Contributors to Complexity of Cardiac ECMO

Desiree Bonadonna, MPS CCP FPP
Duke University Hospital and Health System

Duke Heart

AWARD FOR EXCELLENCE IN LIFE SUPPORT
ELSO
CENTER OF EXCELLENCE
PLATINUM

Duke Children's

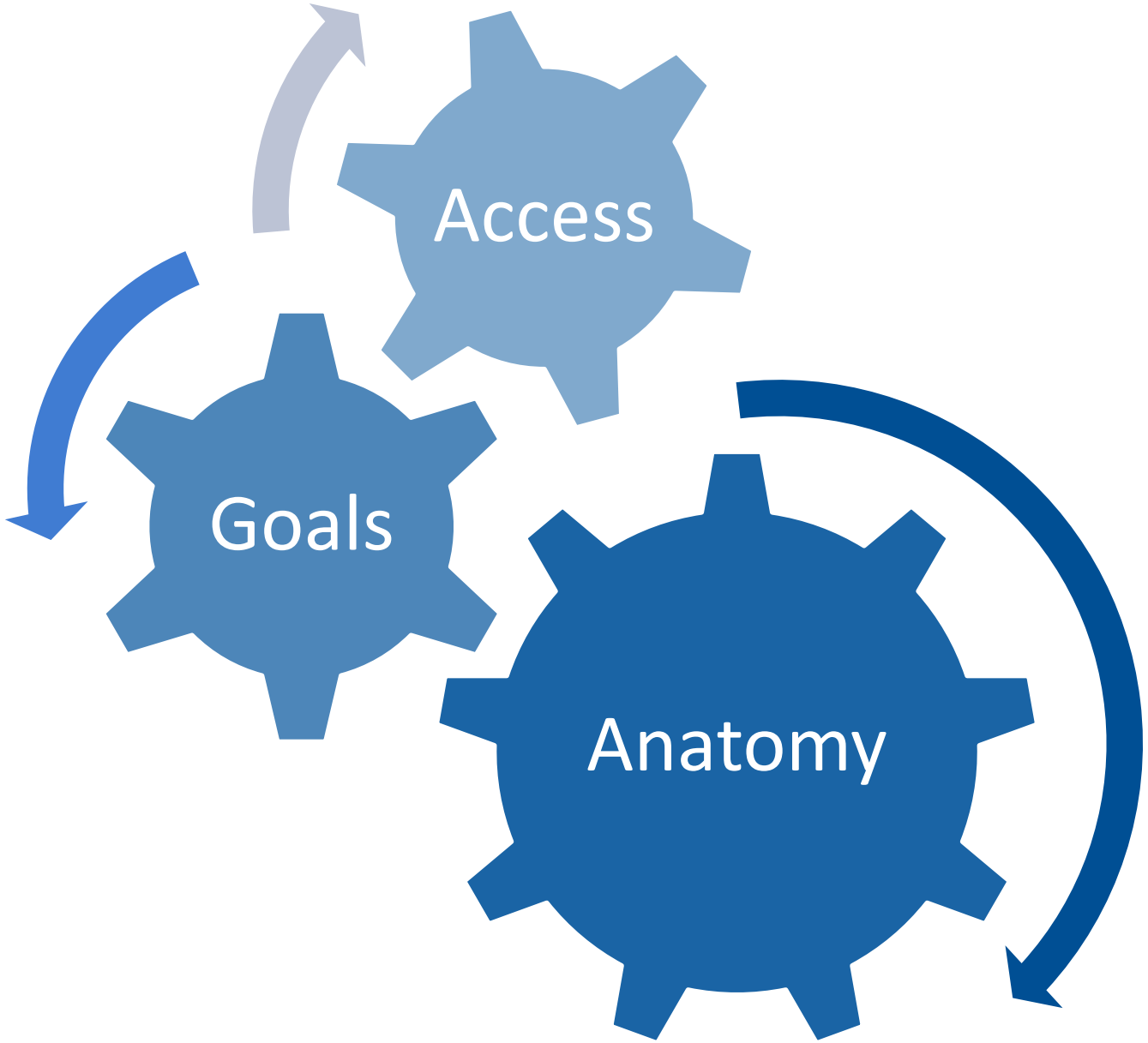
Disclosures

- No relevant financial relationships
- May include discussion of off-label use of FDA approved drugs/devices or investigational devices

CLARK

PEDS ECMO DEPLOYMENT STAT TO DUKE CENTRAL TOWER, ROOM 3B[redacted], LESS THAN 20KG CHLOE [redacted], 919[redacted],

Duke Heart


Access
Goals
Anatomy

Single Ventricle

Shunts

Anatomy

Vessel Anomalies

Previous Surgeries

Duke Heart

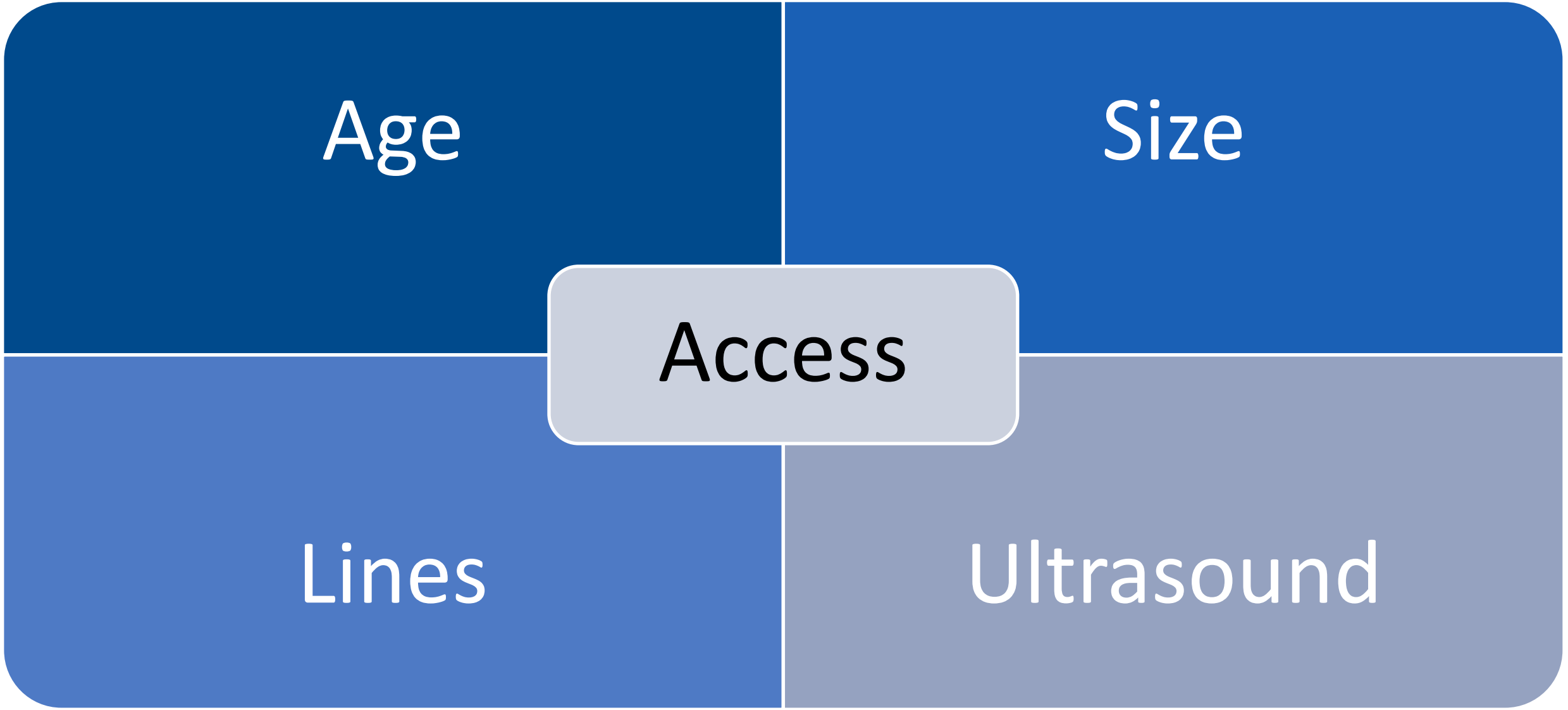
Urgency?

