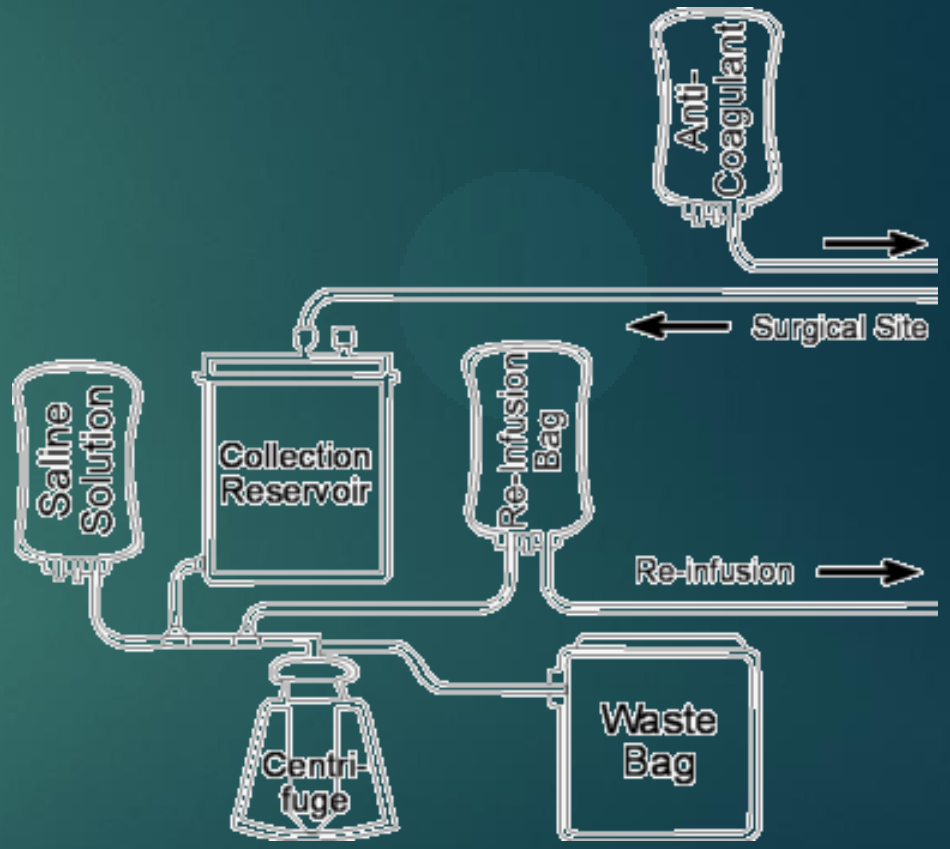
Left Heart Bypass

25TH FEBRUARY 2021

CRISTINA REVILLA MARTIN

Cell saver

- The blood is suction and mixed with anticoagulant.
- Reservoir: filtered to remove large clots and debris.
- Centrifugal bowl: The force supplied by the centrifuge holds the more dense RBCs.
- Waste bag: with the washing solution we also remove white blood cells, platelets, plasma, anticoagulant, fat, clotting factors, and free plasma haemoglobin.
- Packed RBCs are collected in a separate bag.



