Name __________________________

**Module 5 Assignment - Key**

**Instructions:** Answer the following questions. Follow the guidelines in the course syllabus for proper submission of your document. All references, including course materials, must be cited using APA guidelines at the end of the document. If the answer was found in course materials, a citation is required. If a direct quote is used, the reference should be cited using APA style. Failure to follow the citation directions will result in a deduction of 10% of the possible assignment points.

**Grading:** A total of 42 points will be converted by ratio 20 points for this assignment.

**Due Date:** Thursday, October 27th at 11:55 PM (EST)

**Blood Component Preparation and Therapy**

1. Is it possible to prepare cryoprecipitated antihemophilic factor (AHF) and fresh-frozen plasma (FFP) from the same blood unit? Explain your answer. (1 point)

Cryoprecipitated AHF and FFP cannot be made from the same unit. Cryoprecipitated AHF is removed from FFP, and once it has been removed, the factor VIII and fibrinogen content of the FFP is significantly reduced. FFP that has CRYO removed from it can be refrozen within 24 hours and relabeled as Plasma, Cryoprecipitate Reduced.

2. A nonbleeding adult of average height and weight with chronic anemia is transfused with 3 units of red blood cells. The pretransfusion hemoglobin is 7.0 g/dL. What would be the expected posttransfusion hemoglobin? List several potential reasons for a failure of the patient’s hemoglobin to increase after transfusion. (1 point)

Each unit of red blood cells should raise the hemoglobin by 1 g/dL. In this patient, the expected hemoglobin should be 10 g/dL after transfusion of 3 units. If the hemoglobin does not increase as expected, undetected bleeding may be occurring or an antibody against the transfused red blood cell antigens may be present; these possibilities should be investigated.

3. A severely immunosuppressed adult patient has been transfused with 10 units of pooled platelets. The pretransfusion platelet count was 8000 µL. What is the expected platelet count 1 hour after the transfusion? If the platelet count does not increase as expected, what are some potential causes? (1 point)

Each unit in a platelet pool should increase the platelet count by about 5000/µL. The expected posttransfusion platelet count should be (10 × 5000) + 8000, or 58,000/µL. If the platelet count does not increase as expected, refractoriness due to fever or the presence of platelet or HLA antibodies should be suspected.
4. A 70-kg patient with hemophilia is going to have surgery to have a small tumor removed. The physician requests enough cryoprecipitated AHF to maintain the patient at 50% activity for surgery. The patient is currently at 10%. Determine how many units of cryoprecipitated AHF will need to be pooled for surgery. (1 point)

\[
\text{Factor VIII units} = \frac{\text{Plasma volume} \times (\text{Desired level} \% - \text{Initial level} \%)}{80 \text{ U/bag}}
\]

\[
(40 \times 70) \times (.50 - .10)
\]

\[
= 2800 \times .40
\]

\[
= 14 \text{ bags of cryoprecipitated AHF}
\]

**Case 1 (3 points – 1 point per question)**

1. A 75-lb child is scheduled for orthopedic surgery in 3 weeks. The physician requests that 2 units of autologous red blood cells be drawn before surgery. Determine the amount to be drawn and the anticoagulant adjustment needed to collect red blood cells from this child.

\[
\text{Weight of patient} \times 500 = \text{Amount of blood to be withdrawn}
\]

\[
110 \times 500 = 340.5 \text{ mL}
\]

\[
.681 \times 70 = 47.7 \text{ mL of anticoagulant required}
\]

\[
70 - 48 = 22 \text{ mL of anticoagulant to be removed}
\]

2. On the day of surgery, the patient becomes ill, and surgery is postponed. Because of the tight operating room schedule, the surgery cannot take place for 2 months. Do the units need to be discarded and redrawn? Do any options exist?

The units can be frozen and stored until surgery is rescheduled.
3. The patient’s older sister would like to be a donor for this patient. She meets the regular blood donor criteria and donates a unit of blood as a directed donor 1 week before the new surgery date. What procedure is required before this unit can be made available to her sibling? Will the expiration date change? If her sibling does not use the unit during surgery, can it be returned to the regular inventory?

A directed unit to be transfused to a blood relative would need to be irradiated to prevent graft-versus-host disease. The expiration limit for the red cell unit would be reduced to 28 days or the expiration date of the unit, whichever is shorter. If the unit is not used for the sister, the unit can be placed into the regular inventory.

Case 2 (2 points – 1 point per question)

1. A nurse is completing her shift in 1 hour and needs to start a transfusion and give the same patient an intravenous medication before she leaves. To expedite the process, she opts to give both through the Y-set she has prepared for the blood administration. She is not sure whether this is allowed, so she calls the blood bank before she picks up the blood. What should she be advised to do?

Medication or any other fluid except normal saline should NOT be added to blood components prior to transfusion.

