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TechSpert Essential Skills: Blood Crossmatch

Background:

Transfusion medicine demands that the veterinary technician administer type-specific blood products to recipients and ensure to the best of their ability that the transfusion will not elicit a reaction. One of the steps in this process is the blood crossmatch (BCM). This procedure involves actually mixing donor and recipient blood together to identify whether a reaction will occur. Donor blood is mixed with recipient plasma, attempting to identify any antibodies in the recipient that may react with the donor, and donor plasma is mixed with the recipient blood to identify any antibodies in the donor that may cause a reaction. Presence of agglutination or hemolysis indicate a positive crossmatch reaction and the product should not be transfused to that recipient.

Procedure:

1- Obtain EDTA blood from the recipient and a sample of blood from the donor
   a. Often donor blood is available attached to the unit you will be infusing in a plastic tube extending from the blood unit. Just clip off one of those tubes and empty.
2- Once blood has been obtained, place the donor and recipient samples into a small plain tube that can be centrifuged. A plain red top will work, or one of the tubes below with the small heparin disc emptied out.
3- Label each tube with a "D" for Donor and "R" for recipient and centrifuge on a standard blood setting.
4- Remove the tubes. Set aside two additional plain tubes and label them D Plasma an R Plasma.
5- Remove the plasma from the D and R tubes and place into the corresponding D Plasma and R Plasma tubes.
6- Set aside the plasma tubes for later use.
7- Obtain 0.9% NaCl and fill the D and R tubes thus making a red blood cell wash
8- Centrifuge the D and R tubes again
9- Remove the saline supernatant leaving the RBC's in the tube
10- Repeat steps 8 and 9 two more times, performing a total of THREE RBC washes
11- Label two additional tubes D RBC's and R RBC's
12- Place 20 drops of saline into each of the D and R RBC tubes
13- Place ONE drop of RBC from each corresponding tube (D and R) into the D and R RBC tubes to make an RBC suspension 1 drop RBC:20 drops saline
14- Label three additional tubes: Major, Minor, and Control
15- Place TWO drops R Plasma and ONE drop D RBC into the MAJOR tube
16- Place TWO drops D Plasma and ONE drop R RBC into the MINOR tube
17- Place TWO drops R Plasma and ONE drop R RBC into the CONTROL tube
18- Mix them a few times, incubate them at room temperature for 15 minutes
19- Then centrifuge on a standard blood setting
20- Examine the supernatant for hemolysis, and gently re-suspend the cell pellet for any agglutination
21- Re-suspend the entire suspension and add one drop to a slide and observe under the microscope at 10-40x power for micro-agglutination

Results and Interpretation:

If the supernatant of the major or minor crossmatch contains evidence of hemolysis (red color to the plasma) the crossmatch is marked as positive and indicates a reaction. If there is evidence of hemolysis in the control this indicates a false positive reaction. The cell pellet should re-suspend completely if there is no agglutination. Agglutination will cause cell clumping and can be seen as macro (visible to naked eye) or microscopic (only visible with microscopic viewing). Presence of agglutination in the major or minor crossmatches indicates a positive reaction. Presence of agglutination in the control tube represents auto-agglutination and can skew results of a crossmatch.

Resources:

Blood Crossmatch. Animal Blood Resources International. http://abrint.net/ABRI%20CrossMatch.pdf

Crossmatching. Merck Veterinary Manual.
http://www.merckvetmanual.com/mvm/circulatory_system/blood_groups_and_blood_transfusions/crossmatching.html