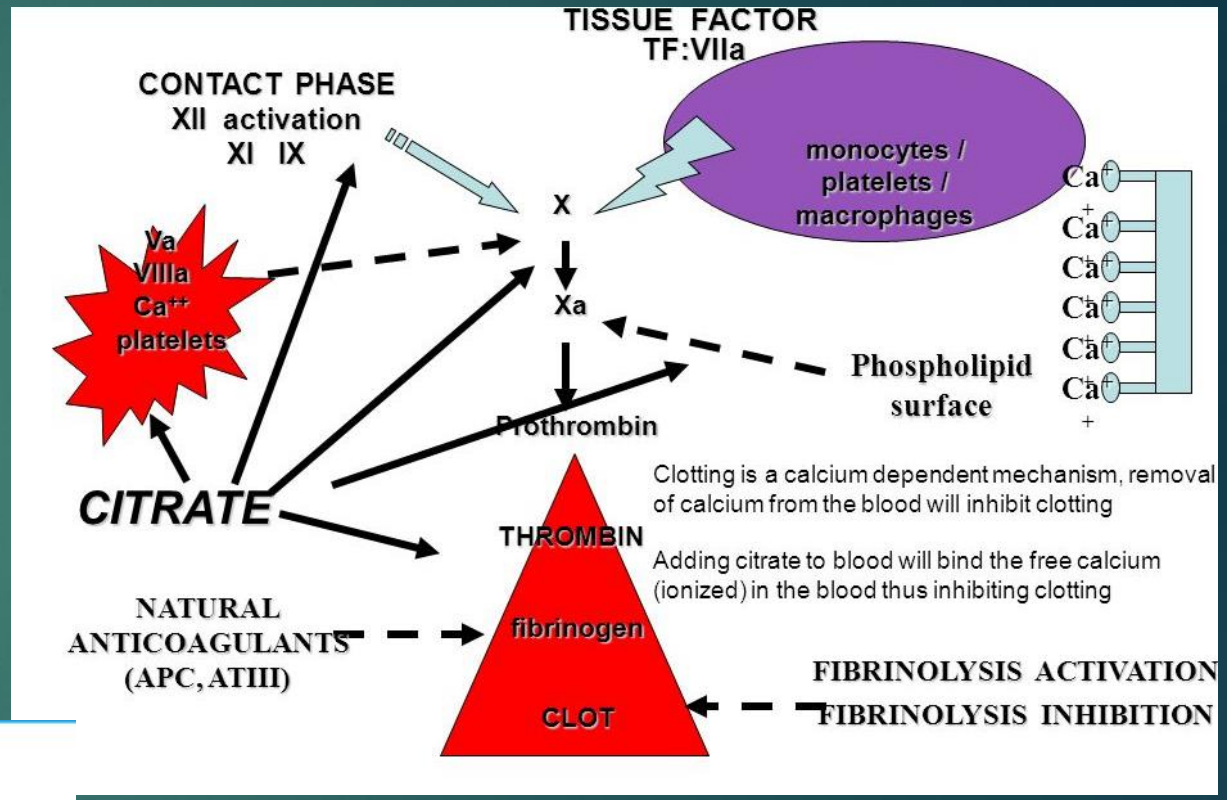
Rapid infusion system

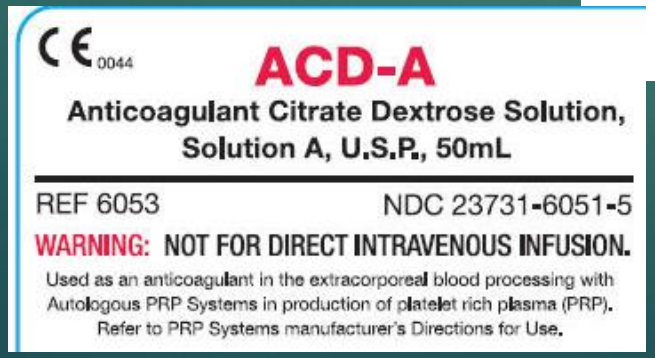
- 2 cell-savers.
- 2 roller pumps for quick blood return.

Rapid infusion system

ACD-A acts as an anticoagulant by the action of the citrate ion chelating free ionized calcium, thus making calcium unavailable to the coagulation system.

****REGULAR SERUM Ca++ LEVELS****

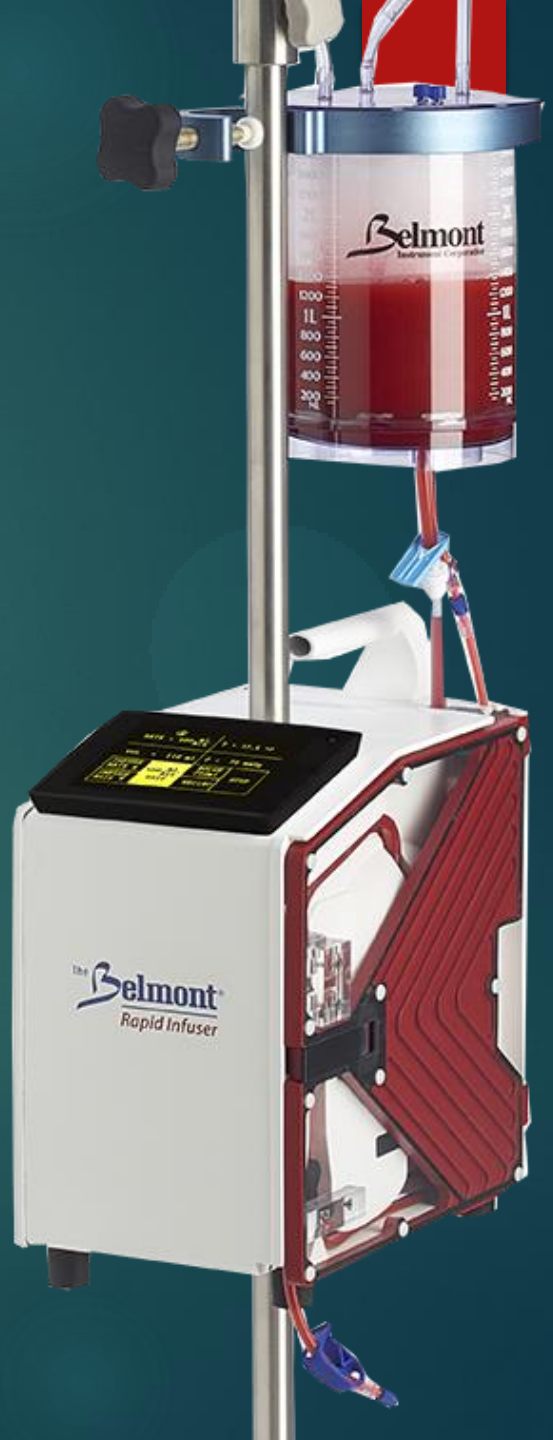




Rapid infusion system

The Belmont Rapid Infuser

- Automatic air removal.
- Heat in seconds.
- Consistent, fast and safe transfusion.
- Precise control of transfusion (2.5ml/min to 1000ml/min).
- Operator controlled bolus.
- Infusion pressure avoiding vessel trauma.



Platelet Rich Plasma Sequestration

- Cell saver specific protocol.
- Collect patient whole blood.
- Centrifuge to separate RBCs.
- Concentrate of platelet-rich plasma.

Benefits?

- RBCs can be given at any time during the procedure.
- Platelet Rich plasma is saved for post-CPB.
  - Preserve platelet function.
  - Reduce post-CPB bleeding.

Platelet Rich Plasma Sequestration

Why shall we do it?

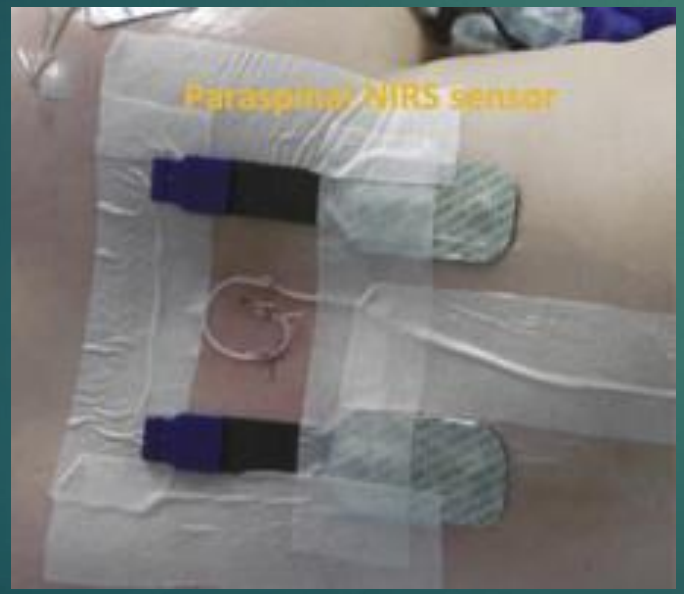
- It is a safe procedure.
- Reduction in the frequency of allogeneic platelet transfusion.
- Platelet dysfunction is believed to be the most common cause of nonsurgical bleeding after CPB.
- It preserves platelet count and ristocetin-mediated platelet aggregation and partly restores aggregation mediated by other activators after CPB.

