



Great Ape Plasma Banking Considerations

Priya Bapodra BVetMed MSc Dipl. ACZM FRCVS

Hayley Murphy DVM

Goal

Provide resources to encourage safe and effective whole blood collection and plasma processing within institutions, in the event of local or national need for blood products. Plasma collection via operant conditioning is unlikely to be successful for large blood collection volumes in these species.

Supplies required

1. 20-18 gauge 1 inch needles
2. 30 inch extension set (or preferred length)
3. 3 way stop cock
4. 20-35 ml syringe (Luer lock preferred)
5. Injection ports
6. Blood collection bags (100, 250, 500ml bags, prefilled with anticoagulant or empty, attached transfer bags are ideal)
7. Anticoagulant if bags are empty
8. Gram scale (to fill bags up to 540g in weight for 500mls bags, and up to 270g for 250ml bags)
9. Tourniquet for peripheral veins
10. Plasma separation devices (not essential but makes the process much smoother)
11. Refrigerated centrifuge for separation (not essential but if needed, can potentially partner with local blood banking facilities or veterinary universities)
12. Transfer bags if not already attached to blood collection bags

Plasma collection

1. Prepare blood collection site with clipping and aseptic preparation. Femoral and large peripheral veins work well in great apes (cephalic, brachial, caudal tibial)
2. Select bag size based on volume required to be collected
 - a. Prefilled ACD anti-coagulant blood collection bags (250mls and 500mls bags)
 - b. Empty 100ml, 200ml or 500ml collection bags will need anticoagulant added
 - c. For any empty bags, add 14mls ACD anticoagulant per 100mls whole blood collected
3. Extension sets are used so that multiple bags of blood can be collected without requiring multiple large gauge needle entries into a vein
4. The 3 way stop cock method for blood collection allows blood to be actively suctioned from the vein, and therefore reduces collection time compared with passive/ gravity induced blood collection. The risk of hemolysis when blood is collected using this method is minimized with minimal needle re-direction and limiting syringe suction being applied
5. Bags should be filled to capacity as plasma processed from half-filled bags will have a higher anticoagulant to plasma ratio, resulting in the administration of higher amounts of anticoagulant and thus increasing the risk of clotting issues and hypocalcemia

6. The volume to be collected from the donor animal should be dictated by animal size, but an adult great ape weighing over 50kg should be able to easily tolerate 500mls of whole blood collection (weight restrictions based human donor limitations)
7. Donor animal considerations – general health, long term medications, risk of infectious disease transmission, compatibility with recipient
8. Blood collection frequency is likely to be dictated by anaesthesia frequency but should be limited to every 8 weeks based on human guidelines, especially in relation to elective blood product banking
9. Blood volume replacement using crystalloids or colloids can be conducted after blood collection, although may be unnecessary in the larger great apes

Plasma processing and storage

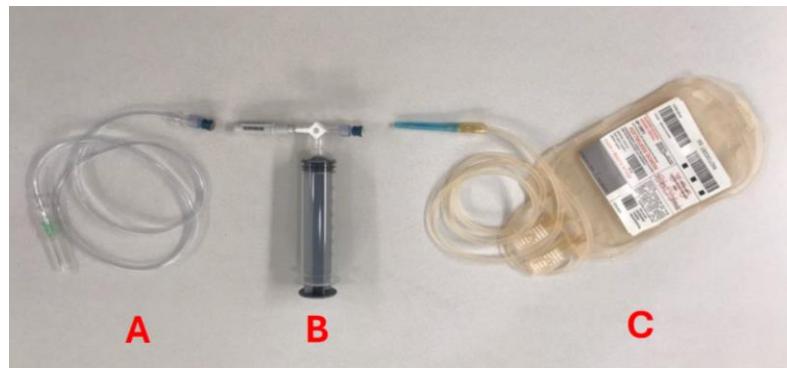
1. Whole blood transfusion bags can be processed in house by sedimentation or via centrifugation (high speed, large volume, refrigerated centrifuge, estimated 1200-1400rpm for 12-14 minutes but settings will vary with centrifuge, number of blood bags and volume)
2. Blood product information (From Manual of Veterinary Transfusion Medicine and Blood Banking, Ed. Yagi, K., and Holowaychuk, M. Wiley Blackwell, 2016)
 - a. Whole blood
 - i. Keep at room temp for up to 8hrs to maintain platelets' ability to aggregate
 - ii. Whole blood can be stored in 4C for up to 28 days with CPDA-1 anticoagulant, and up to 30 days with ACD anticoagulant, with daily gentle mixing and rotation of bags, and when stored vertically
 - iii. However, ideally use refrigerated blood within 14 days for critical patients
 - b. Plasma
 - i. Fresh plasma without refrigeration used within 8 hours of collection will contain platelets (any refrigeration or freezing will eliminate platelets)
 - ii. Fresh frozen plasma is separated and frozen within 8 hours of whole blood collection (shelf life in -20 to -40C for 1 year)
 - iii. Frozen plasma is separated and frozen after 8 hours of whole blood collection (shelf life in -20 to -40C for 5 years). Contains fewer clotting factors vs. fresh frozen plasma
 - iv. Plasma can be separated from whole blood for up to 14 days
 - v. Thawed plasma can be stored at 4C for up to 26 days

Requests for plasma and blood products

1. In the event that plasma or whole blood is required, please communicate the request to a local facility that might help facilitate collection, the AAZV list serve, or to your institutional representative that will be able to access the Ape TAG list serve to distribute a call for assistance
2. Blood product compatibility is not guaranteed between recipient and donor, and minor and major crossmatching and/or slide agglutination is recommended prior to administration

Plasma Administration

1. Plasma doses vary but typical first doses are 20-40ml/kg. Plasma sending facilities should ideally send a plasma sample with the donation to allow for slide agglutination to be performed prior to thawing an entire plasma bag. Plasma transfusions can be repeated as needed, with care and monitoring for transfusion reactions
2. Best practice is to thaw plasma on a counter at room temperature. To expedite thawing, place frozen plasma in sealed Ziploc bag and in a warm water bath with temperatures not to exceed 98.6F
3. Use filtered primary administration lines to administer blood products
4. Administer plasma at a slow rate over the first 5 mins and monitor for any signs of anaphylaxis. If no reaction is observed, the rest of the plasma infusion can be given at faster rate over the following 30 minutes



Plasma blood collection set up using the suction method (left to right)

- A. **Side to be inserted into the patient** – 18 gauge 1-1.5 inch needle with 30 inch extension set, injection port attached to the open end
- B. **Stop cock mechanism** – 16 gauge 1 inch needle attached to a 3 way stop cock, 20-35ml syringe on 2nd luer lock port, and an injection port on the 3rd luer lock port
- C. **Side for plasma bag attachment** – insertion of the needle of a blood collection bag into the injection port of the 3 way stop cock