What is good quality in the residual blood from the heart–lung machine?
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A "Bloody" Work, 25 October 2014, Odense

Allogeneic blood transfusion
Blood transfusion
Low hematocrit

Blood saving techniques

Quality control

Effects of bypass

Effects of bypass


Exposure to foreign surfaces
- Tubings, oxygenator, filters, cannulas
- Activation of the immune system
- Activation of the coagulation system

Effects of bypass

- Maldistribution of blood flow
  - Non pulsatile flow
  - Variations in pressure and flow
  - Micro embolization (Air/Particles)
  - Arterial injury

Activation of the immune system

Activation of the coagulation system

- ACT
- APTT
- INR
- Fibrinogen
- D-dimer

Effects of bypass

- Activation of blood element cascades


Effects of bypass

- IL-6
- IL-8
- IL-10
- TNF-α
- C3a


Effects of bypass

- ACT
- APTT
- INR
- Fibrinogen
- D-dimer

Effects of bypass

- ACT
- APTT
- INR
- Fibrinogen
- D-dimer

End-organ dysfunction

- Gut
- Kidneys
- Brain
- Heart
- Lungs
Risk of contamination

Retransfusion techniques

Cellsaver

Retransfusion techniques

Direct infusion

Ringer Wash-In

Hemoglobin and Platelets

Hemoglobin

Platelet count

Platelet function

Fibrinolysis

D-dimer

** = p < 0.01
Anki Olsson

**Potassium**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Pre-op</th>
<th>4h after arrival at ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWI</td>
<td>3.8 ± 0.8</td>
<td>5.5 ± 0.8</td>
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<tr>
<td>DI</td>
<td>6.8 ± 0.8</td>
<td>9.5 ± 0.8</td>
</tr>
</tbody>
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**Hemolysis**

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<tr>
<td>RWI</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>DI</td>
<td>17</td>
<td>18</td>
</tr>
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**Free Hemoglobin**

![Graph showing hemoglobin levels over time with trend lines for Pre-op, 4h after arrival at ICU, RWI, and DI. The graph includes a significant p-value of <0.01 indicated by a ** symbol.]

**IL-6 and IL-8**

<table>
<thead>
<tr>
<th>Time</th>
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<th>IL-8</th>
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<tbody>
<tr>
<td>Pre-op</td>
<td></td>
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<tr>
<td>Before</td>
<td></td>
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<tr>
<td>After</td>
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**C3a**

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**Something to think about**

When we retransfuse the residual blood with a DI we transfuse blood with a lower platelet function, more signs of fibrinolysis and hemolysis and more signs of activation compared to when we use the RWI-technique.

All allogeneic blood transfusion is leukocyte depleted. What about the leukocytes in the residual blood? How will that affect the lungs?

Extended CPB-time and ‘movement’ of the blood increases the risk for contamination and thereby possible the risk for infection.

**I think………..**

The quality of the blood is at its best as long as it runs in the circulation with an intact endothelium and no contact with foreign material.

It is important to be aware of what you do and what the effects could be on the blood and in the patient.
Leukocytes

Pre-op  | Before Weaning | 1h after arrival | ICU

Leukocytes