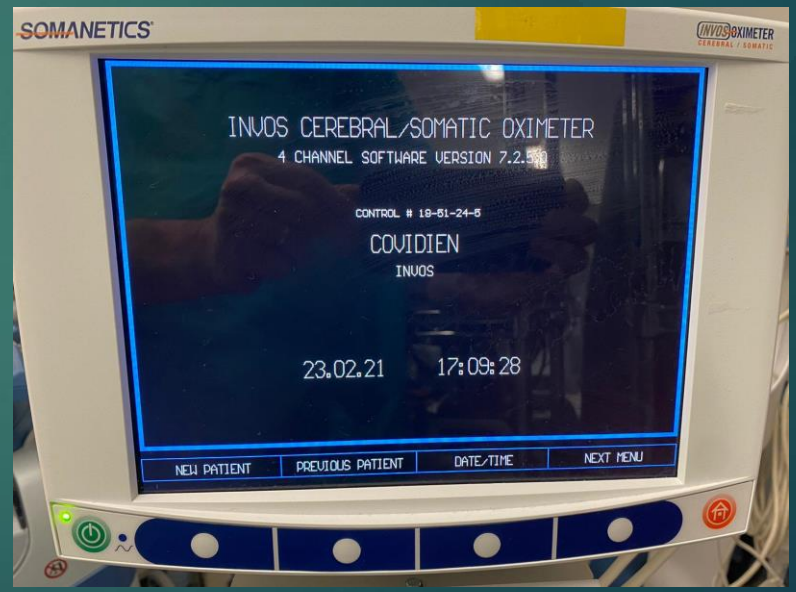
(Platelet Function during Platelet-Rich Plasma Sequestration in Complex Cardiac Surgical Procedures - Prospective Controlled Study Slavik L*1, Hajek R2, Chaloupkova P1, Ulehlova J1 and Lonsky)

NIRS

Set baselines

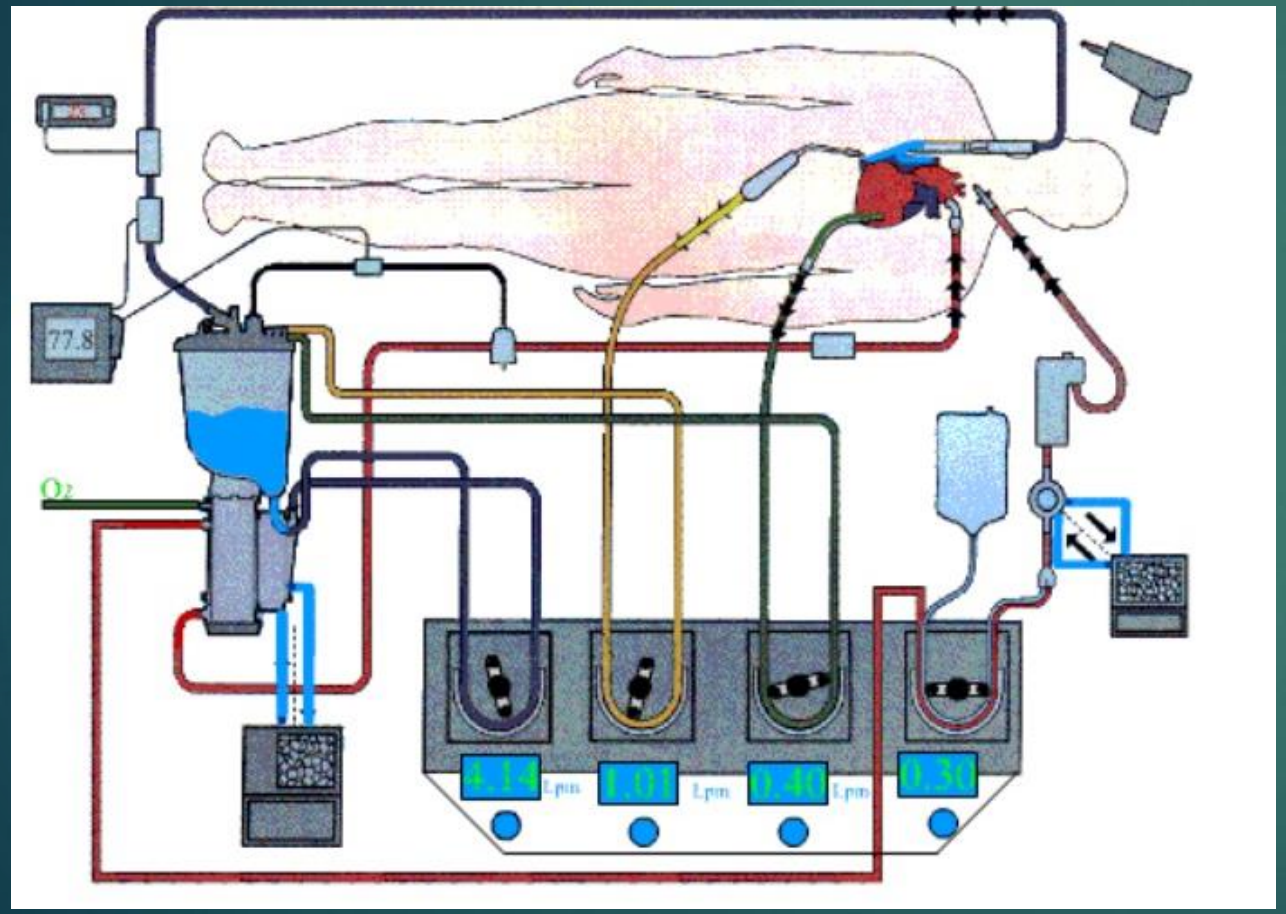
- Right and left cerebral
- Right and Left spinal
- Right and Left calf.



