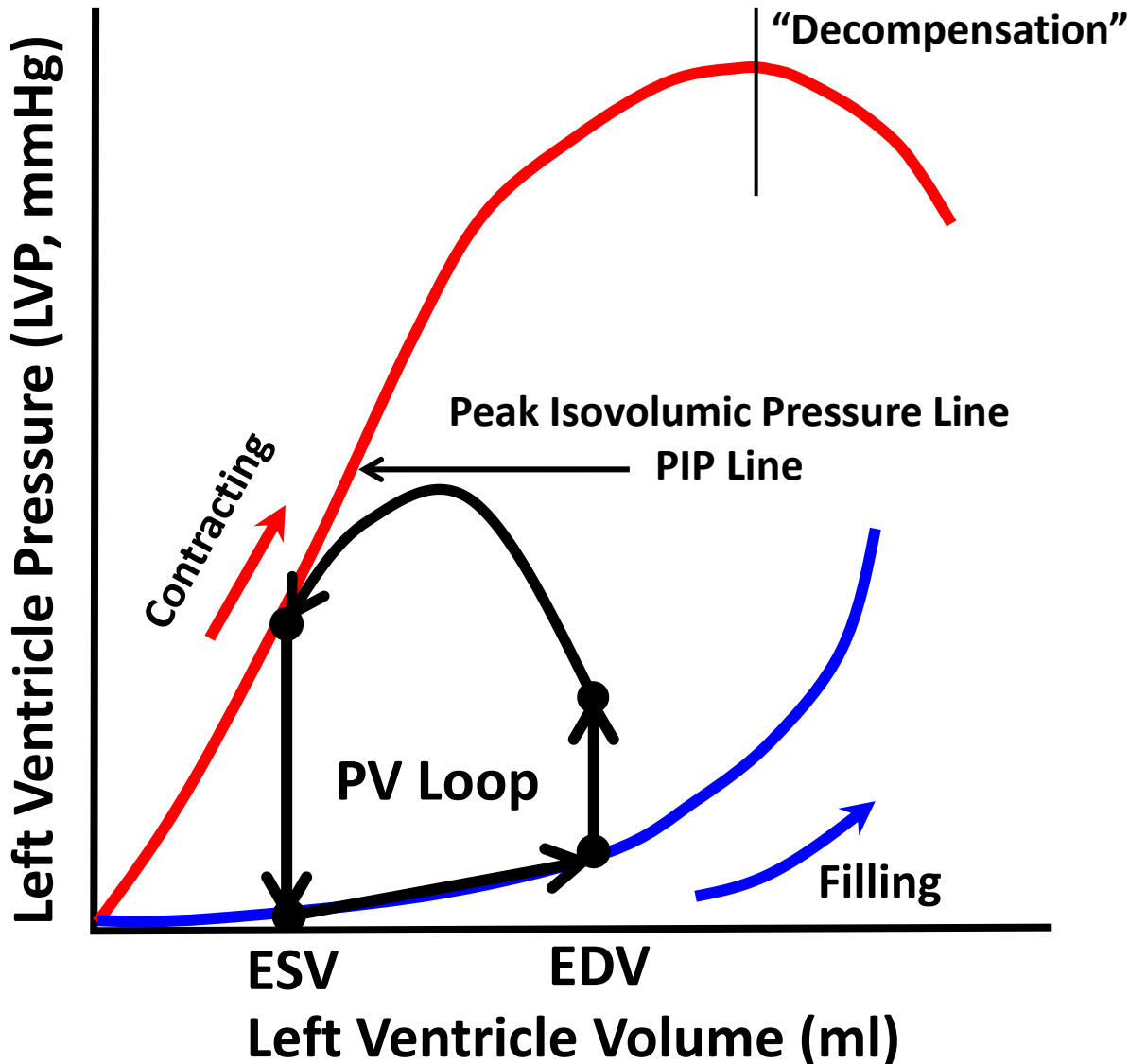
Closer View of LVP vs. ABP vs. Aortic Blood Flow



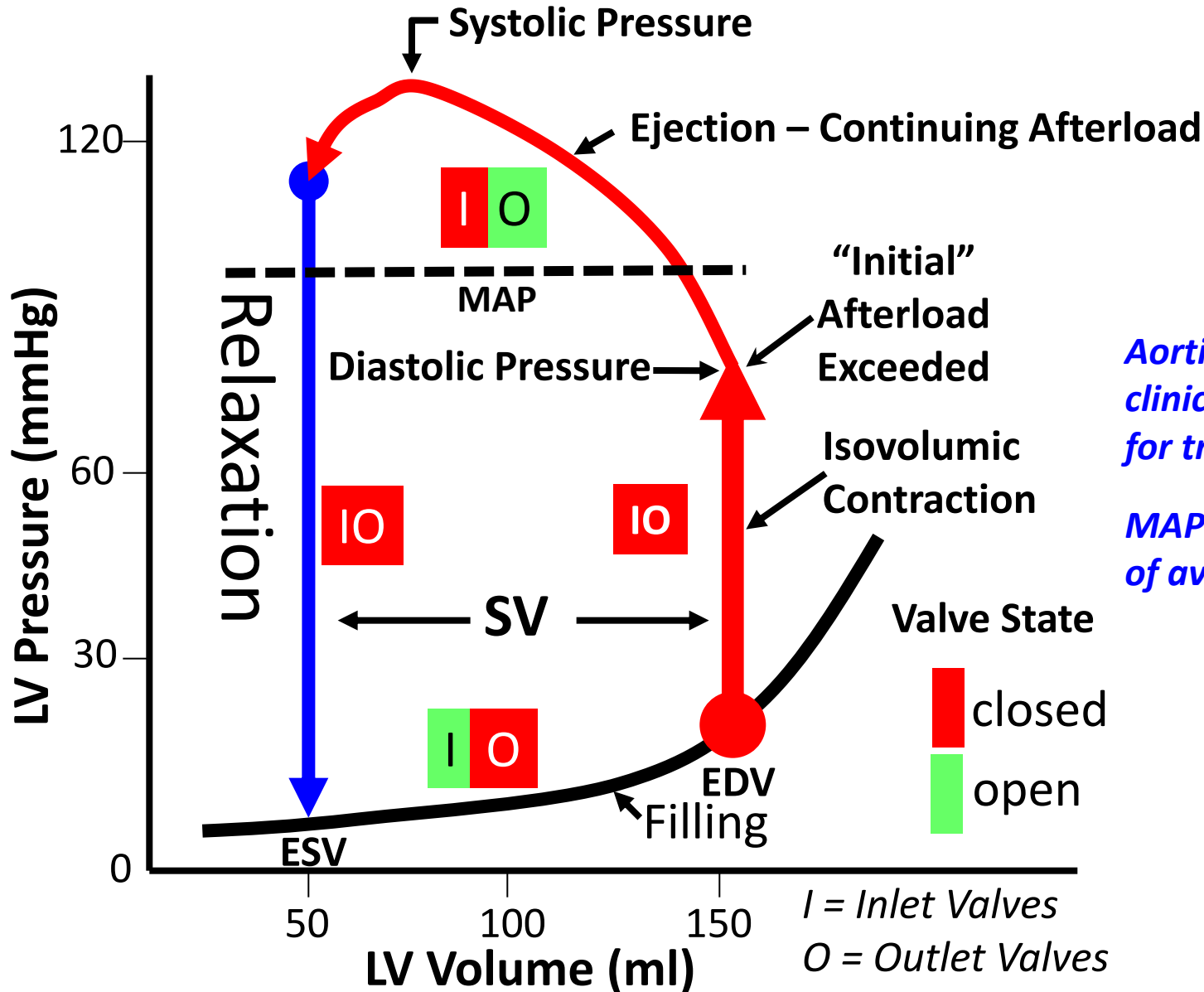
Cardiac Cycle Essentials via Wiggers's Diagram



