Blood products are not used to treat diseases

Supportive therapies

Blood components

- Whole blood
  - Packed red blood cells
  - Fresh frozen plasma
- Cryoprecipitate
- Cryo-poor plasma
- Platelet-rich plasma

Blood donor selection

- History taking
- Blood examinations
- Blood type
  - Dog:
    - DEA 1.1, 1.2, 1.3, 3, 4, 5, 6, 7, 8 etc...
  - Cat:
    - A, B, AB
- Pathogen screening
  - Dog:
    - babesiosis, Ehrlichiosis, HWD, Hemotropic mycoplasmosis
  - Cats:
    - FeLV, FIV, Hemotropic mycoplasmosis

Pretransfusion compatibility test

- Cross-match
  - Major
  - Minor

Collection of blood

- Whole blood
  - Packed red blood cells
  - Fresh frozen plasma
Collection of blood

- Whole blood
  - Packed red blood cells
  - Fresh frozen plasma

- 0.14 ml CPDA-1/1 ml blood
- 20 ml/kg of whole blood increases patients’ PCV by 8–10%
- Sedation (if necessary)
  - Dogs: butorphanol, Zoletil
  - Cats: ketamine+diazepam, Zoletil
- Hair clipping
- Gravity or suction

Collection of blood--Dog

Collection of blood--Cat

Blood components

- Whole blood
  - Packed red blood cells
  - 2000rpm, 5-10 mins
  - Fresh frozen plasma
  - 2500rpm, 30 mins
  - Cryoprecipitate
    - Thawing FFP at 0-6°C
    - Von Willebrand’s factor, fibrinogen, factors XII & VIII
  - Cryo-poor plasma
  - Factors II, VII, IX, X
  - Platelet-rich plasma

Administration of blood products

- Before transfusion.....
  - Corticosteroid, diphenhydramine.....?
- Transfusion rate (increased gradually)
  - 15 drops/ml
    - 240/ideal rate = Sec/drop
    - Ex. Ideal rate 20ml/hr → 240/20=12 sec/drop
  - 20 drops/ml
    - 180/ideal rate = Sec/drop
- Monitoring during transfusion
  - BT/HR/RR/BP

Monitoring during transfusion

Monitoring during transfusion
**Adverse effects of transfusion**

- Acute immunologic
  - Acute hemolytic reaction
    - Blood type
  - Nonhemolytic fever and urticaria
- Acute nonimmunologic
  - Collecting, storage
  - Delayed immunologic
    - Purpura
  - Delayed nonimmunologic
    - Infectious

**Storage-related changes in pRBC**

- Packed red blood cells
  - Storage-related changes
    - Metabolic effects
    - Shape changes
    - Microparticles
    - Oxidative injury
    - Nitric Oxide

- Metabolic effects
  - Slowed glycolysis
    - Proton accumulation
    - 1-6°C
  - Hyperkalemia
    - Arrhythmias and fatal cardiac arrest in human pediatric patients

- Shape changes
  - From biconcave disk to echinocytes and eventually spheroechinocytes
  - Critical in maintain adequate tissue oxygenation

- Microparticles (MPs)
  - In both healthy and diseased individuals
  - Submicron (<1μm) membrane-derived exocytic vesicles
  - Erythrocytes, leukocytes, platelets, endothelial cells etc.
    - Antigen
    - Cell surface proteins
    - Cytoplasmic contents
    - Nuclear components
  - Has proven detrimental for blood transfusion recipients
    - Systemic inflammation
    - Cardiovascular
    - Hematologic
    - Oncologic
    - Transfusion-associated acute lung injury
    - Thrombotic complications
    - Ischemic brain injury
- Microparticles (MPs)
  - Leukoreduction (LR)
    - Eliminate leukocytes and platelets

- Oxidative injury
  - Superoxide radical and ferric methemoglobin
  - Membrane damage and cell lysis of RBCs
  - Increase over a 28 day storage period

- Nitric Oxide (NO)
  - Vasodilation
    - Improve capillary blood flow
  - Free hemoglobin and MPs
    - 1000 times faster than intact erythrocytes

---

**Vox Sanguinis**

**Original Paper**

Transfusion of 28-day-old leucoreduced or non-leucoreduced stored red blood cells induces an inflammatory response in healthy dogs


- Department of Clinical Studies, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA, USA
- Department of Pathology and Laboratory Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

**Results & Discussions**

No differences between LR and non-LR groups were observed in complete blood cell counts **in vivo**

LR did not affect the responses of leukocytosis, increased neutrophils, and decreased platelet counts

Old RBC transfusions induce an MCP-1 response, accompanied by increased neutrophils and decreased platelets

Both fresh and old stored blood induce extravascular hemolysis
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>1962</td>
<td>7 cats</td>
</tr>
<tr>
<td>Second</td>
<td>1963</td>
<td>11 ml/kg (Cr11), Lifespan 3.6 days (longest 5.4 day)</td>
</tr>
<tr>
<td>Third</td>
<td>1968</td>
<td></td>
</tr>
<tr>
<td>Fourth</td>
<td>1969</td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>1963</td>
<td>Autoagglutination (+), in vitro hemolysis (+): 6-7 days</td>
</tr>
<tr>
<td>Third</td>
<td>1968</td>
<td>2nd transfusion: 1 cat in 4 days, 2 cats in 1 and 2 days (survive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth</td>
<td>1969</td>
<td>8 cats</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Autoagglutination (+): 6 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd transfusion: &lt; 6 days: survive, &gt; 7 days: died</td>
</tr>
</tbody>
</table>
Xenotransfusion with canine blood in the feline species: review of the literature

Catherine Bovens and Tim Gruffydd-Jones

First study (1962)
Second study (1963)
Third study (1968)
Forth study (1969)
Fifth study (2004)
Case report

Questions!?