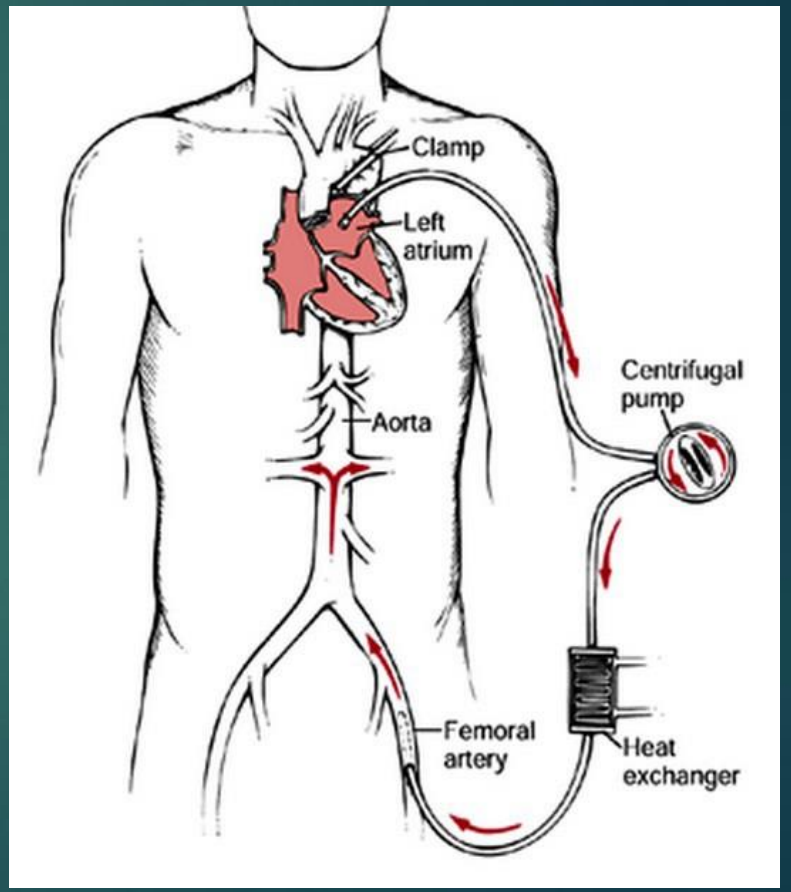


(Lopez-Marco, A; Adams, B; Oo, AY. Thoracoabdominal aneurysmectomy: Operative Steps for Crawford Extent II Repair. JTCVS Techniques 2020;3:25-36)

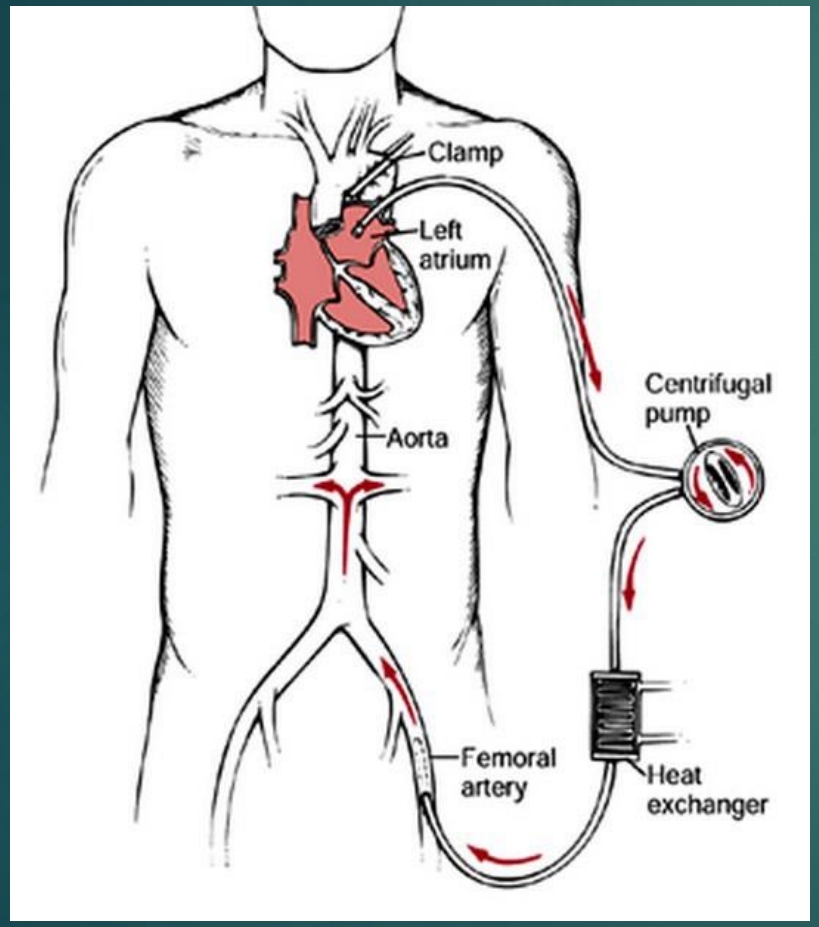
Standard Bypass



Left Heart Bypass



Left Heart Bypass



Cannulation:
Drainage- Left Inferior Pulmonary Vein: 28 Fr (Air free!)
Return- Left Femoral Artery / Distal abdominal Aorta
or side arm of a branched graft: 20-22 Fr.