Cardiac Pressure-Volume Loop: Introduction



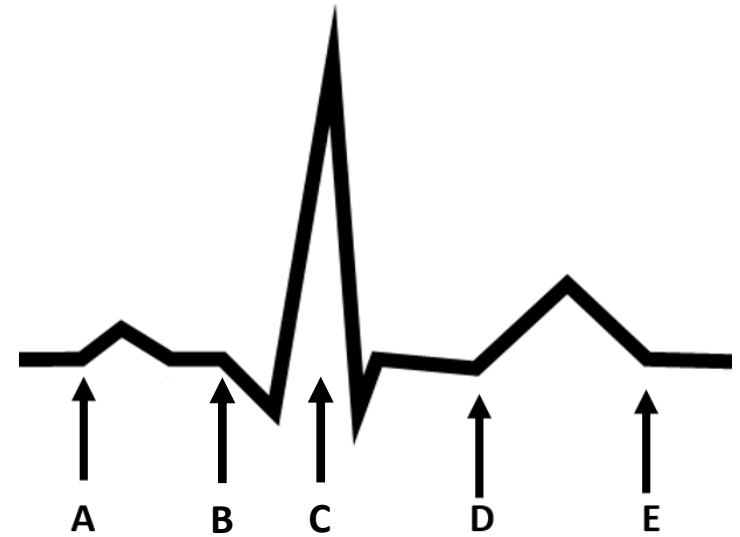
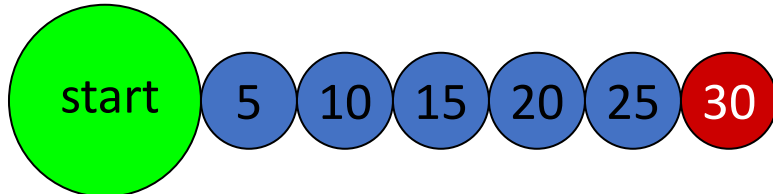
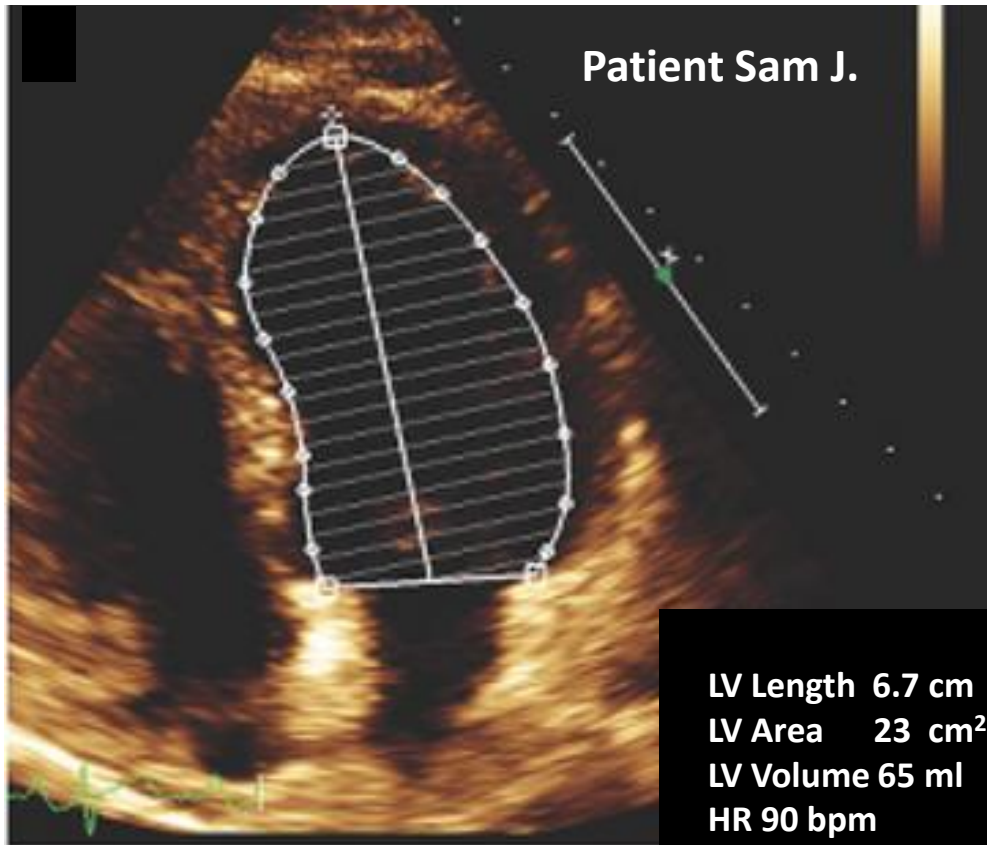
Cardiac Pressure-Volume Loop



Aortic pressure is a clinical surrogate for true afterload

MAP is an estimate of average afterload

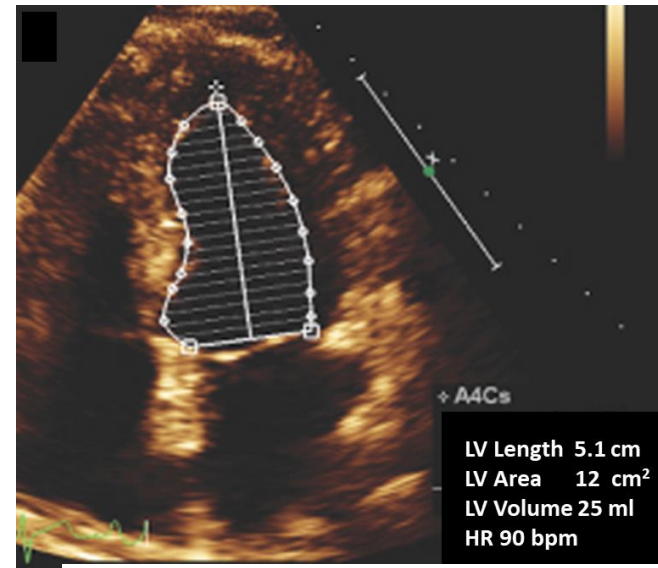
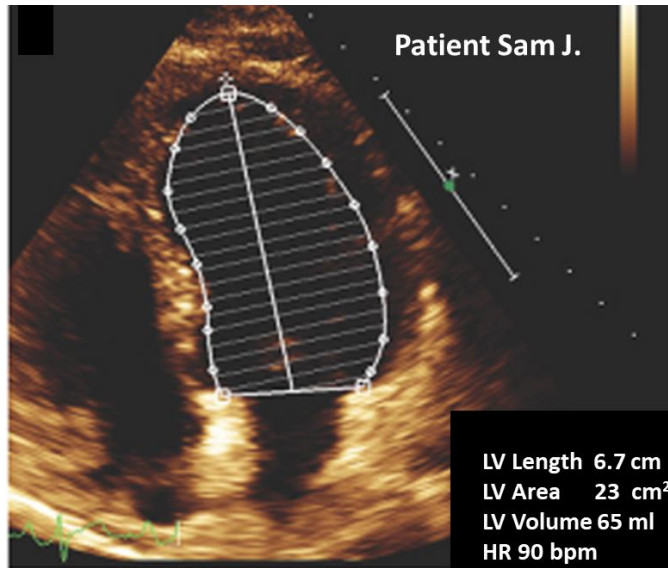
Measuring EDV via Echocardiography



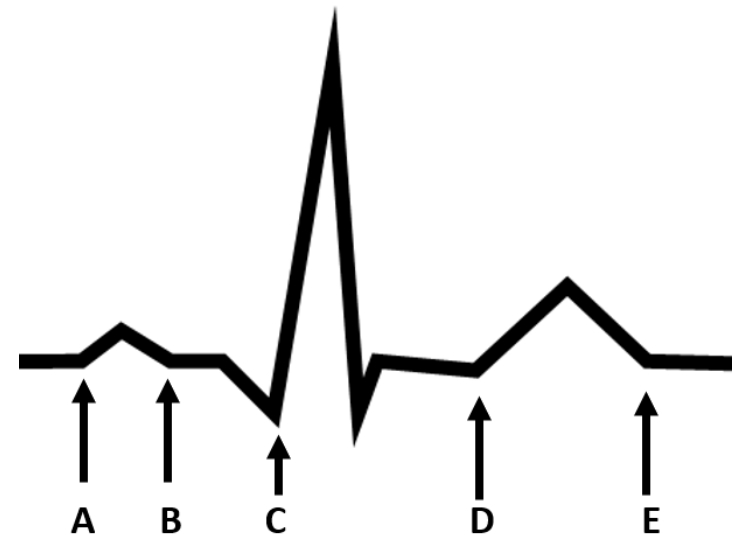
Of the times shown above,
at which time should the **EDV**
measurement be made?

