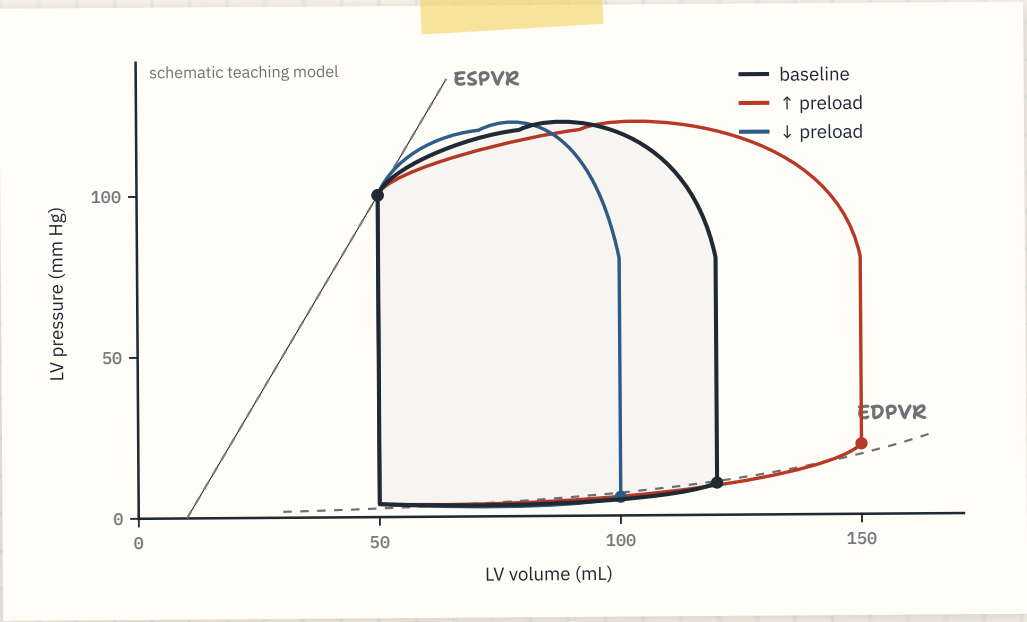
Preload on the PV loop

Predict EDV, stroke volume and loop shape



Step by step

1. Preload = stretch before contraction, estimated by EDV
2. Filling limb sits on the EDPVR (a curve); end-systolic point on the ESPVR
3. Hold afterload and contractility constant, change filling
4. ↑ preload: corner slides up-right, loop widens, SV rises
5. ↓ preload: corner slides down-left, loop narrows, SV falls

Loop	EDV	ESV	SV	EF
Baseline	120 mL	≈ 50 mL	70 mL	≈ 58%
↑ preload (IV fluid)	150 mL	≈ 50 mL	100 mL	≈ 67%
↓ preload (blood loss, venodilation)	100 mL	≈ 50 mL	50 mL	50%

Teaching model, afterload and contractility fixed

EJECTION FRACTION

$$EF = SV / EDV$$

70 / 120 ≈ 58% · 100 / 150 ≈ 67% · 50 / 100 = 50%

Right side moves

Preload moves the right side of the loop.
The left side barely moves.

Exam traps

- More preload does not mean a bigger ESV.
- In a real body ESV creeps up slightly: little change, not never.
- EF moves the same way as stroke volume, but proportionally less.
- A steeper ESPVR is contractility, not preload.

Preload on the pressure-volume loop: EDV, stroke volume and the EDPVR

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/cardiovascular/preload-pressure-volume-loop

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