Centrifugal pump (pre load and after load dependent)

- Less blood trauma
- Less risk of air embolism
- Cannot over pressurize
- Less cavitation

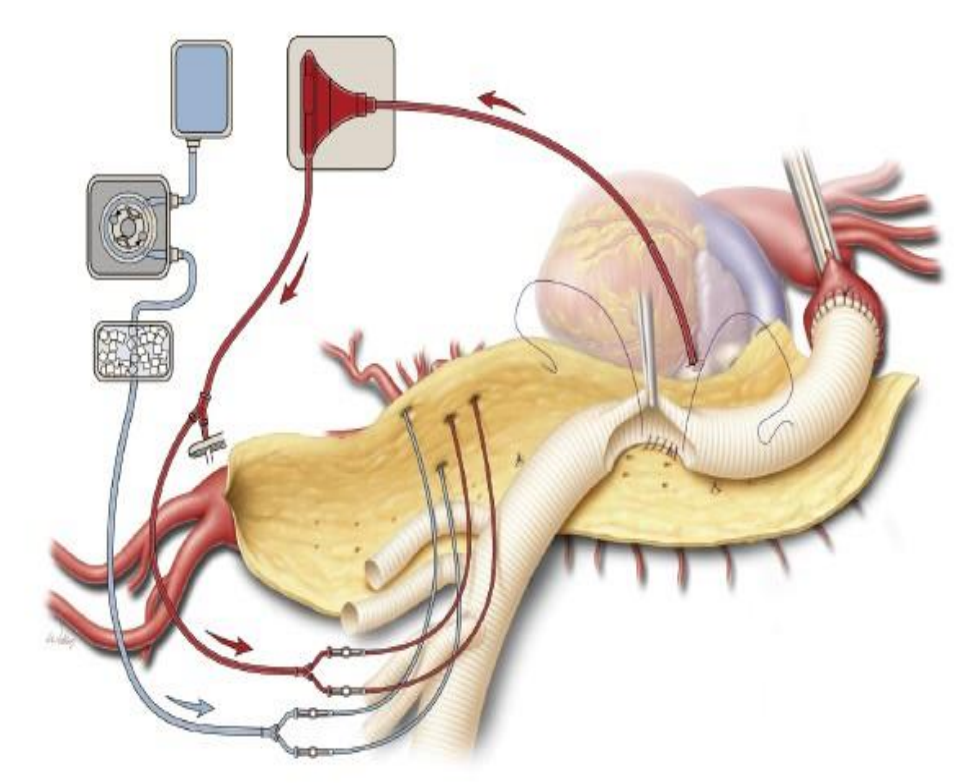
Flow rate: ?1.5 L/m to 2.5 L/m

Line Pressure: 80 to 150 mmHg.

Temperature: 34-35 °C.

ACT: 300 - 350 seconds.

Left Heart Bypass



Selective perfusion of visceral and intercostal vessels

Cannulation: 13 Fr Gundry/ 12 Fr LeMaitre cannula.

Continuous Flow: 300 - 600 mls/min

Pressures: 80 -150 mmHg

Temperature: 25 °C

Kidney Vessels

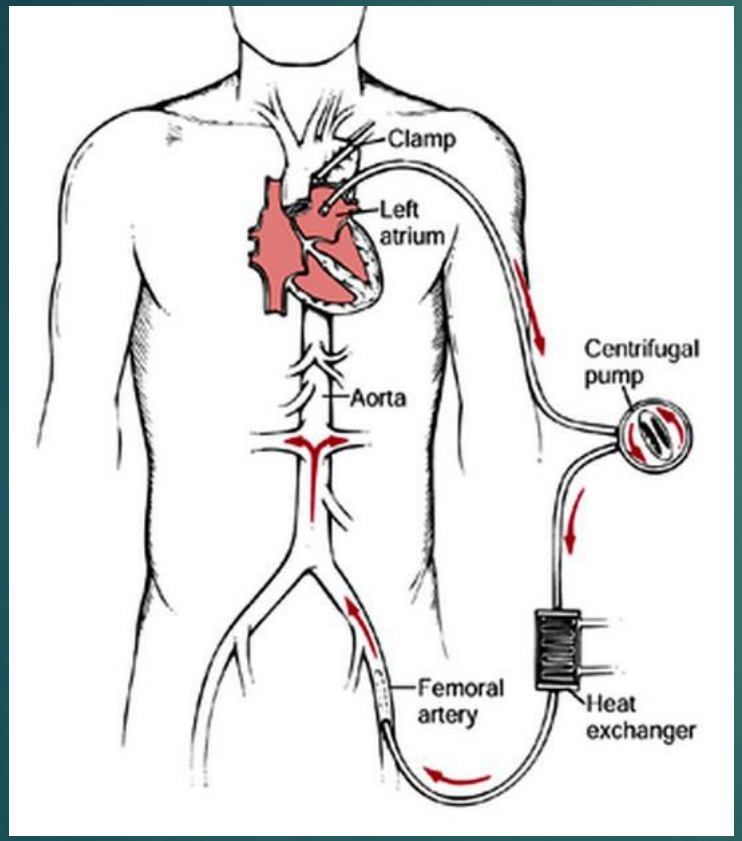
Cannulation: 10 Fr Gundry/ 9 Fr LeMaitre cannula.