30 seconds

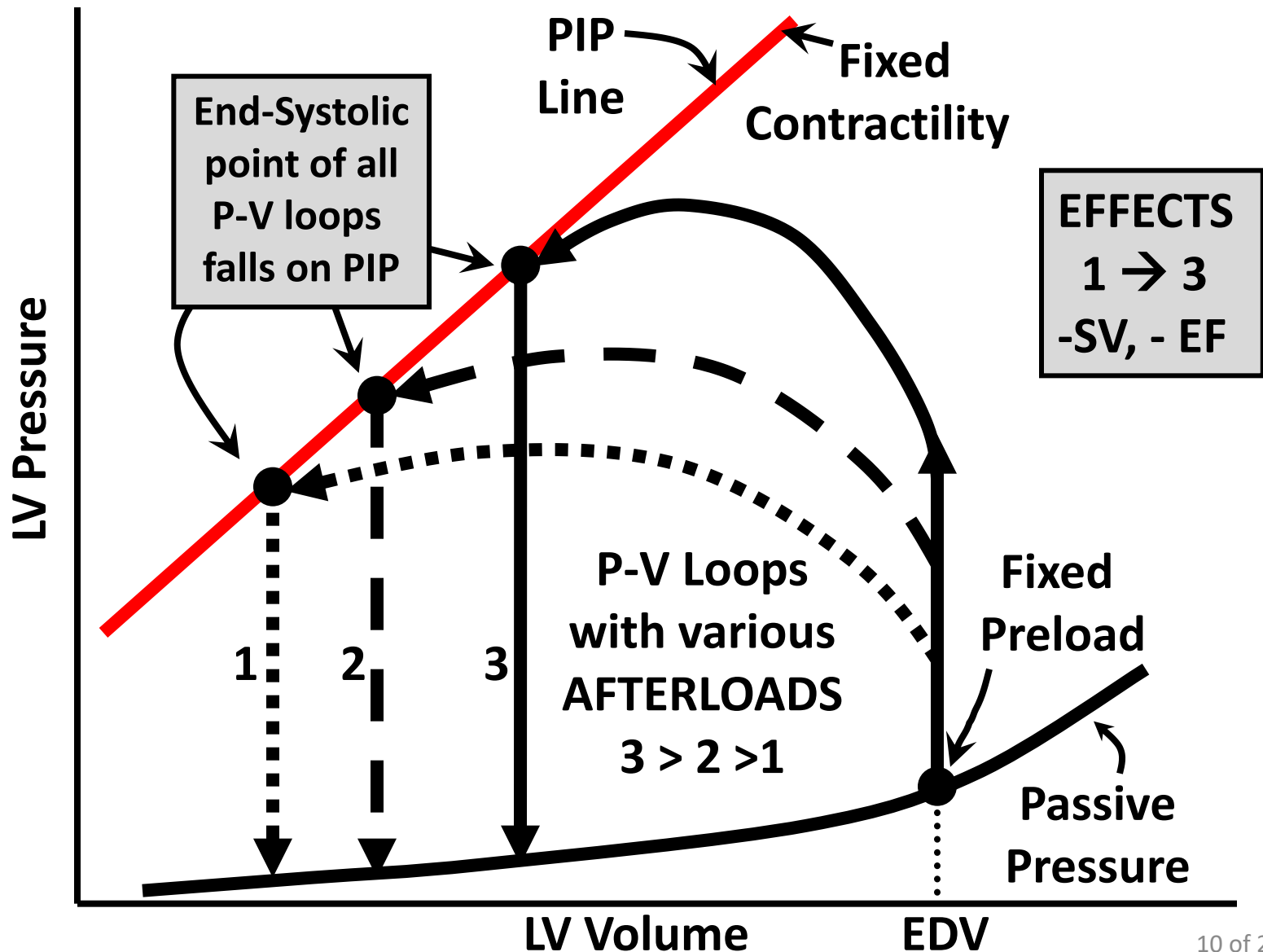
Measuring **ESV** via Echocardiography



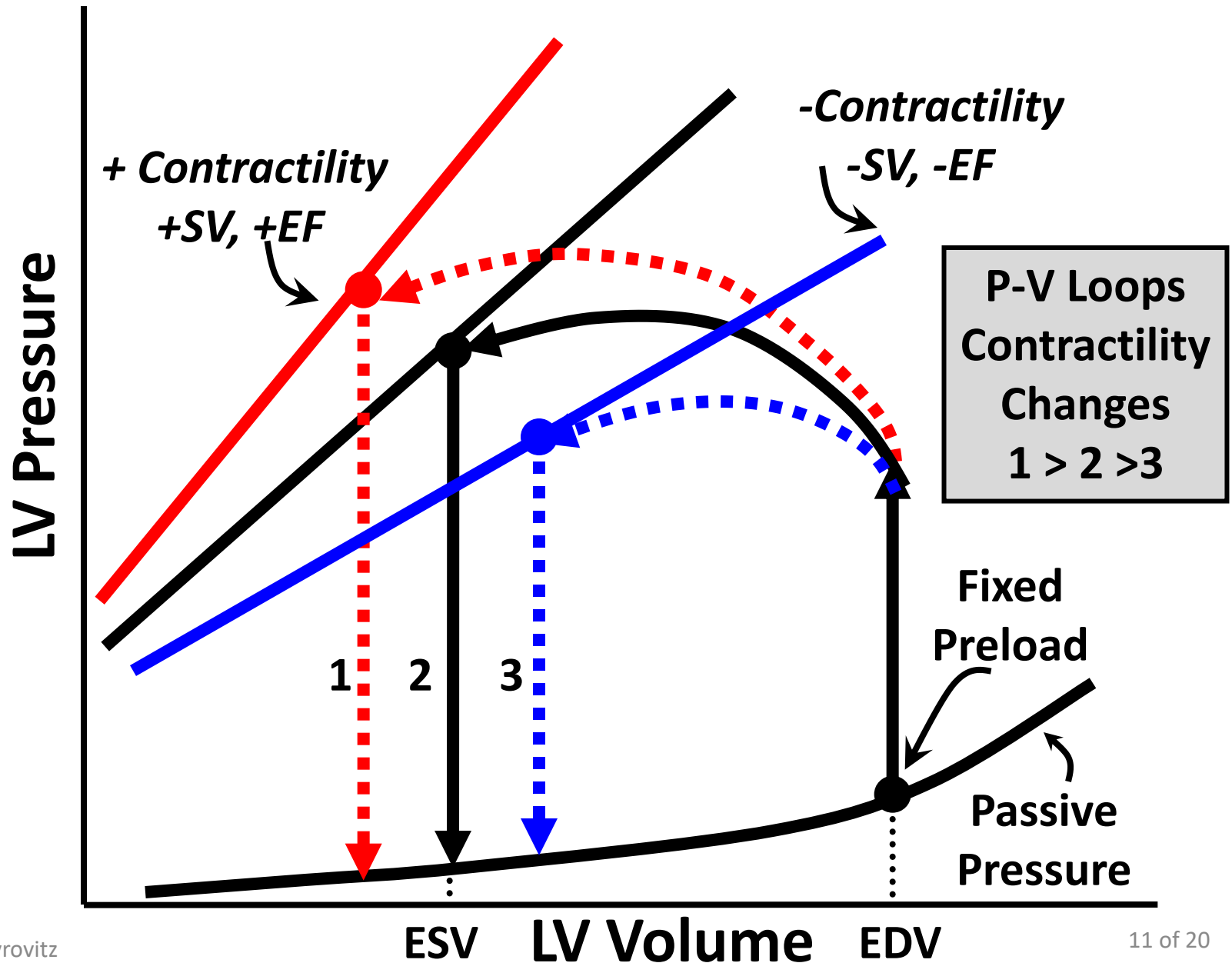
1. Of the times shown adjacent, at which time should the **ESV** measurement be made?
2. What is Sam's ejection fraction?
3. What is Sam's Cardiac Output?