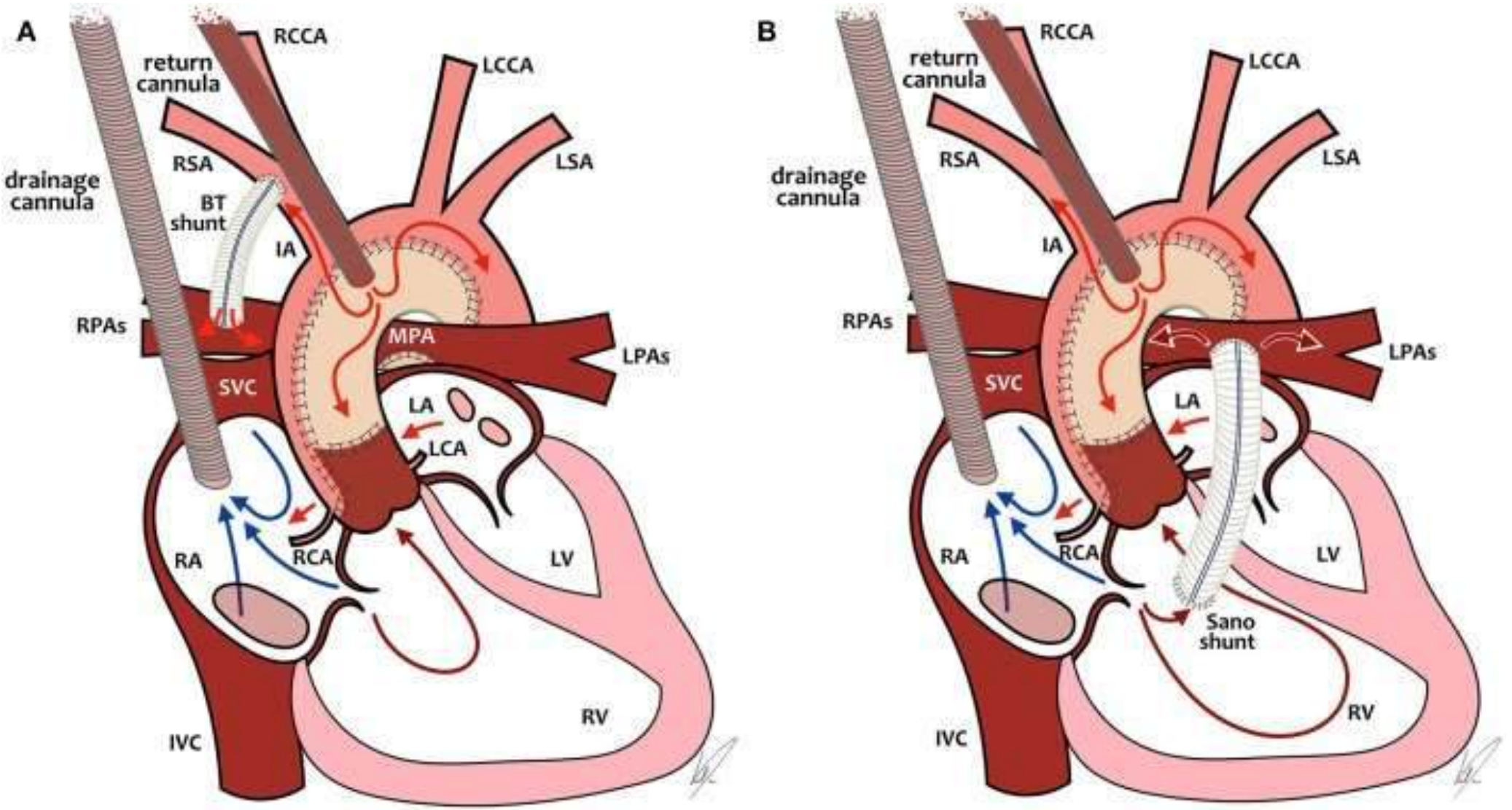
CO? Qp? O2?