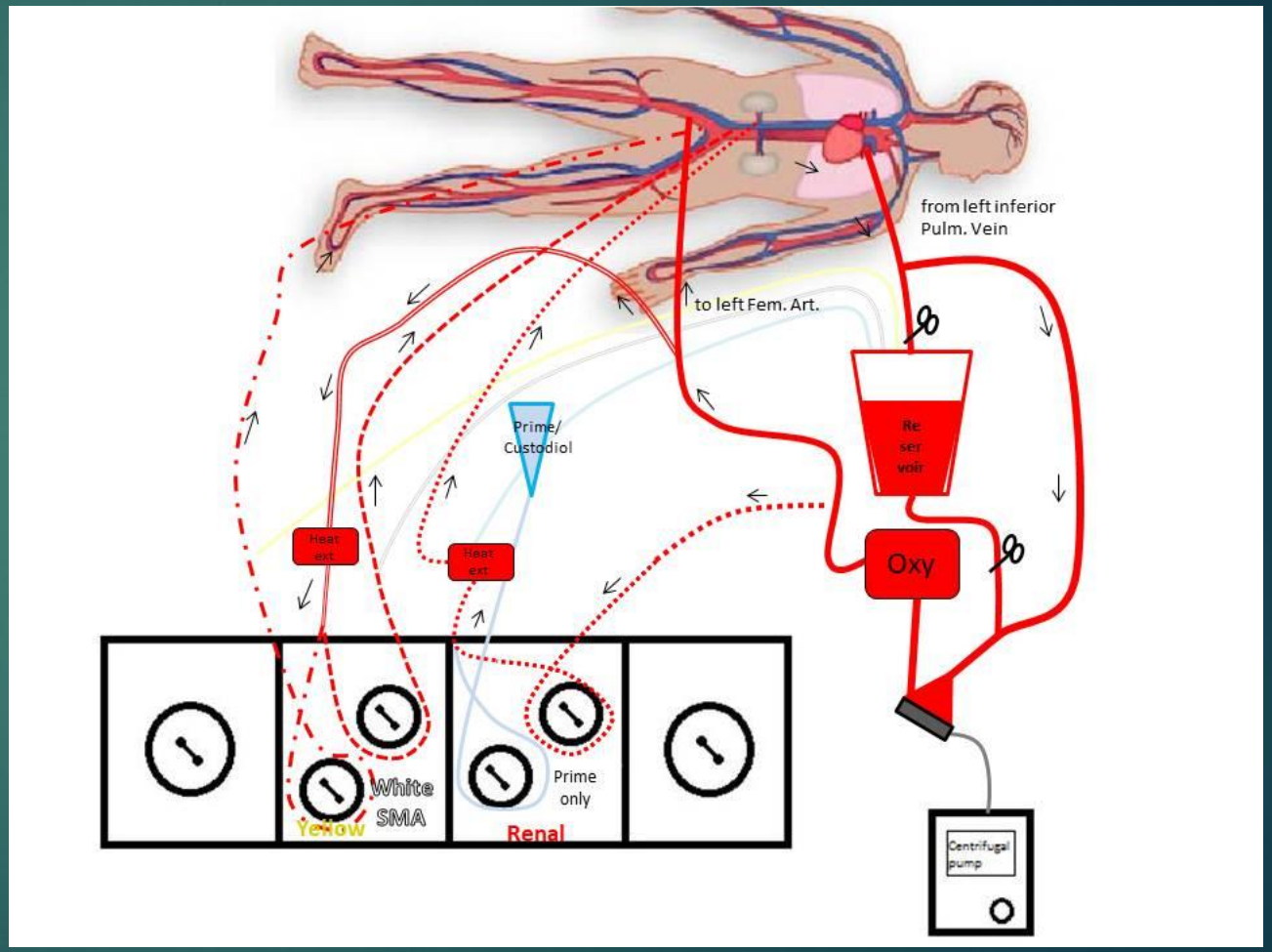
Custodial solution at 5 °C or continiuos cold blood at 15 °C

