# ECMO / Stanford

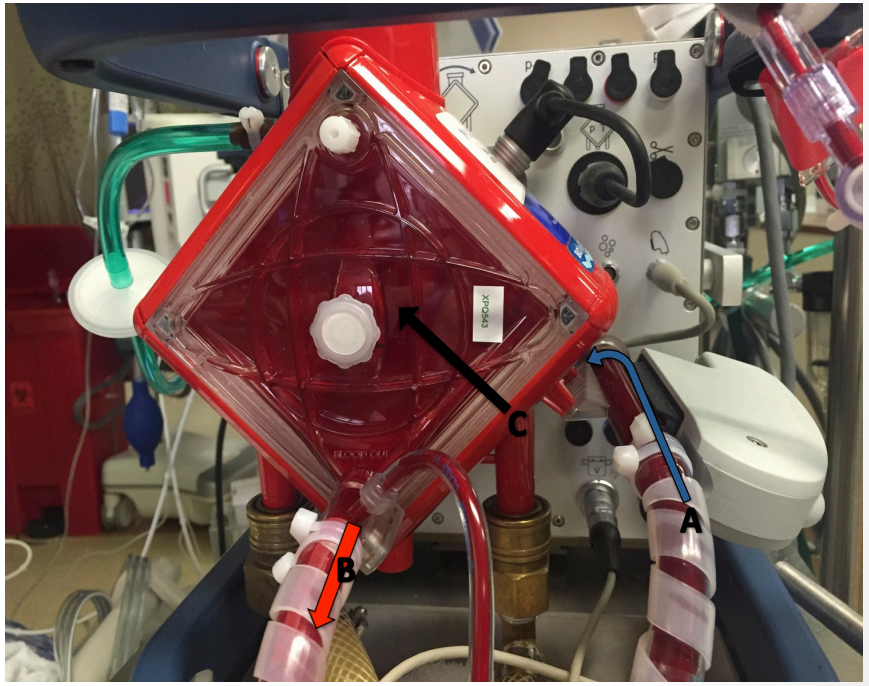
# Topics

- Plumbing
- Considerations for application
- Indications for use
- Process for access / initiation

# Plumbing

- Centrifugal pump

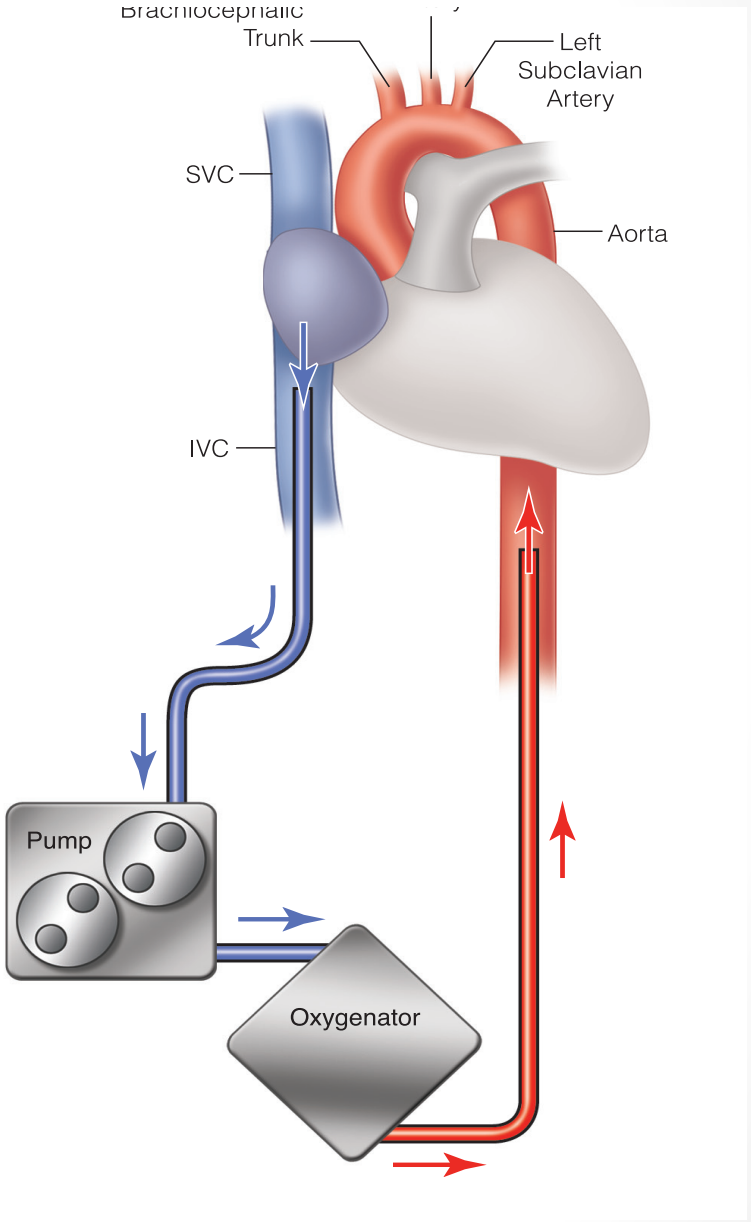
- Low resistance oxygenator
  - $O_2$ and $CO_2$ flux