Goals

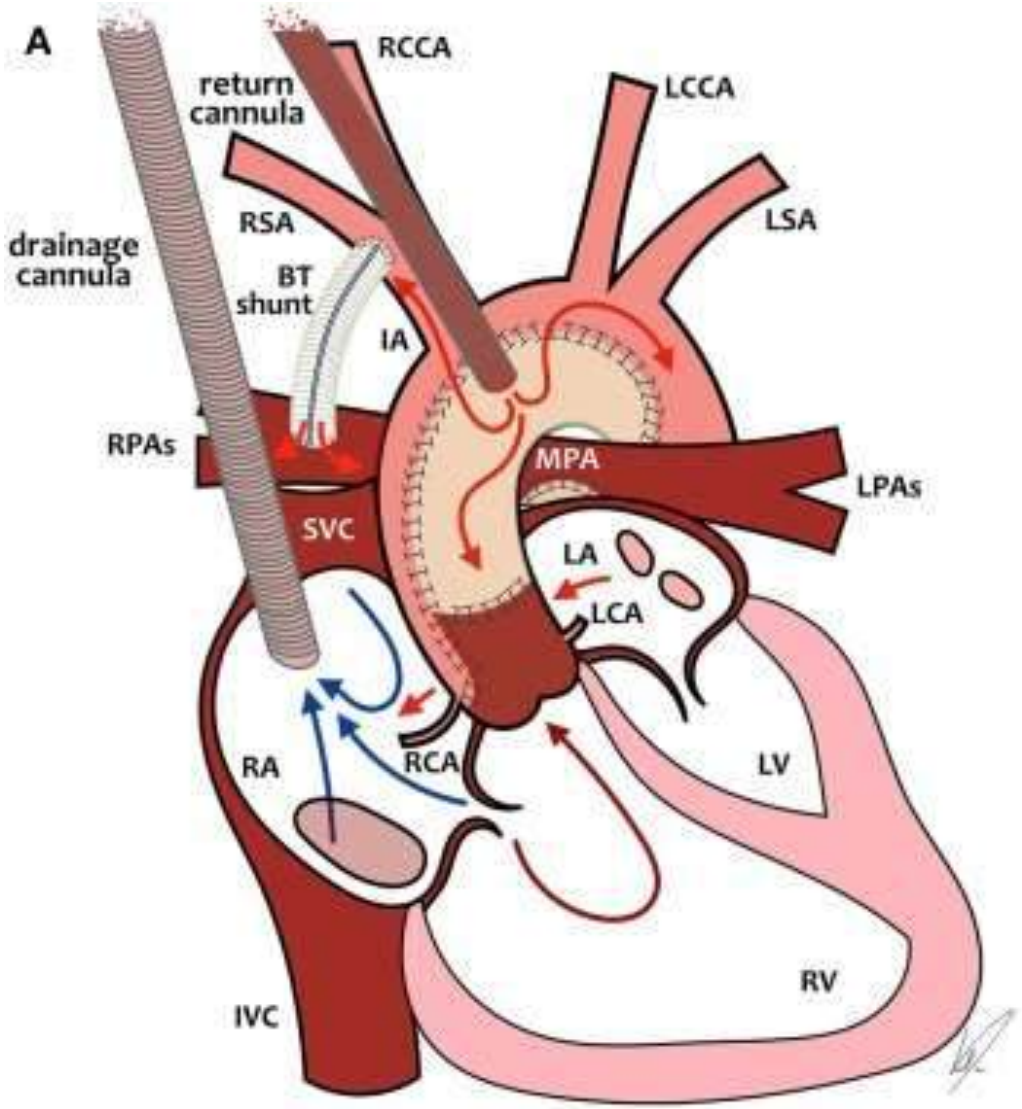
How much support?

BTR? BTD? BTVAD? BTT?

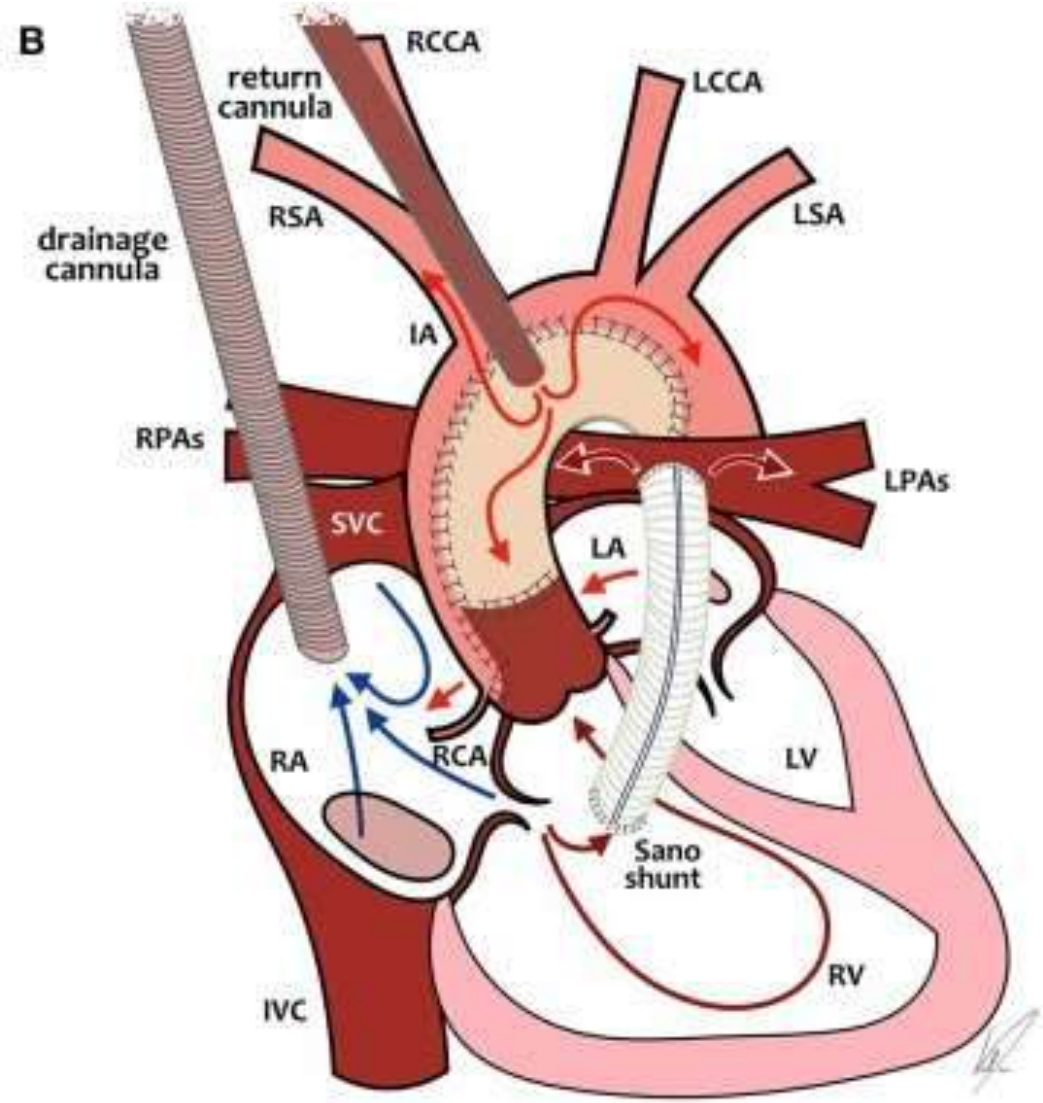

Age
Size
Access
Lines
Ultrasound


A
RCCA
return cannula
LCCA
RSA
LSA
drainage cannula
BT shunt
IA
RPAs
MPA
LPAs
SVC
LA
LCA
RA
RCA
LV
RV
IVC
B
RCCA
return cannula
LCCA
RSA
LSA
drainage cannula
IA
RPAs
LPAs
SVC
LA
RA
RCA
LV
Sano shunt
RV
IVC