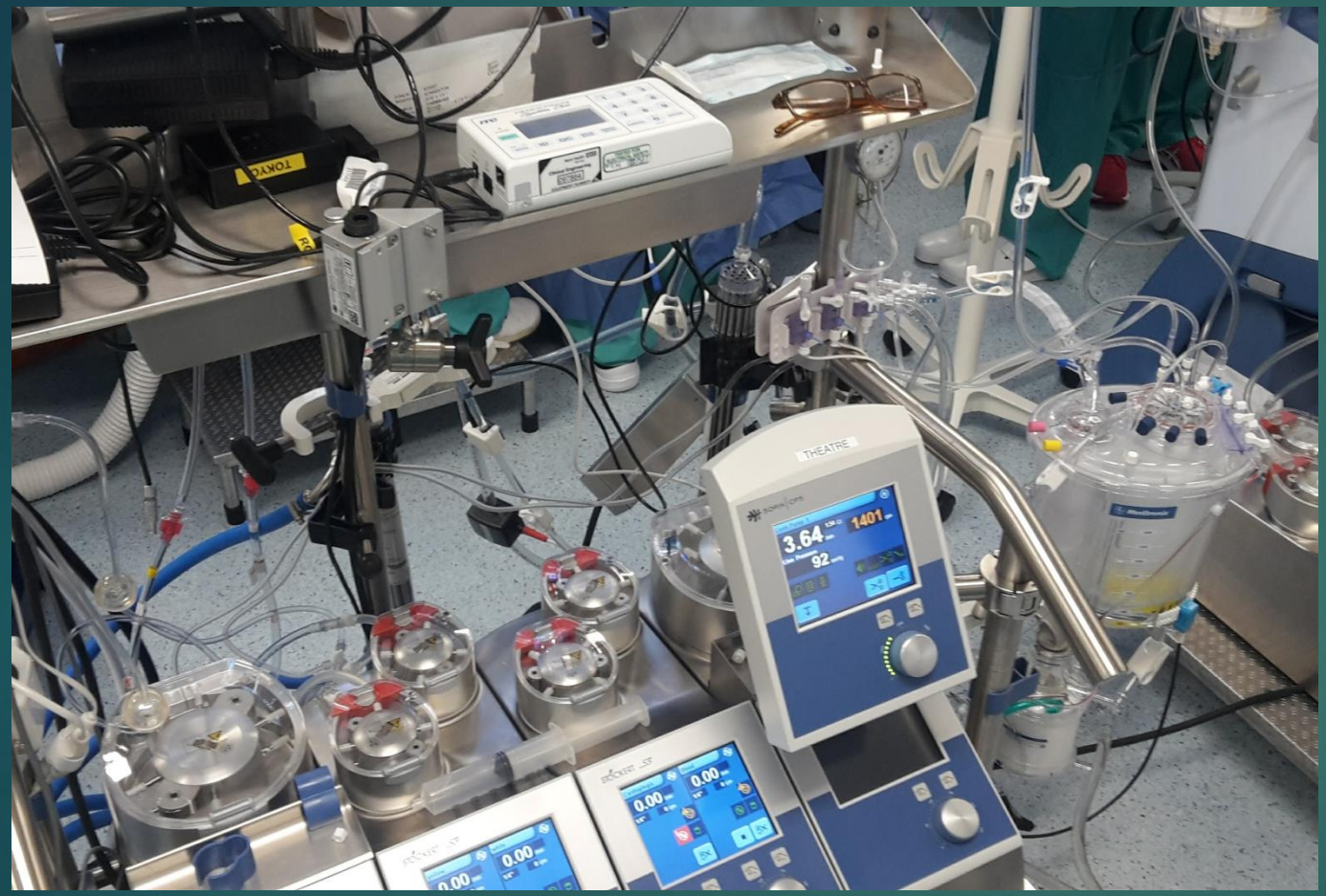
Initial dose: 400 - 600 mls

Maintenance dose: 300 mls

Maximum dose: 2 Liters


Clamp
Left atrium
Aorta
Centrifugal pump
Femoral artery
Heat exchanger

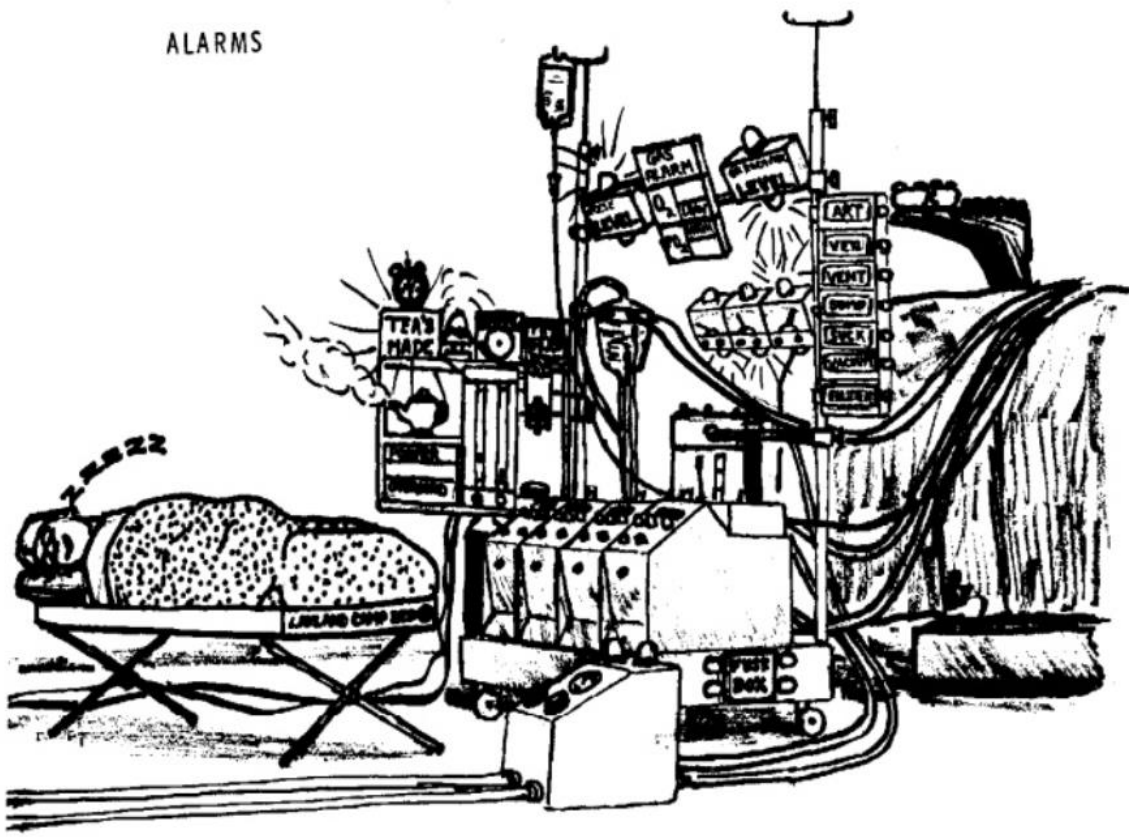

from left inferior Pulm. Vein
to left Fem. Art.
Prime/ Custodiol
Re ser voir
Heat ext
Heat ext
Oxy
White SMA
Yellow
Prime only
Renal
Centrifugal pump


THEATRE
3.64
1401
92
0.00
0.00
0.00

Other things to consider:

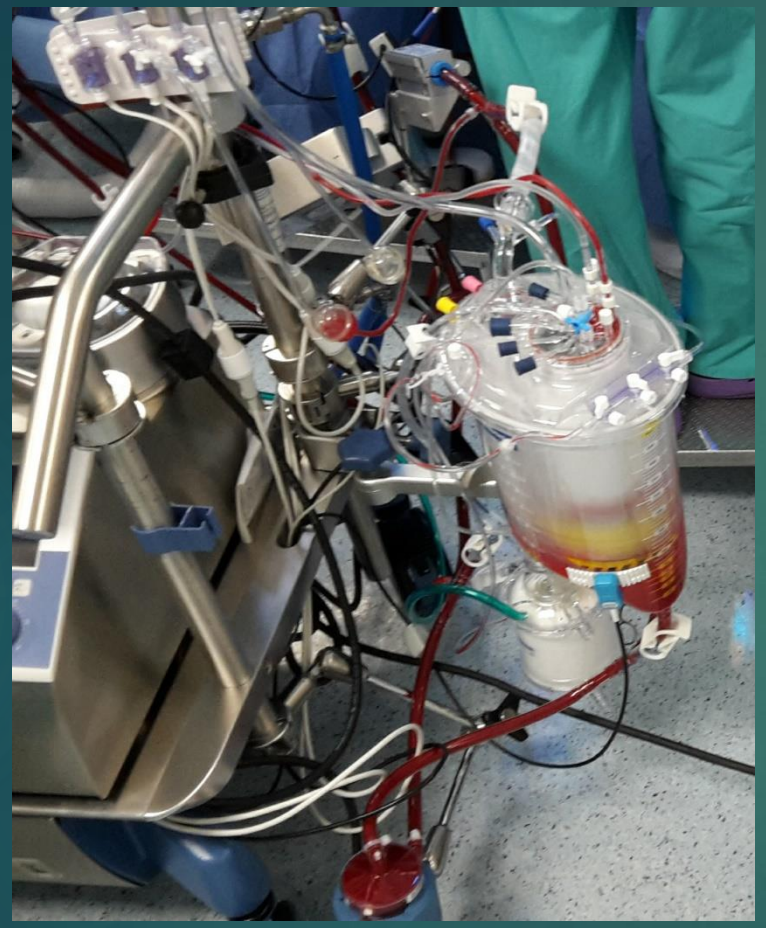
MDT COMMUNICATION!!