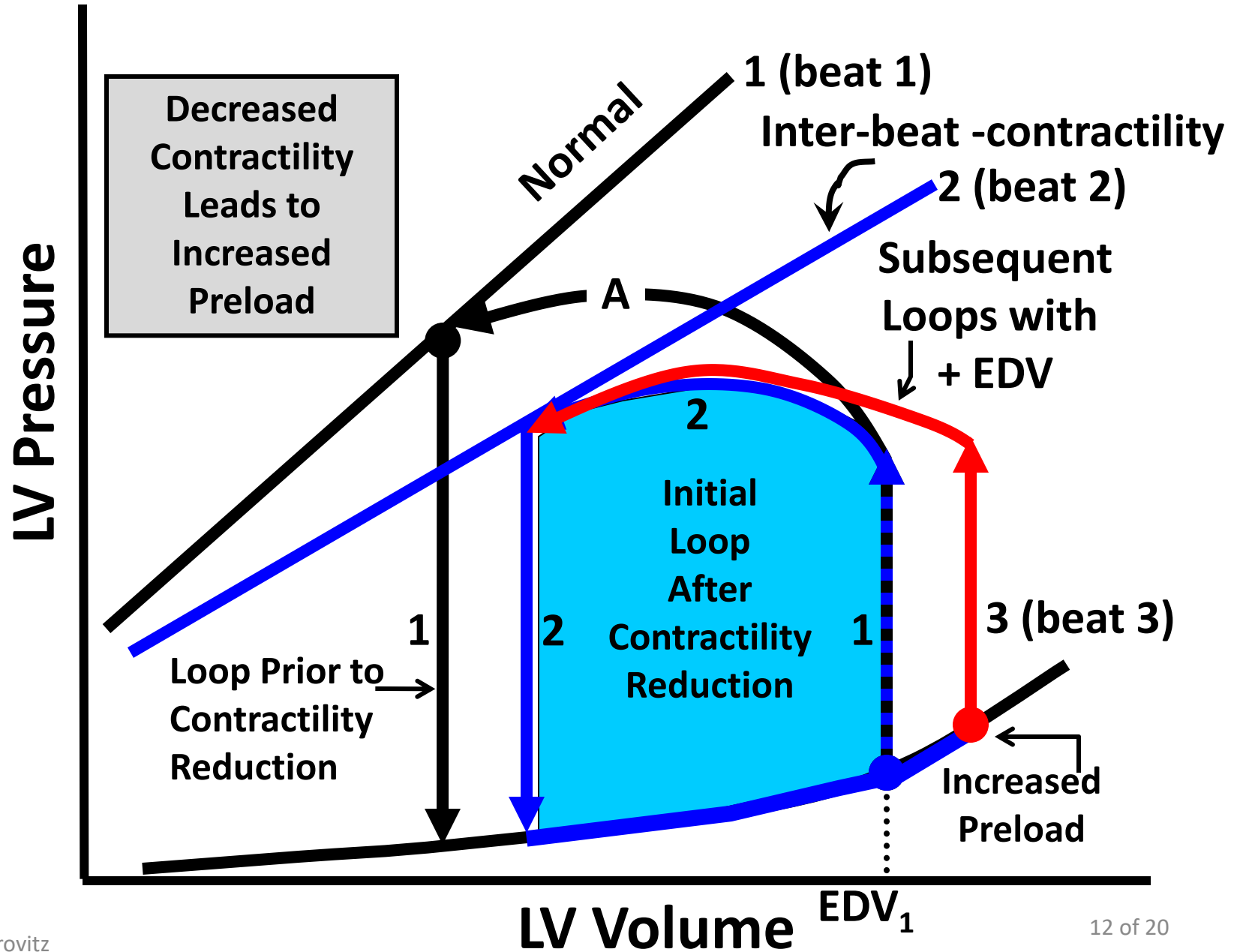
Afterload Effects and Peak Isovolumic Pressure