Duke Heart


A
RCCA
return cannula
LCCA
RSA
LSA
drainage cannula
BT shunt
IA
RPAs
MPA
LPAs
SVC
LA
LCA
RA
RCA
LV
RV
IVC

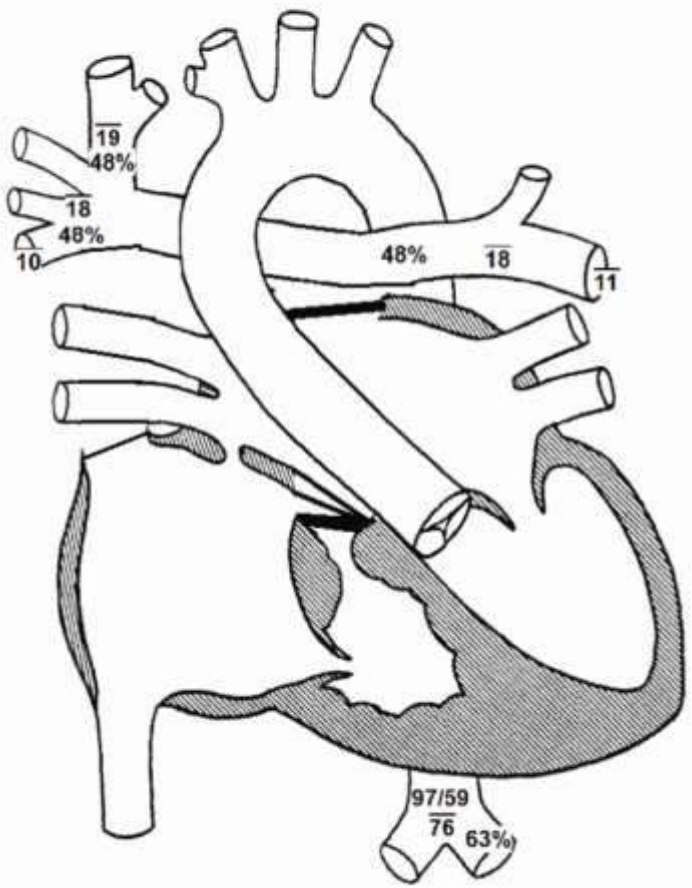
Duke Heart


B
RCCA
return cannula
LCCA
RSA
LSA
drainage cannula
IA
RPAs
LPAs
SVC
LA
RA
RCA
LV
Sano shunt
RV
IVC

Duke Heart

Duke Children's Hospital and Health Center

Durham, North Carolina
Pediatric Cardiology
Cardiac Catheterization Laboratory



Arrows indicate catheter course.

Diagnoses / Procedures

Height: 59.0 cm Weight: 4.5 kg
BSA = 0.26 m2

Fluoro: 16.80 min Contrast: 7.00 mL
Radiation Dose: 12.00 mGy 77.06 cGy-cm2
Vein: Right jugular 6fr
Artery: Right femoral 4fr

Baseline 50% GETA

Qp = 0.46 L/min (1.76 L/min/m2)
Qs = 1.43 L/min (5.51 L/min/m2)
Rp = 16.41 units (4.27 units x m2)
Rs =
Qp/Qs = 0.32 : 1 | Rp/Rs =

Heart Rate: 153 bpm
VO2: 164 ml/min/m2
Hemoglobin: 14.6 gm/dL

Inspired O2: 78%
pH: 7.11
pCO2: 69.0
pO2: 47.0
HCO3: 21.9

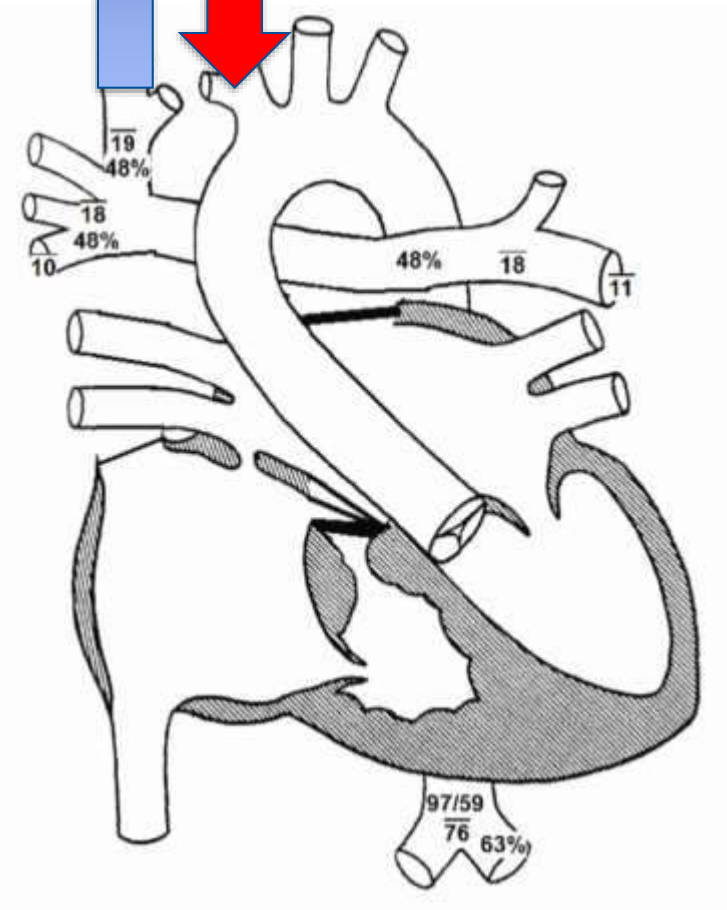
Thermo CO:

%O2	Site	Sys/A	Dias/V	Mean
48	SVC			19
	RA			
	RV			
	PA			
48	RPA			18
48	LPA			18