- ACTs.
- Proximal and distal pressures.
- NIRS.
- Urine output & filtration.
- ABGs.
- Optimal flows to thoracic and abdominal Ao.



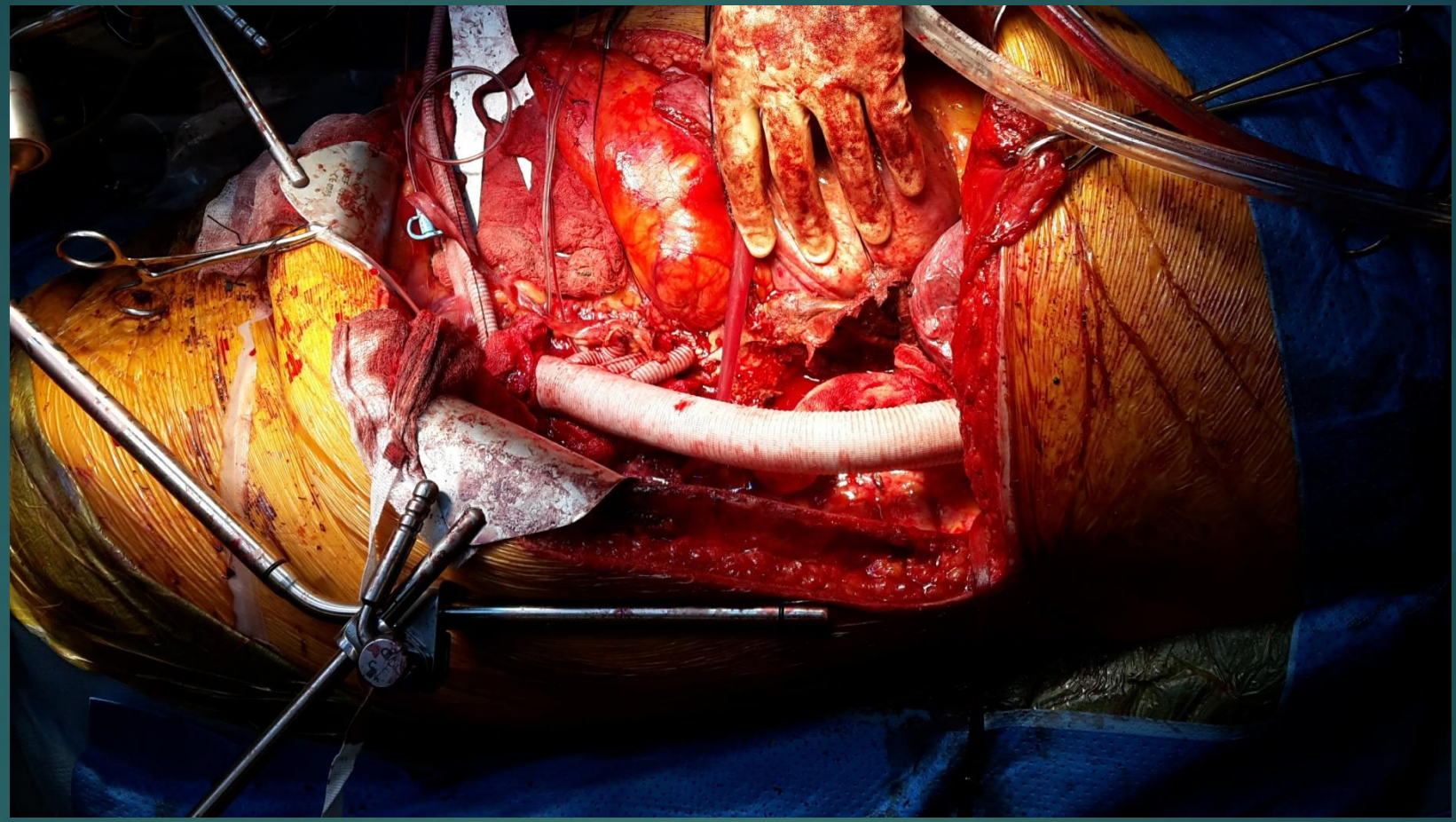
Other things to consider:

- **Adjustments to the alarm settings:**
  - Vessel perfusion pumps.
  - Drainage pressure.
- **Filtration or balanced hemofiltration**.
  - By adding a filter between the drainage and return line.
  - Ca^{++}-free renal replacement solution.
- **Maintain homeostatic conditions for clotting:**
  - Temperature 34-35° C
  - pH > 7.2
  - Serum [Ca^{++}] >1 mmol/L



Other things to consider:

- Separate control of femoral artery flow from visceral , intercostal and renal flows.
- Separate control of temperatures.
- Possibility for quick addition of volume.
- When bypass is terminated, the pump volume should be chased promptly to prevent stagnation and thrombus formation.



Thank you