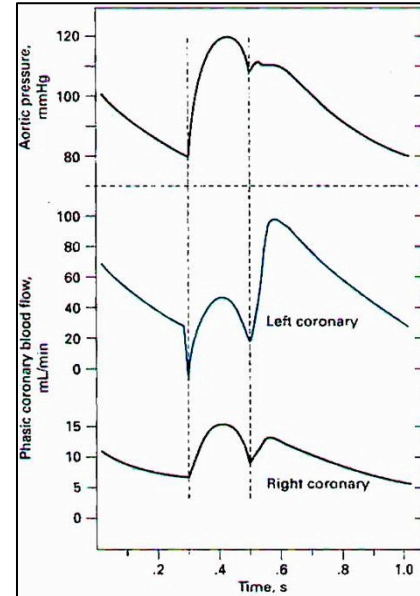


Physiology of Coronary Blood Flow

Anesthetic Pearls: Anesthetic Implications and Management of Coronary Blood Flow

The myocardial blood supply is ~ 5% of the cardiac output or ~250 ml/min.
 Left coronary artery (LCA) flow occurs almost exclusively in diastole.
 Right coronary artery (RCA) flow occurs in systole and diastole.



A. **Coronary Blood Flow = Coronary Perfusion Pressure / Coronary Vascular Resistance**

- Coronary Perfusion Pressure (LV-CPP) = Driving Force - "Back Pressure"**

$$\text{CPP} = \text{Diastolic Blood Pressure} - \text{LVEDP}$$

(LVEDP is estimated from PA occlusion pressure from the PA catheter)

Optimization of CPP:

- Normal to high diastolic BP
- Low LVEDP (don't overfill the heart)
- Low HR (more time is spent in diastole with slower heart rate)

- Coronary Vascular Resistance (CVR)**

	Increase CVR	Decrease CVR
Metabolic (tissue content)	↑ O ₂ , ↓ CO ₂ , ↓ H ⁺	↓ O ₂ , ↑ CO ₂ , ↑ H ⁺ ↑ Lactate & Adenosine
Autonomic Nervous System	↑ Alpha-adrenergic tone ↑ Cholinergic tone	↑ Beta-adrenergic tone
Hormonal	↑ Vasopressin (ADH) ↑ Angiotensin ↑ Thromboxane	↑ Prostacyclin

Note: ↑ Hct & ↓ Temperature => ↑ Viscosity => ↑ CVR

- Coronary Autoregulation**

-Normally occurs within a CPP range of ~60-150 mmHg
 -CBF may ↑ 5-6x to meet demand

B. **Myocardial Oxygen Consumption**

-High Consumption
 -Coronary venous blood saturation only ~30% (P_{O2}: 18-20 mmHg) therefore can **NOT** increase extraction anymore.
 -CBF must ↑ if the heart requires additional O₂.

C. **Myocardial Oxygen Supply and Demand**

Decreased Myocardial O₂ Supply

- Decreased coronary blood flow
 - Tachycardia
 - Diastolic hypotension
 - ↑ Preload
 - Hypocapnia
 - Coronary spasm
- Decreased O₂ delivery
 - Anemia
 - Hypoxia
 - ↓ 2,3-DPG

Increased Myocardial O₂ Demand

- Tachycardia
- ↑ Wall Tension
 - ↑ Preload
 - ↑ Afterload
- ↑ Contractility