Duke Heart

Drainage to ECMO Circuit*

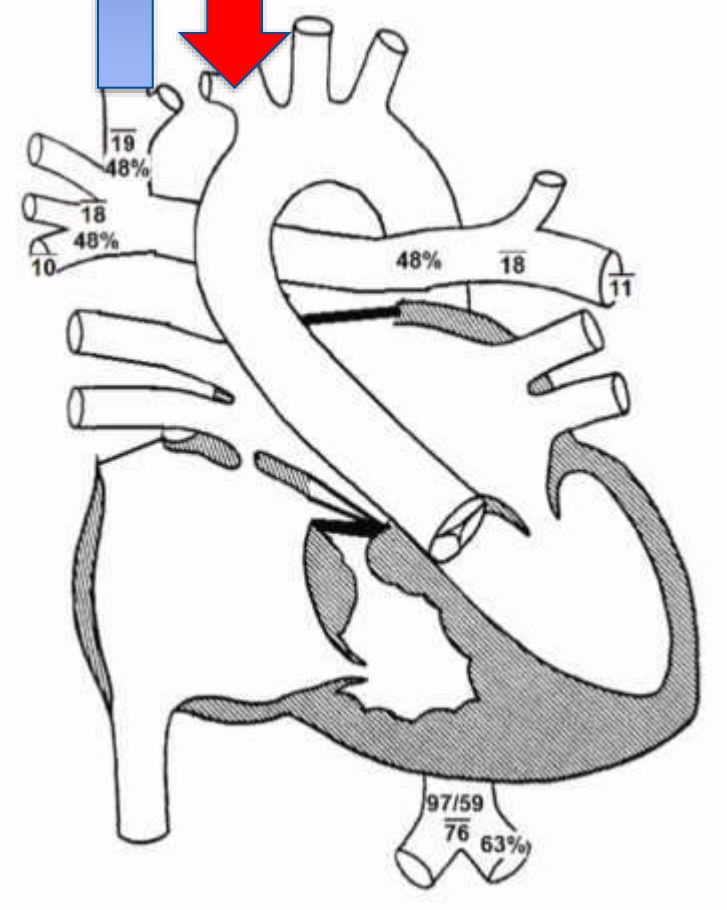
Return from ECMO Circuit*



Duke Heart

Drainage to ECMO Circuit*

Return from ECMO Circuit*



ECMO Warnings

*This flow is pulling away from the Glenn, bypassing the lungs, and reducing pulmonary flow

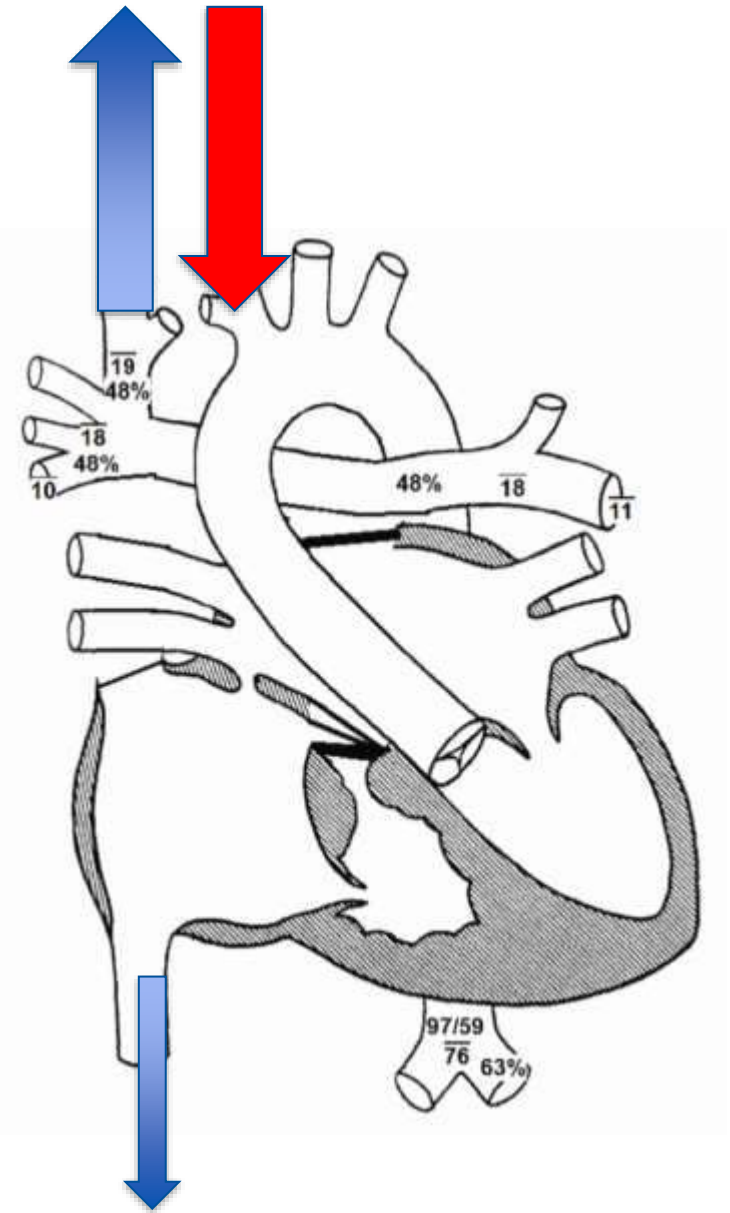
*This is partial flow ECMO, only receiving upper body venous drainage

