

Cardiac Cycle

Note 2 important points:

- *blood flow through the heart is controlled entirely by pressure changes.
- *blood flows down a pressure gradient through open valves.

1. PHASE 1: Ventricular filling: mid-to-late diastole.

- **Pressure in left ventricle:** LOW
 - small rise in atrial and ventricular pressure occurs during atrial systole.
- **Blood flow:** moving through left atrium and into left ventricle.
- **Atrial systole occurs:** provides last 20% of blood in ventricle.
- **Blood volume:** rising in left ventricle. Reaches End Diastolic Volume (**EDV**); **~120 mL**.
- **AV valves:** OPEN
- **SL valves:** CLOSED
- **Pressure in aorta:** dropping (since blood is flowing away from heart); **~80 mmHg** at its lowest.

2. PHASE 2: Ventricular systole

- **Isovolumetric contraction** ("same volume").
 - **Pressure in left ventricle:** RISES rapidly, slamming the AV valve shut (lub).
 - **BOTH VALVES CLOSED** because AV valve shut when pressure rose in ventricle; however, pressure in ventricle is not yet high enough to throw open the SL valve.
- **Ventricular ejection phase** (blood leaves ventricle)
 - **Pressure in left ventricle:** Climbs a bit longer, then begins to drop as blood volume diminishes.
 - **Blood flow:** entering aorta
 - **Blood volume:** dropping in left ventricle. Reaches End Systolic Volume (**ESV**); **~50mL**.
EDV-ESV = Stroke Volume (SV); ~70mL
 - **Ejection fraction = SV/EDV**
 - **AV valves:** CLOSED
 - **SL valves:** OPEN
 - **Pressure in aorta:** rises as it is filled with blood (**~120mmHg** at its highest), then drops (along with ventricular pressure) as blood flows away.

3. PHASE 3: Isovolumetric relaxation: early diastole.

- **Pressure in left ventricle:** dropping rapidly as ventricle walls relax. This allows the SL valves to close. Once again, briefly, **BOTH VALVES CLOSED**.
- **Blood flow:** able to enter atria from pulmonary veins, but AV valve is still closed.
- **Blood volume:** isovolumetric in ventricle.