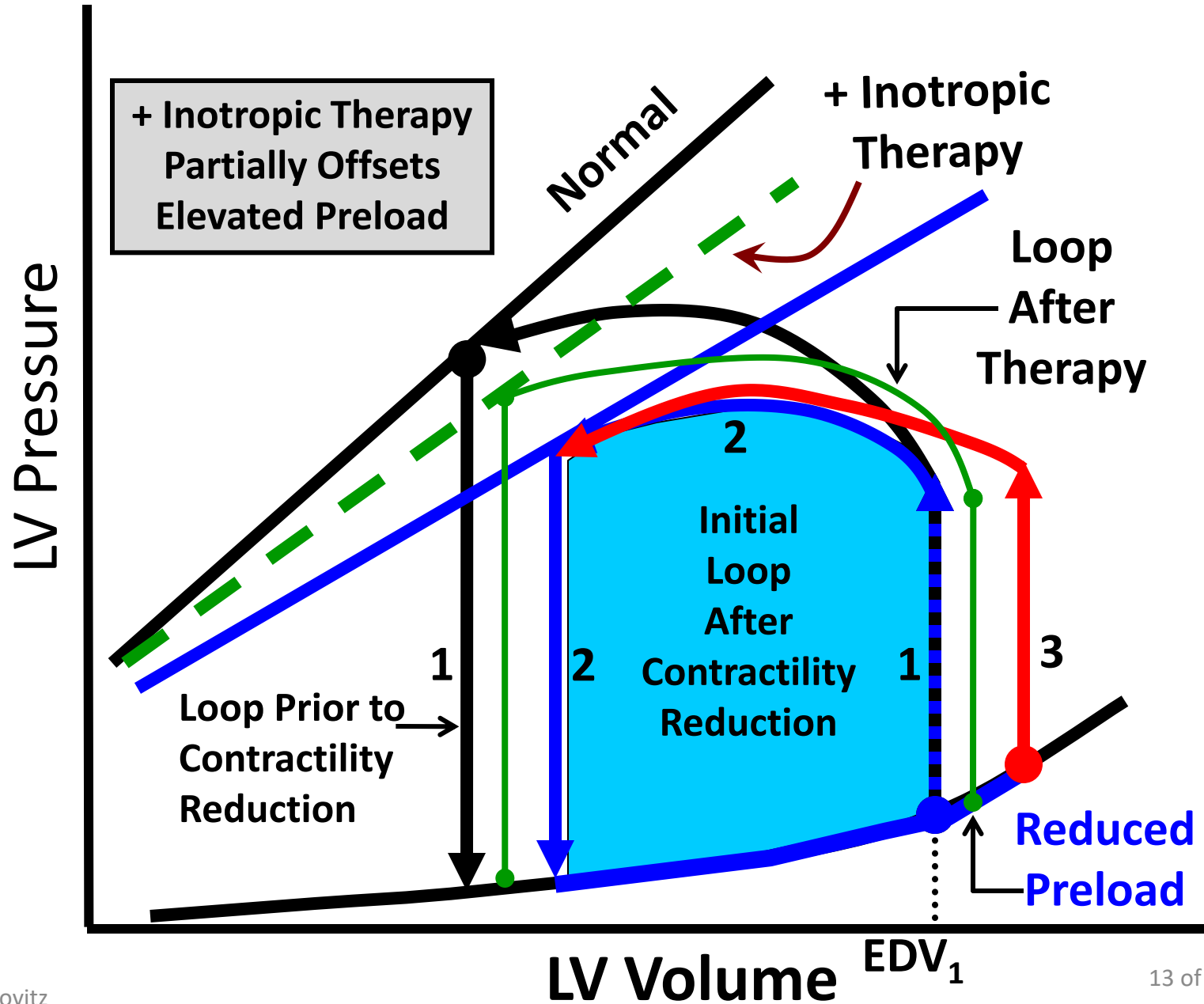
Contractility Effects on P-V Loops



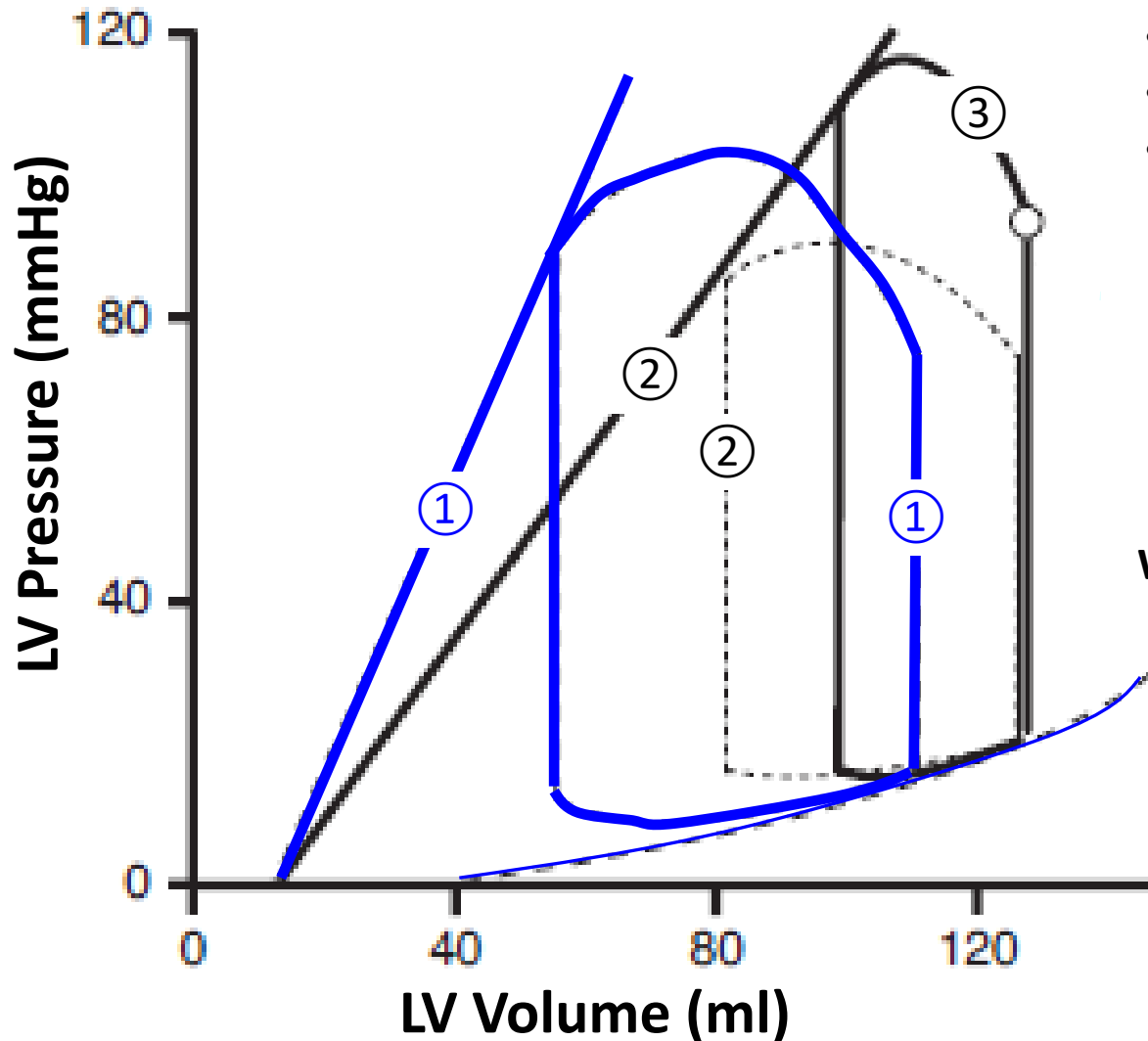
Decreased Contractility → Increased Preload



Positive Inotropic Therapy



Interactive Question



What changes from 1 → 2?

