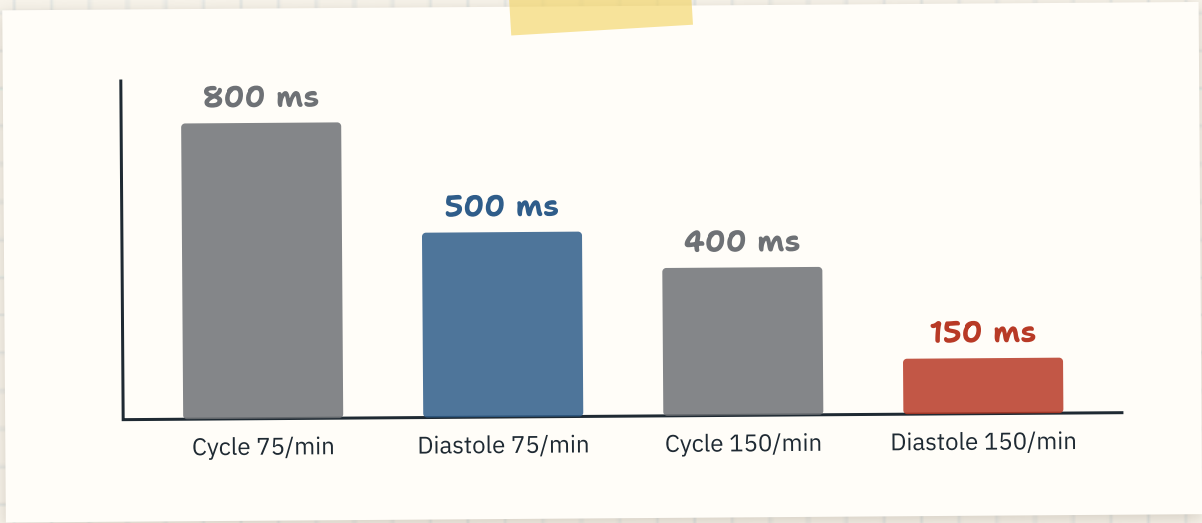
Myocardial O_2 supply and demand

Why tachycardia provokes ischaemia



Step by step

1. Demand: rate, contractility, wall tension
2. Extraction is already high, so flow must rise
3. Left coronary flow is mainly in diastole
4. Tachycardia: demand up, diastole short
5. Fixed stenosis: no flow reserve

CORONARY DRIVING PRESSURE

Aortic diastolic − LV end-diastolic pressure

Left coronary flow is mainly diastolic; supply = flow × O_2 content

Side	Determinants
Demand	Heart rate, contractility, wall tension
Wall tension	↑ with pressure and radius, ↓ with wall thickness
Supply	Coronary flow × O_2 content
Flow falls with	Low aortic diastolic, high LVEDP, short diastole

Demand and supply

Rule of thumb

Rate doubled, diastole fell to under a third

Subendocardium: perfused in diastole only

Ischaemic at one rate; rest relieves it

Exam traps

- Faster rate does not increase the diastolic share of the cycle.
- Extraction is already high at rest, so it cannot simply rise to meet demand; flow must.
- The 75 and 150/min timings are illustrative approximations.

Myocardial oxygen supply and demand: why tachycardia causes ischaemia

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/cardiovascular/myocardial-oxygen-supply-demand

For exam study only, not medical advice. Follow local guidelines and your lab's ranges.
© 2026 Medservatory, a project of ADMR Solutions Ltd. Free to print and share for personal study.