Journey of a Blood Bag - Blood Centre. Processing and Testing

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Why do we separate whole blood into different components?
Whole Blood Pack Type

- Identified at donor session
- Determines components that can be produced:
  1. **Whole Blood Filtration (Top and Top)**
     - (red blood cells, plasma or cryoprecipitate)
  2. **Bottom and Top**
     - (red blood cells, and platelets; rarely-plasma and cryoprecipitate)
Whole Blood Filter (WBF) Pack

Anticoagulant 63ml CPD

100ml SAG-M
Overnight storage

- Regardless of bleed type most WB is stored overnight before processing
  - Phagocytes in product engulf bacteria
Leucodepletion of Whole Blood Donations
Centrifugation - fast (3800 rpm)
Semi-automated press

- Plasma
- Red Cells
WBF Components

SAG-M additive solution added

Red Cells
4°C +/- 2
35 days
Freezing
Fresh Frozen Plasma (FFP)

< -25°C
3 years
Bottom and Top (BAT) Pack

Anticoagulant CPD-A1

Additive SAG-M
Centrifugation - fast
BAT Components

- Plasma
- Buffy Coat (for platelets)
- Red Cells
Leucodepletion of Red Cells
BAT – platelet pooling

- 4 BCs + 1 PAS
- Same ABO group
- Rh and CMV only neg if all neg
- Unique pool number generated
Platelet Pooling
- Sterile Connecting Device (SCD)
Platelet Pooling - SCD

- Sterile Connection
- Joins tubing aseptically
- Disposable copper blade
- Creates a ‘train’
PAS is washed through the “train” of bags to pool together the contents of the 4 Buffy coat bags into the terminal bag.
Centrifugation
- slow (1300 rpm)
Pooled Platelet

22°C +/-2 gently agitating

7 days (if bacterial monitoring)
Special components: Cryoprecipitate
Granulocytes

Stored 22°C without agitation for 24 hours only

Must contain >5x10^9 cells per unit

Must be CMV neg (if patient CMV neg)
Donation Testing – Grouping

- Mandatory testing:
  - ABO / RhD grouping
  - antibody screening
Haemagglutination

NEG
Mandatory/ discretionary testing

- Why do we test for what we do test for?

- Why don’t we test for everything?
Agent/host/test interaction

Point of exposure

Level of NA/Ag/Ab

Symptoms

Time →
### Mandatory screening

<table>
<thead>
<tr>
<th>Virus/Infection</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B virus</td>
<td>HBsAg, (+HBV DNA)</td>
</tr>
<tr>
<td>Hepatitis C virus</td>
<td>Anti-HCV, HCV RNA</td>
</tr>
<tr>
<td>HIV</td>
<td>Anti-HIV I &amp; II (+HIV Ag, HIV RNA)</td>
</tr>
<tr>
<td>HTLV</td>
<td>Anti-HTLV I &amp; II</td>
</tr>
<tr>
<td>Syphilis</td>
<td>Anti-treponemes (inc other endemic infections)</td>
</tr>
<tr>
<td>?HEV</td>
<td>?NAT</td>
</tr>
</tbody>
</table>

### Discretionary tests

<table>
<thead>
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<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B virus</td>
<td>Anti-HBc, anti-HBs*</td>
</tr>
<tr>
<td>Malaria</td>
<td>Anti-malaria</td>
</tr>
<tr>
<td><em>T. cruzi</em></td>
<td>Anti-<em>T. cruzi</em></td>
</tr>
<tr>
<td>West Nile virus</td>
<td>Stopped 2006 (deferral in season). Restarted 2012</td>
</tr>
</tbody>
</table>
Malaria Distribution

Approximate geographic distribution of malaria

(Parasites and Parasitological Resources)
Vector of Chagas’ Disease

Adult *Rhodnius prolixus*, a kissing bug.
WHO/TDR/Stammers
<table>
<thead>
<tr>
<th>Infection</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCV</td>
<td>1:12150</td>
</tr>
<tr>
<td>HBV</td>
<td>1:20500</td>
</tr>
<tr>
<td>HTLV</td>
<td>1:30750</td>
</tr>
<tr>
<td>Syphilis</td>
<td>1:32200</td>
</tr>
<tr>
<td>HIV</td>
<td>1:65000</td>
</tr>
</tbody>
</table>
PRISM:- Principles of reaction HIV HBV HCV EIA

Latex microparticles

Washed through to filter

• Assay specific acridinium-labelled antibody (or antigen) conjugate added to reaction well
Nucleic Acid Amplification Technology (NAT)
Residual risks for NHSBT (blood) donations

<table>
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<tr>
<th>Risk due to</th>
<th>HBV</th>
<th>HCV</th>
<th>HIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window period donation</td>
<td>0.46</td>
<td>0.026</td>
<td>0.17</td>
</tr>
<tr>
<td>No. (per million) entering the blood supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 per X million donations</td>
<td>2.2</td>
<td>39</td>
<td>5.9</td>
</tr>
</tbody>
</table>
Contaminated Platelets
• Bacterial Screening – 7 Day Platelets