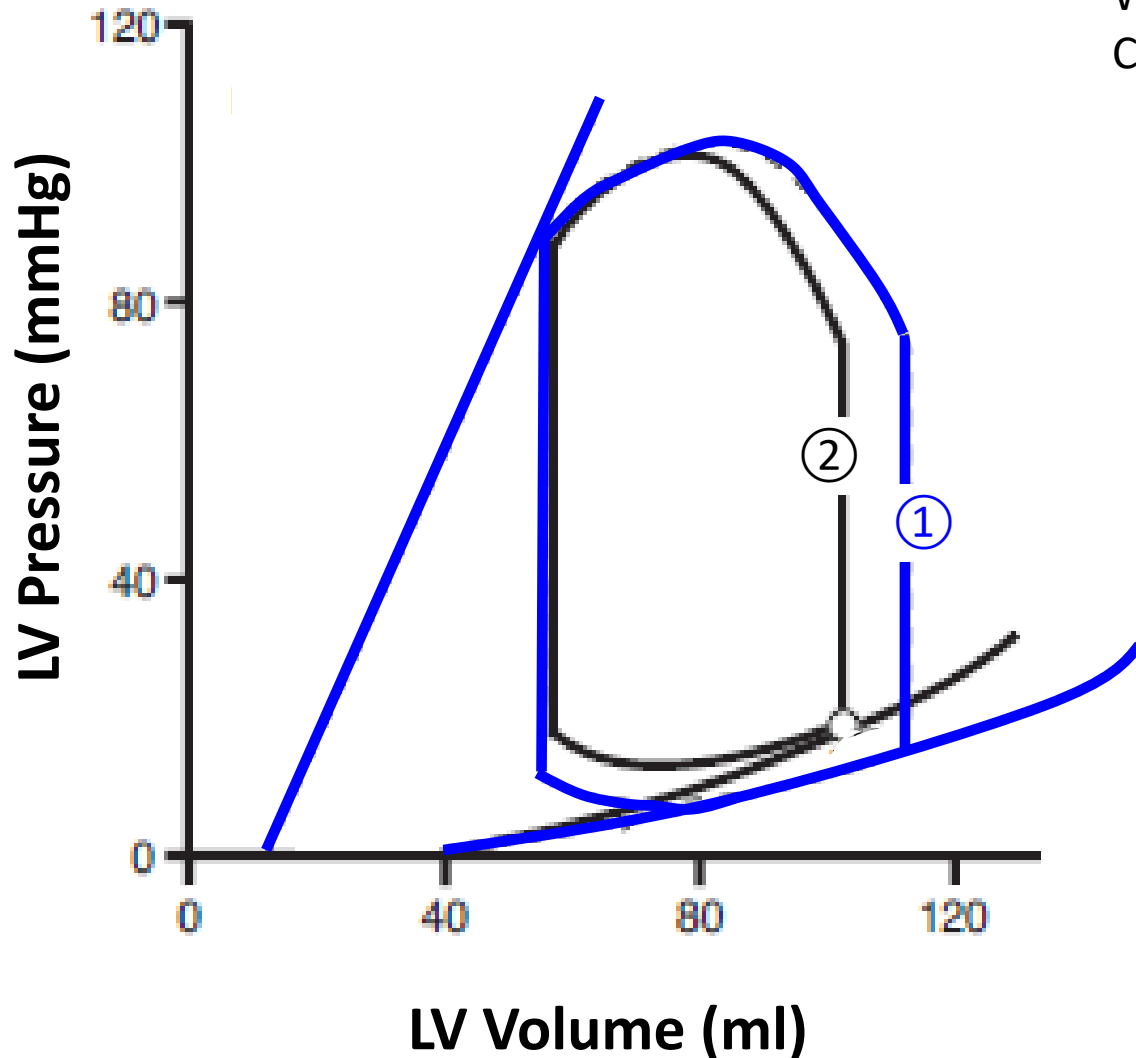
- no change
- increase
- decrease

- A) Contractility
- B) Stroke Volume
- C) Preload
- D) Afterload
- E) Ejection Fraction

What changes from 2 → 3?

- A) Contractility
- B) Stroke Volume
- C) Preload
- D) Afterload
- E) Ejection Fraction

Interactive Question



Which of the following most likely Causes the change from 1 → 2?

- A) Increased preload
- B) Increased afterload
- C) Increased TPR
- D) Decreased LV compliance
- E) Decreased contractility

What is the change?

- Decreased SV
- Increased EDP

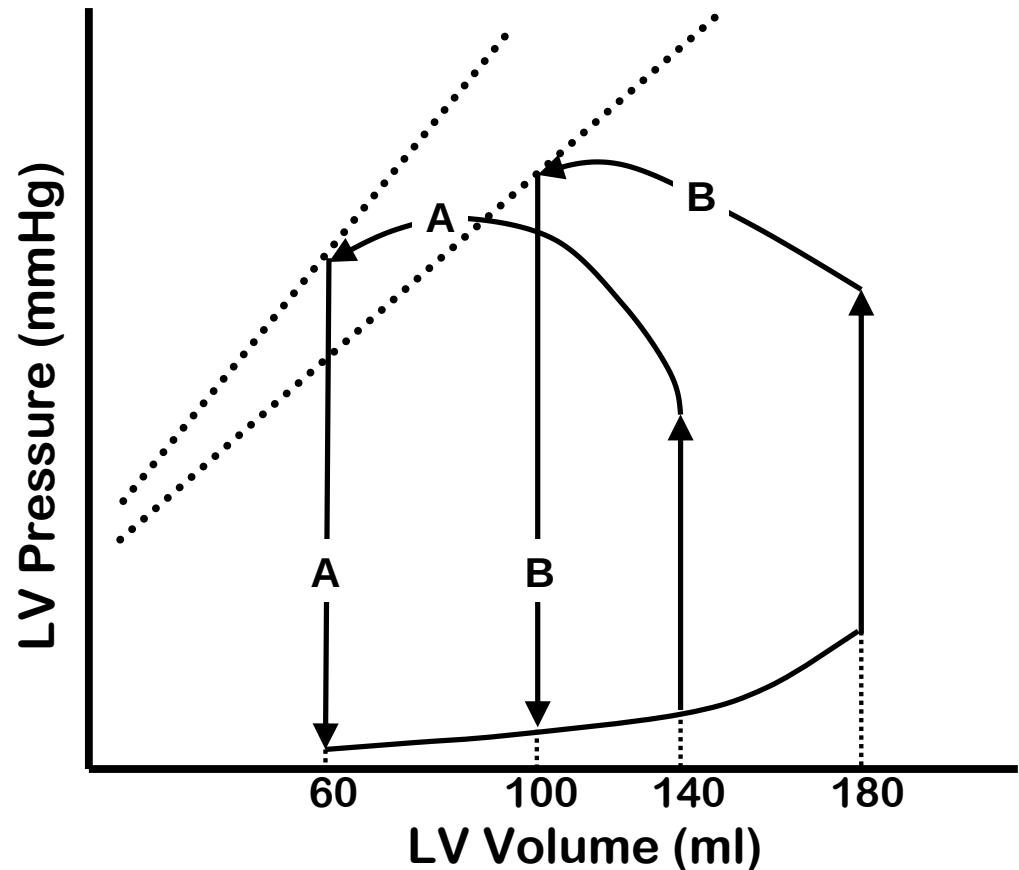
What could account for this?

Interactive Question



If Doug's P-V loop changes from A to B as shown in the figure, which one of the following is NOT changed?

- A. Contractility
- B. Preload
- C. Afterload
- D. Stroke volume
- E. Ejection Fraction



Pick the Cardiac Cycle Phase

Isovolumic
Contraction

Rapid
Ejection

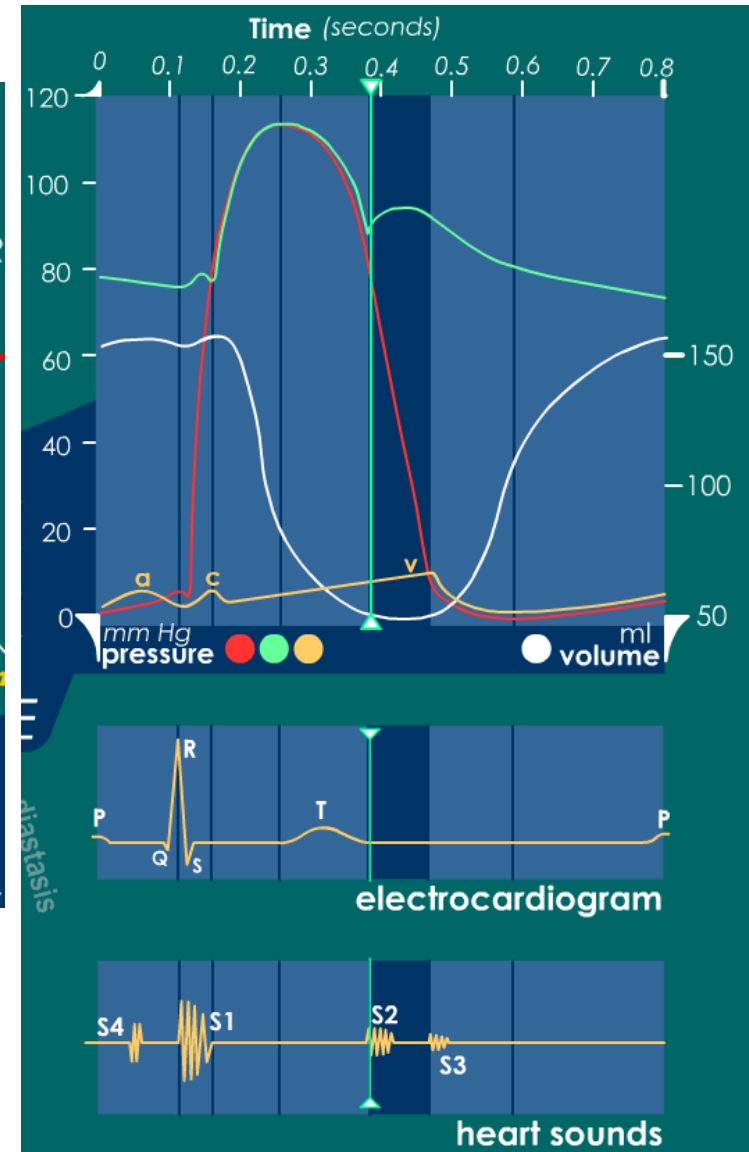
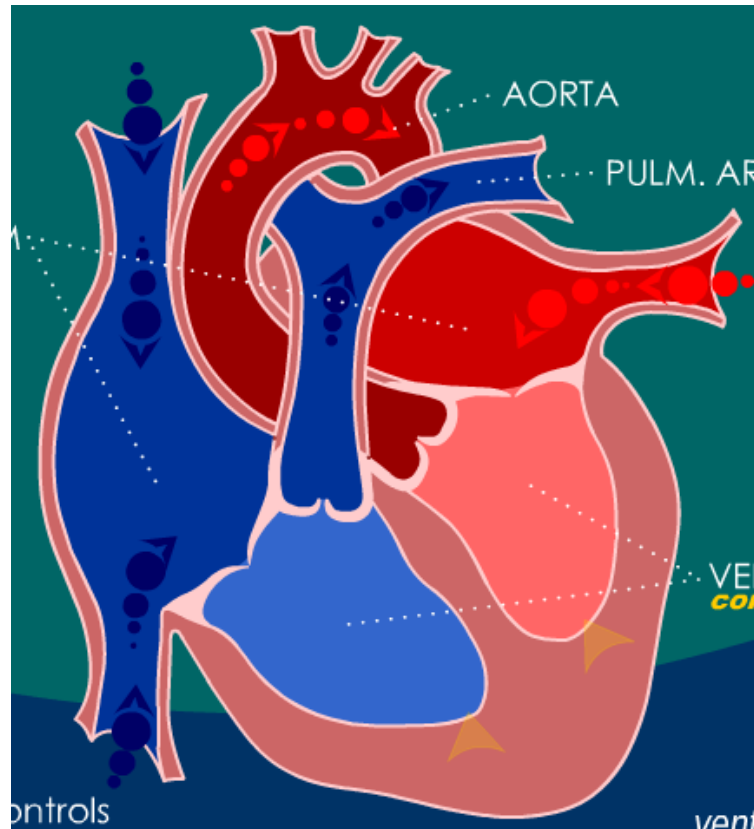
Reduced
Ejection