*To increase pulmonary blood flow, decrease ECMO flow

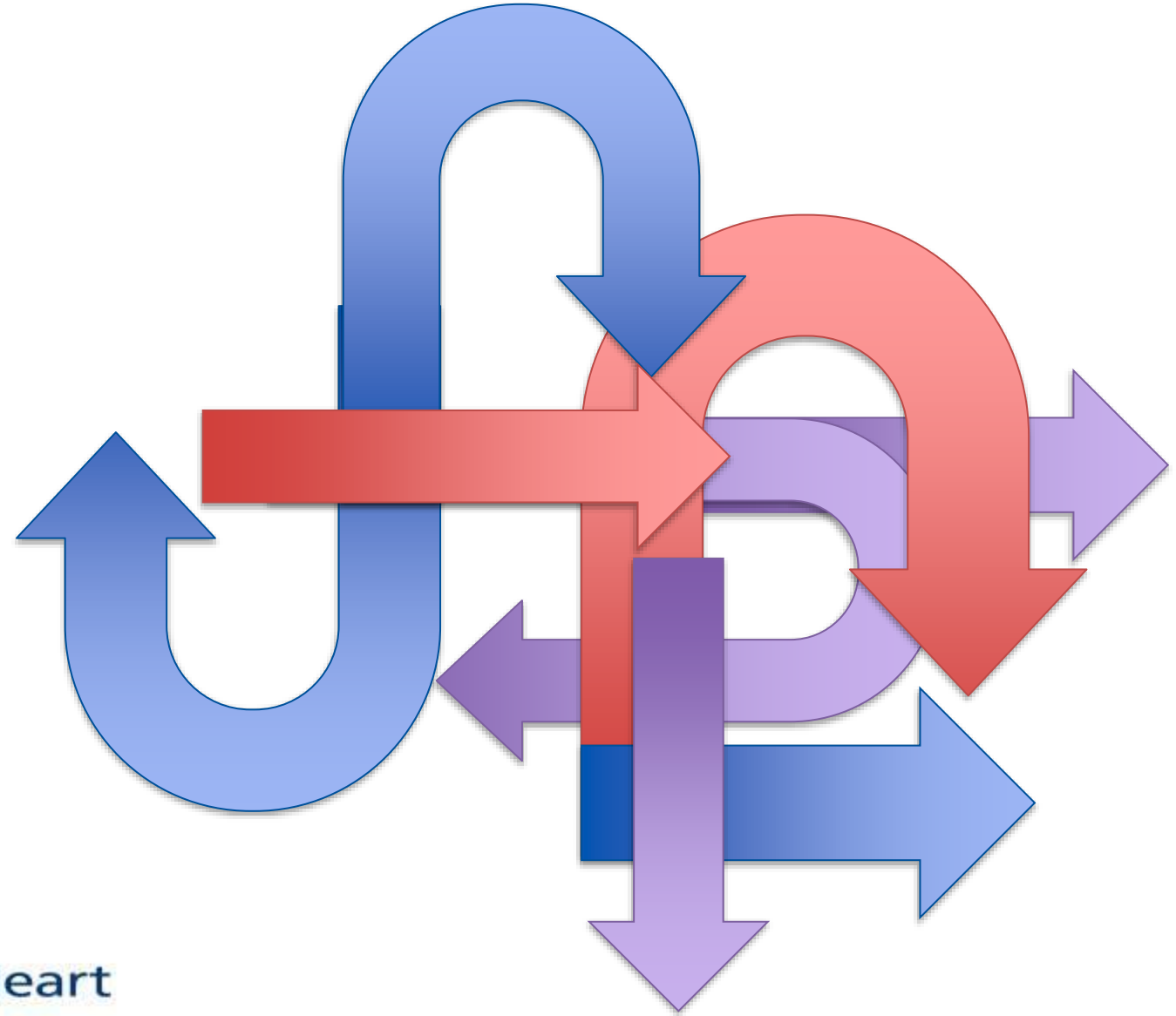
*Does not qualify for SOT

*PALS for cardiac arrythmias; ECMO is not supporting ventricle

Duke Heart



Duke Heart



Duke Heart

Post-op Bleeding

Vessel and Shunt Patency

Secondary Lung Dx

Pulmonary Blood Flow

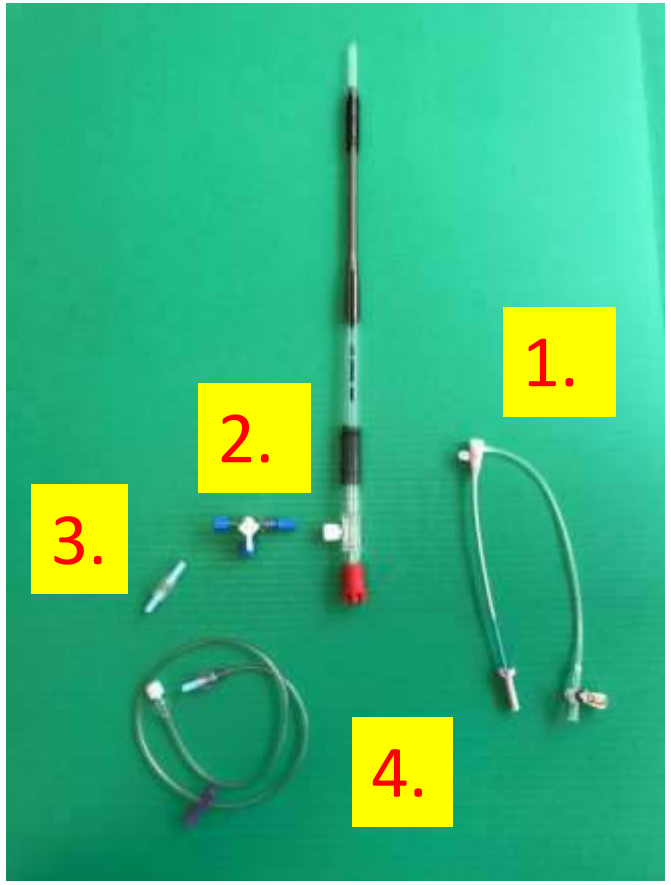
Collaterals

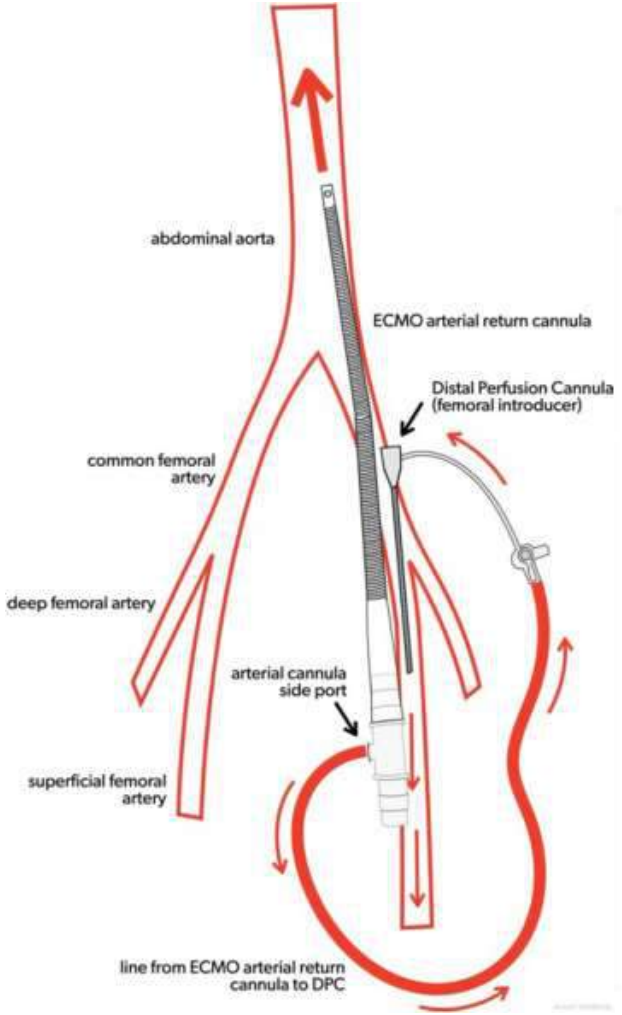
Coronary Perfusion

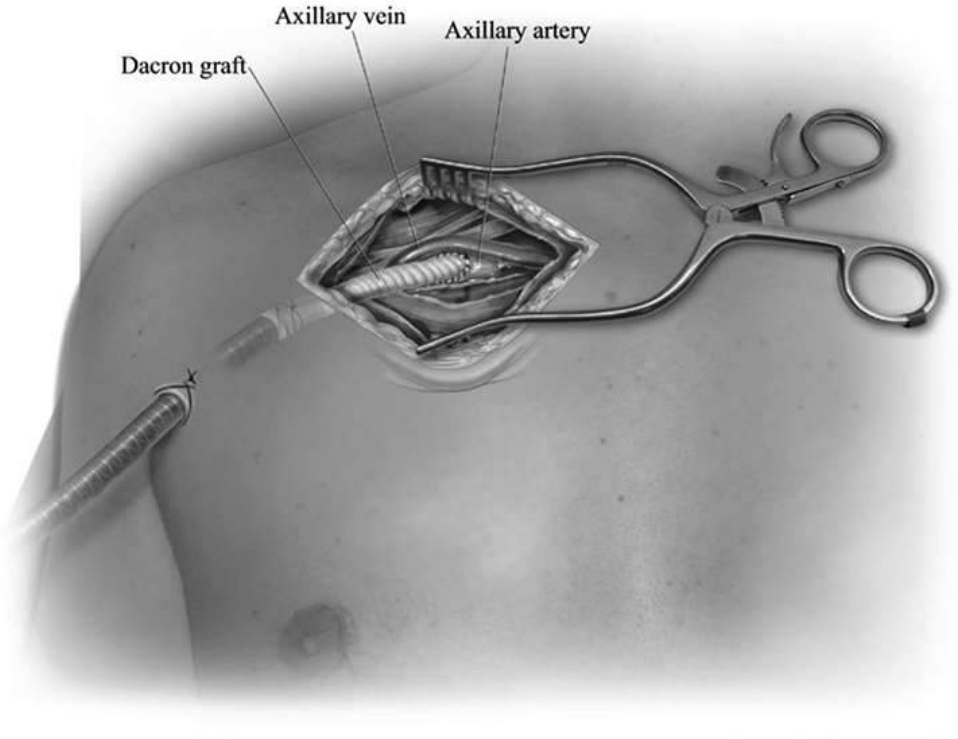
Ventilator Requirements

Unloading/Venting

Duke Heart