# Plumbing

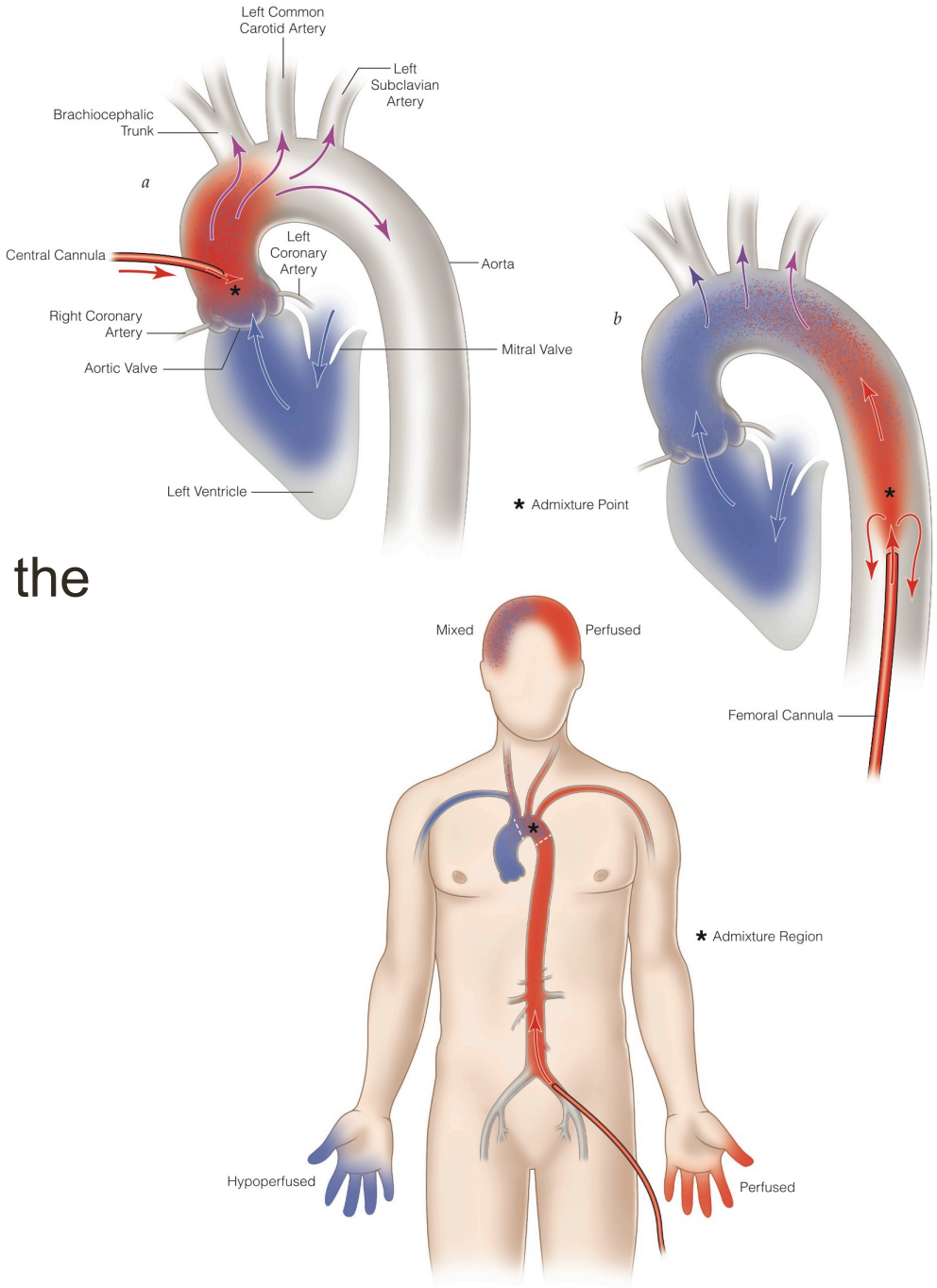
- Veno-Arterial (VA) ECMO:

- Aortic delivery of oxygenated blood
- Circuit bypasses pulmona circulation
- Consider admixture into proximal aorta….