Isovolumic
Relaxation

Rapid
Filling

Slowed Filling
(Diastasis)

Atrial
Contraction
(Atrial Kick)



Pick the Cardiac Cycle Phase

Isovolumic
Contraction

Rapid
Ejection

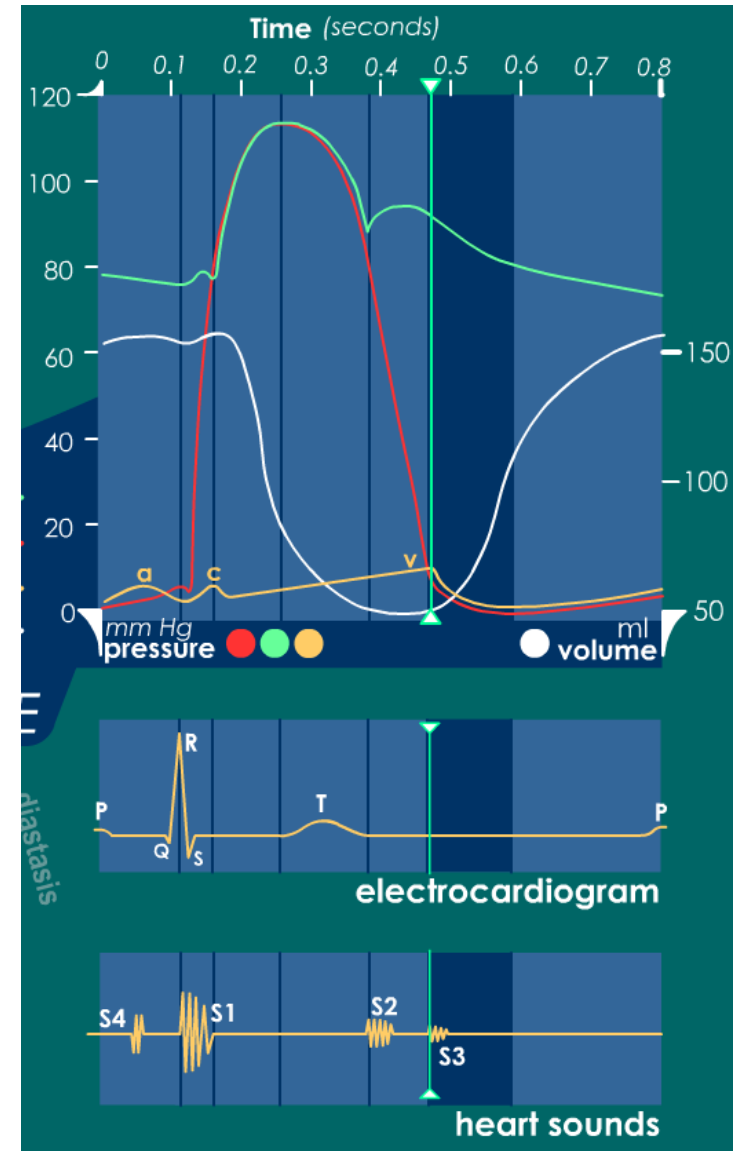
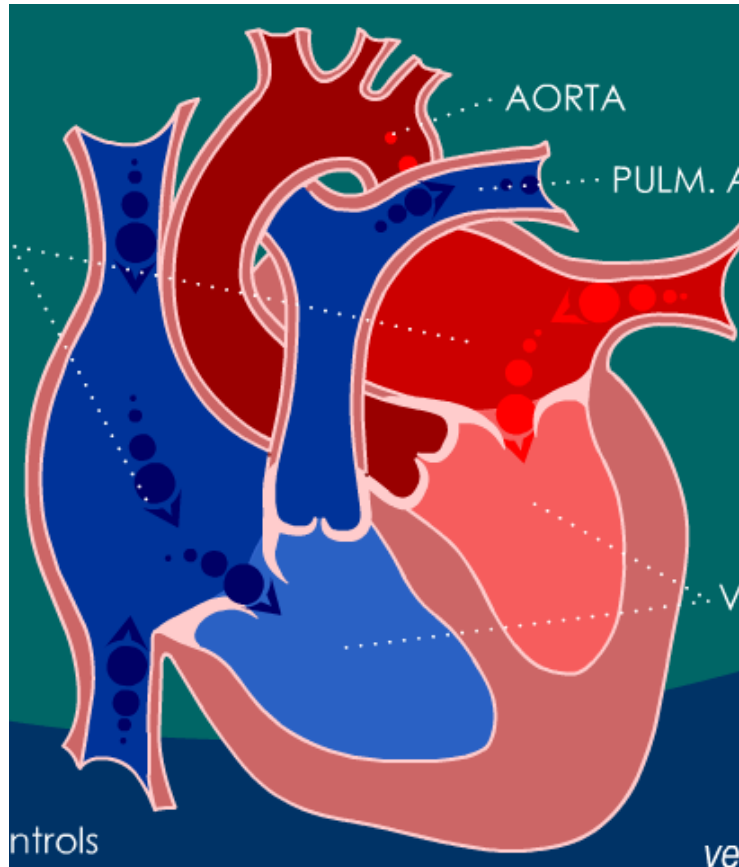
Reduced
Ejection

Isovolumic
Relaxation

Rapid
Filling

Slowed Filling
(Diastasis)

Atrial
Contraction
(Atrial Kick)