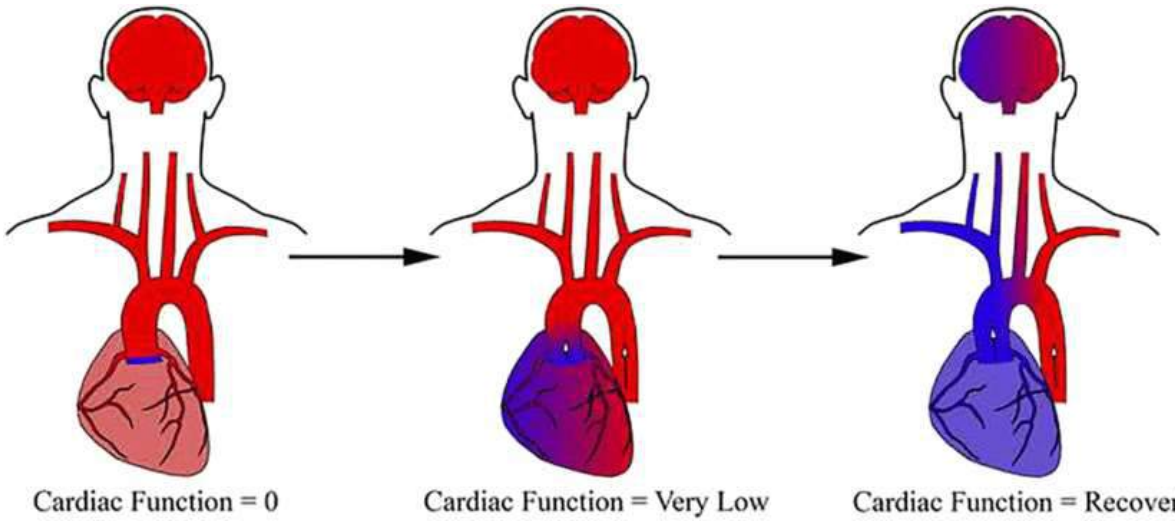


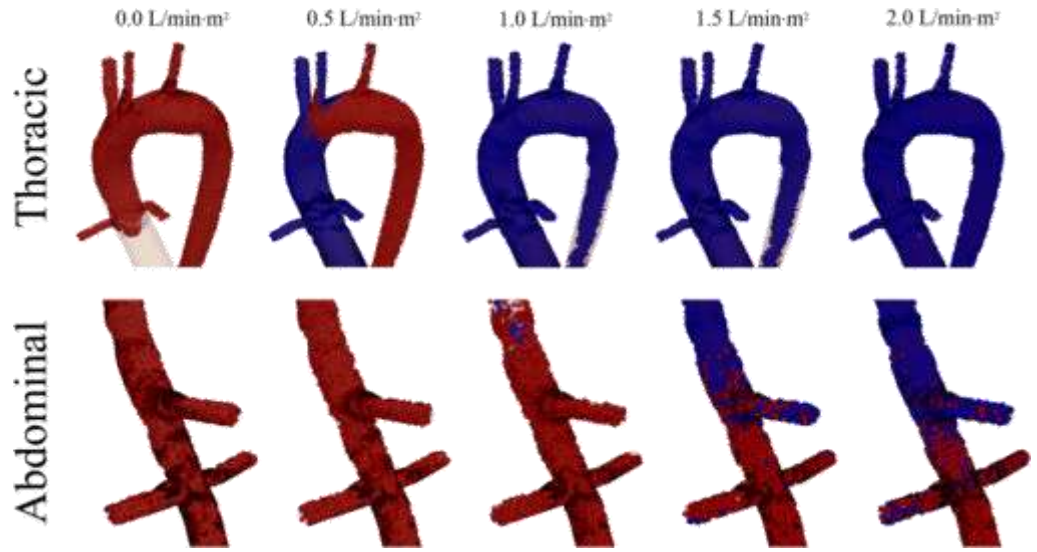


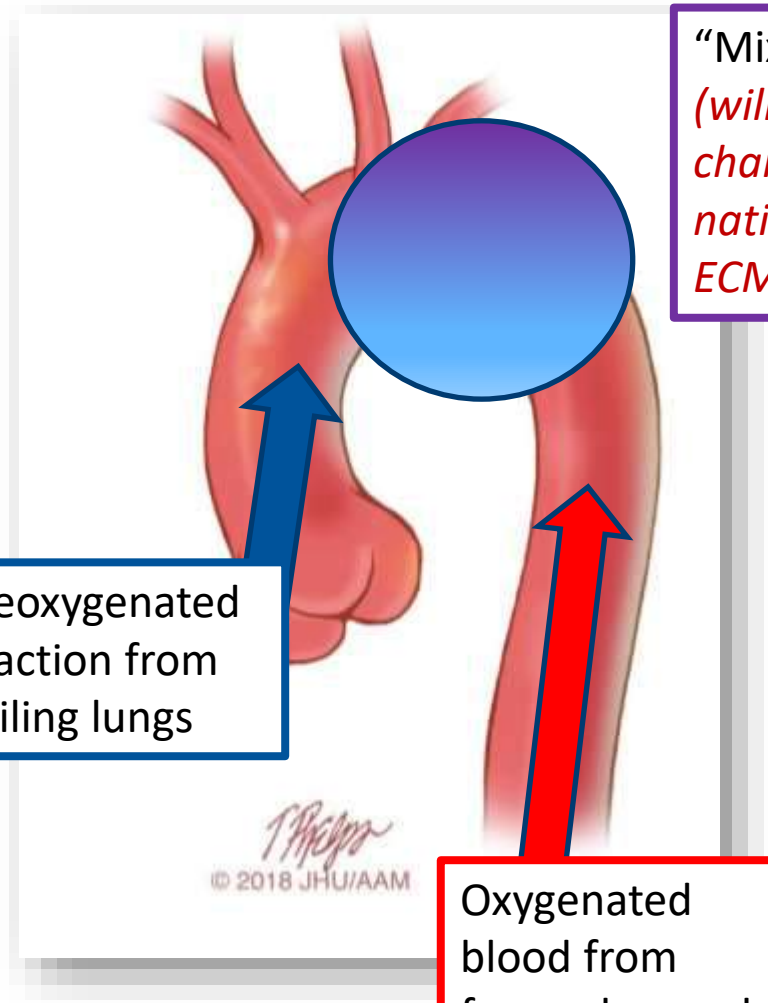
Duke Heart

McDermott et al. 2024
https://doi.org/10.1016/j.jpedsurg.2024.161961.

Babu, A. 2014
https://doi.org/10.1053/j.optechstcvs.2014.11.003







"Mixing Cloud"
(will shift with changes in patient native CO and ECMO Flow)

Deoxygenated fraction from failing lungs

Oxygenated blood from femoral cannula

Duke Heart

Clinical signs:
- Non-Pulsatile arterial trace
- Pulmonary edema in ETT