# Plumbing

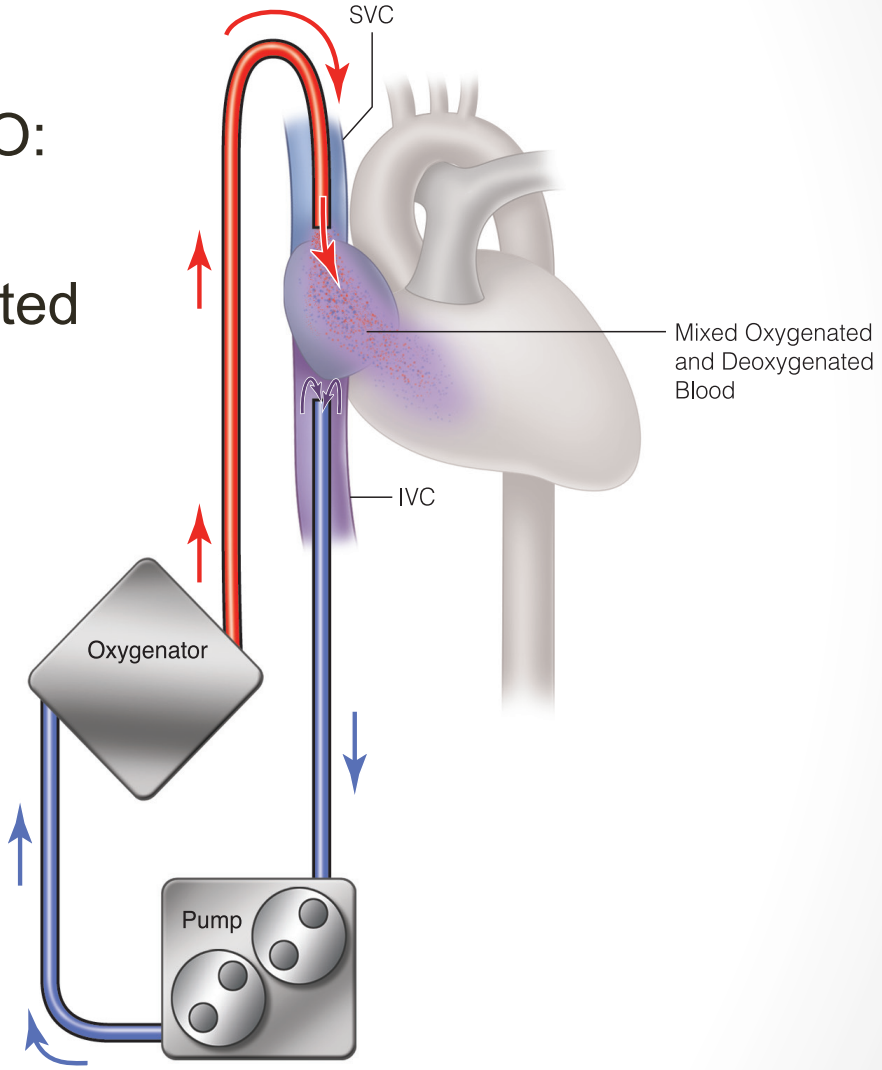
- VA ECMO
- Aortic admixture in the proximal aorta:



# Plumbing

- Veno-Venous (VV) ECMO:

- SVC delivery of oxygenated blood
- Circuit is in parallel with pulmonary circulation
- Consider admixture into right atrium….



# Indications

- General considerations:

| Table 1: Indications for ECMO | |
|---|---|
| **Respiratory Failure** | **Cardiogenic shock** |
| Sepsis with ARDS | Severe cardiomyopathy |
| Influenza | Peri-heart transplant |
| Chest trauma | Bridge to VAD |
| Burns and inhalation injury | Unable to wean CPB |
| Bridge to lung transplant (end-stage pulmonary disease) | Cardiac arrest |
| Severe air leak syndromes | Pulmonary embolism |

# Contraindications

- For all ECMO configurations:
  - Age > 65 Yrs
  - Non-recoverable cardiac disease
  - Non-recoverable respiratory disease
  - Non-recoverable neurological disease
  - Active malignancy
  - BMI > 40
  - Advanced liver disease

- For V-V ECMO for Acute Respiratory Failure:
  - Mechanical ventilation duration of greater than 7 days preceding ECMO consideration
  - Severe pulmonary hypertension (mPAP >50 mm Hg)
  - Severe right or left Heart Failure (EF 25%)
  - Cardiac Arrest

# Outcomes

**Table 7: Adult ECMO survival by diagnosis (Data from ELSO registry through July 2013. Adapted from Paden et al)[45]**

| Respiratory ECMO | | |
|---|---|---|
| Diagnosis | Total cases | Number surviving (%) |
| Bacterial Pneumonia | 761 | 460 (60) |
| Viral Pneumonia | 352 | 228 (65) |
| Aspiration Pneumonia | 112 | 71 (63) |
| ARDS | 858 | 452 (53) |
| Non-ARDS acute respiratory failure | 495 | 263 (53) |
| Other | 1917 | 1012 (53) |
| **Cardiac ECMO** | | |
| Congenital defect | 239 | 79 (33) |
| Cardiogenic shock | 549 | 201 (37) |
| Cardiomyopathy | 372 | 181 (49) |
| Myocarditis | 132 | 82 (67) |
| Cardiac arrest | 3761 | 1391 (37) |
| Other | 2243 | 874 (39) |

# ECMO eval / initiation process

- Access:
  - ECMO consult: hospital operator
  - ECMO code
- Decision-making:
  - Multi-party
  - Inclusion/exclusion considerations
- Limitations:
  - Logistics
  - Clinical considerations

# Questions?