Pick the Cardiac Cycle Phase

Isovolumic
Contraction

Rapid
Ejection

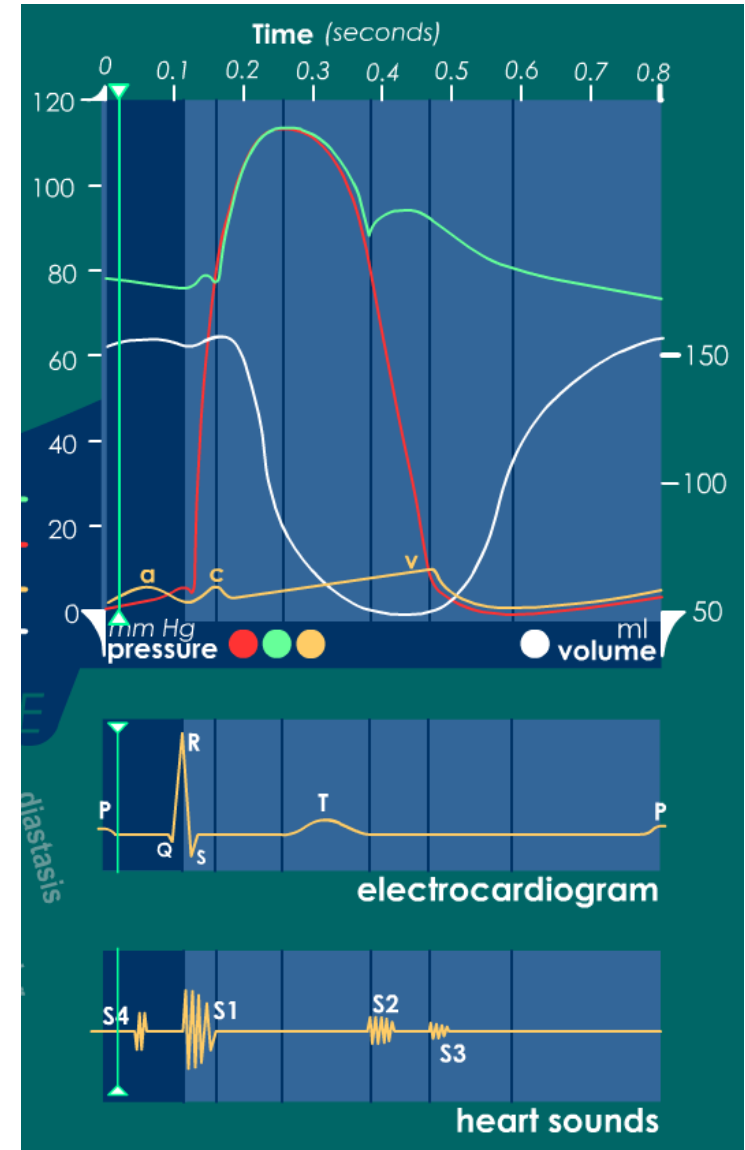
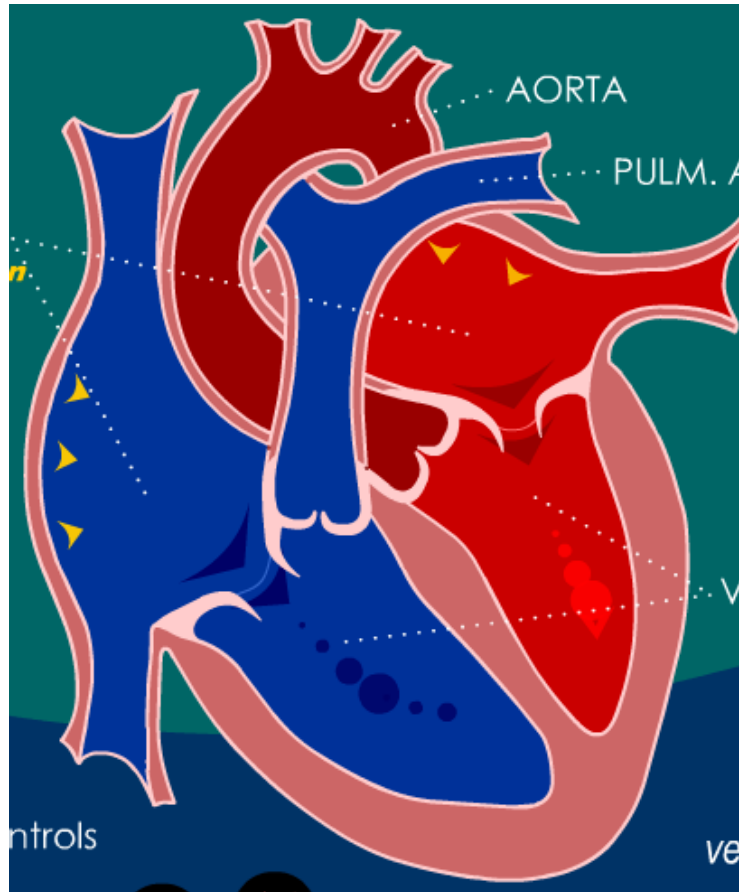
Reduced
Ejection

Isovolumic
Relaxation

Rapid
Filling

Slowed Filling
(Diastasis)

Atrial
Contraction
(Atrial Kick)



Pick the Cardiac Cycle Phase

Isovolumic
Contraction

Rapid
Ejection

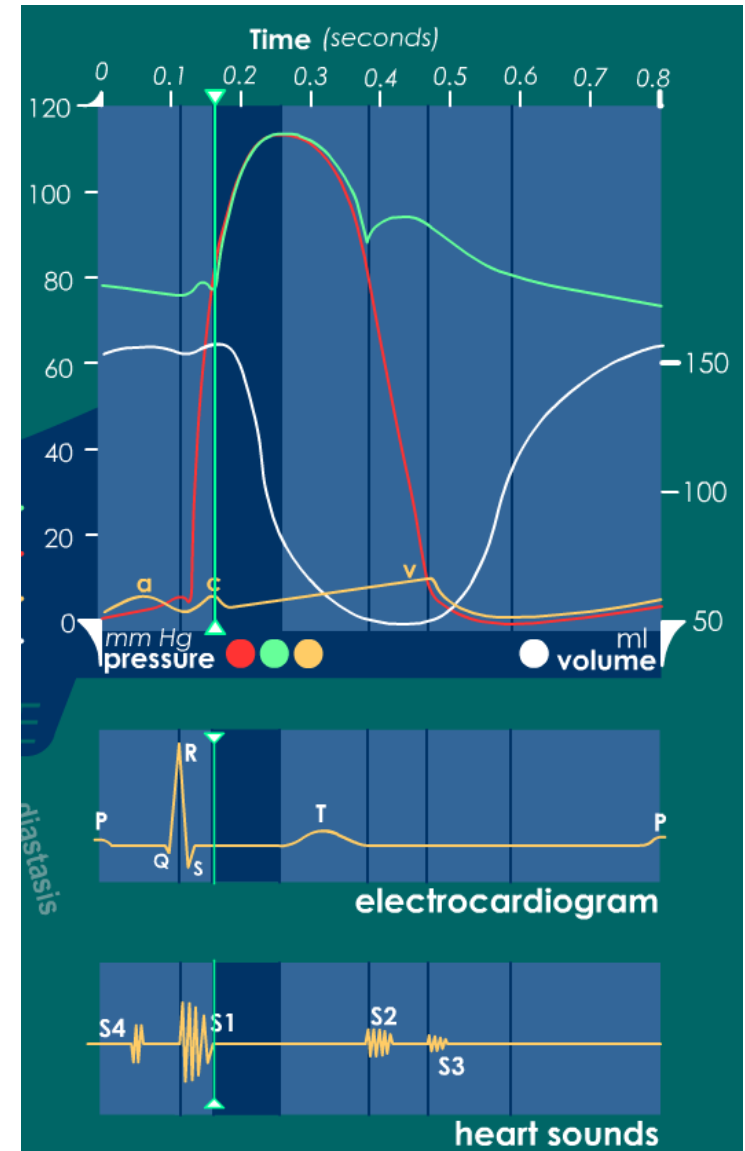
Reduced
Ejection

Isovolumic
Relaxation

Rapid
Filling

Slowed Filling
(Diastasis)

Atrial
Contraction
(Atrial Kick)



End Lecture 25