- Confirmed with TTE/TEE

Severe LV Dysfunction → VA ECMO Cannulation → Inadequate unloading, increased LVEDP, LV Distension → LV Damage, LV/Ascending Ao Thrombus, ↓Respiratory Function

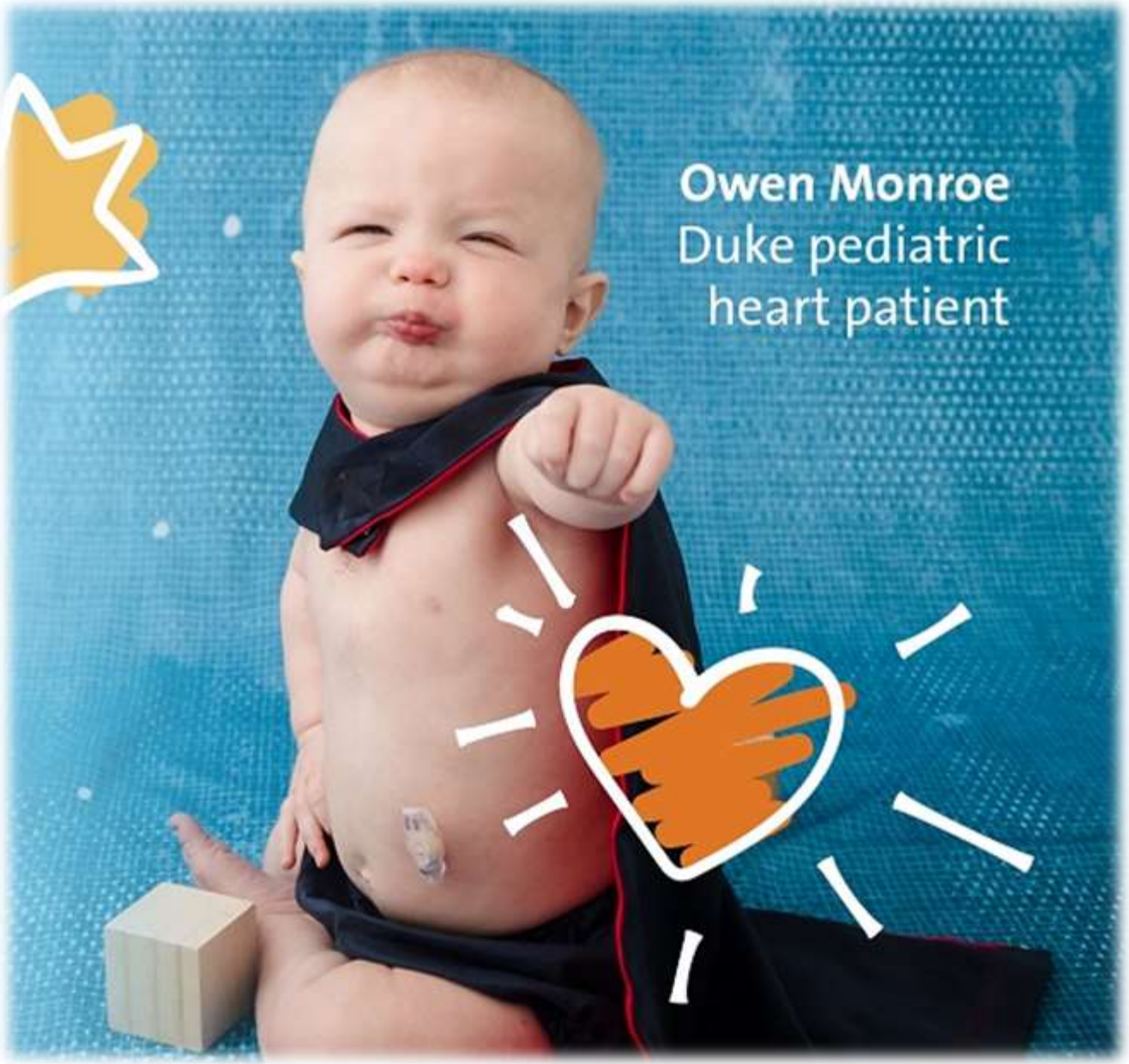
Discussion of LV Unloading Options

Immediate actions to temporize:
- Optimize inotropes to potentially increase ejection
- Afterload reduction
- Diuresis/volume removal

Duke Heart


Blood Exposures
Optimizing End Organ Function
Rehabilitation
Minimizing risk of infection

Duke Heart



Duke Heart