2. The nurse is in a hurry to start this transfusion and realizes that the intravenous solution she attached to the blood administration set is 2% dextrose instead of 0.9% saline. Can she proceed with this transfusion, or should she wait for 0.9% saline? Why?

Dextrose solution can cause clumping of the red cells. The transfusion should be discontinued until 0.9% saline is available. The transfusion must be completed within 4 hours once the unit is spiked.
Matching

Match the correct expiration limit with each red blood cell product. Each choice may be used more than once or not at all. (7 points)

A. 21 days  
B. 35 days  
C. 42 days  
D. 10 years  
E. 28 days  
F. 24 hours  
G. 48 hours  
H. 72 hours

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<tr>
<td>E</td>
<td>1. Irradiated</td>
</tr>
<tr>
<td>D</td>
<td>2. Frozen RBCs</td>
</tr>
<tr>
<td>B</td>
<td>3. CPDA-1</td>
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<tr>
<td>C</td>
<td>4. AS-3</td>
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<tr>
<td>A</td>
<td>5. CPD</td>
</tr>
<tr>
<td>F</td>
<td>6. Deglycerolized</td>
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<tr>
<td>C</td>
<td>7. Leukoreduced (AS-3)</td>
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Match the blood component with the correct storage and expiration limit. Each choice may be used more than once or not at all. (6 points)

A. 20° to 24° C, 4 hours  
B. 1° to 6° C, 24 hours  
C. 20° to 24° C, 6 hours  
D. ≤–18° C, 1 year from collection  
E. 1° to 6° C, < 5 days  
F. ≤–65° C, 7 years  
G. 20° to 24° C, 48 hours

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<tr>
<td>C</td>
<td>1. Cryoprecipitated AHF (thawed)</td>
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<tr>
<td>D</td>
<td>2. Cryoprecipitated AHF (frozen)</td>
</tr>
<tr>
<td>B</td>
<td>3. Fresh frozen plasma (thawed)</td>
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<tr>
<td>E</td>
<td>4. Liquid plasma from whole blood</td>
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<tr>
<td>E</td>
<td>5. Plasma, cryoprecipitate reduced, thawed</td>
</tr>
<tr>
<td>A</td>
<td>6. Cryoprecipitated AHF, pooled</td>
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Transfusion Therapy in Selected Patients

1. A trauma patient in the emergency department has received 6 units of group O, D-negative red blood cells by emergency release. A sample was obtained and sent to the blood bank, and the physician has requested 10 additional units of type-specific red blood cells. What are some potential problems in determining an ABO/D type? At what point will the sample from this patient not reflect his own red cells?

The plasma in the transfused group O, Rh-negative red cell units may cause the reverse or serum typing to have a discrepancy if the patient is not group O. In addition, the group O red cells in the unit may cause a mixed field reaction in the forward or cell typing if the patient is not group O.

After the transfusion of about 10 units of blood in a 70-kg adult, approximately 65% to 75% of the red cells have been replaced with donor blood.

2. A 4-day-old premature infant has been using small aliquots of red blood cells. The parents of the infant meet all the requirements for blood donors and would like to donate blood for their child. Are there any special requirements necessary for red blood cells during the neonatal period? Are cross-matches required? Why is transfusing blood from first-degree relatives considered risky, and what is required to make blood products from family members safer? (2 points)

Premature newborns, because of their immunocompromised status, should receive cytomegalovirus (CMV)-negative blood products. The ABO and Rh type must be compatible with the baby. Red blood cells must be irradiated to prevent graft-versus-host disease. Compatibility testing is not required if the baby is not demonstrating red cell antibodies.

3. A kidney dialysis center requested 2 leukocyte-reduced red blood cell units STAT for a patient with a hemoglobin value of 7 g/dL. The center is an outpatient clinic, and three other STAT orders for preoperative procedures need to be completed before the shift ends. The technologist fills the order but would like to know why the request did not come earlier. What are the unique transfusion needs of kidney dialysis patients, and why was this ordered as a STAT? Does erythropoietin eliminate the need for all red blood cell transfusions for renal patients? What contributes to their anemia? (2 points)

Often, renal patients have unpredictable red blood cell requirements because of the shearing effect of the dialysis procedure on the red cells and the elevation of uremia, which shortens red cell survival as well. Due to vascular access problems with dialysis patients, providing red cell units promptly will allow the intravenous lines used for the dialysis treatment to be used for the red blood cell transfusion, avoiding additional
venipuncture. Erythropoietin has reduced the need for transfusion in dialysis patients; however, there is a delay before the effect of this medication provides increases in the red blood cell mass, and hence there is a need for transfusion support. Due to the loss of kidney function, patients with end-stage renal disease do not produce sufficient erythropoietin to stimulate red cell production in the bone marrow. Leukocyte reduction of blood components is important to avoid exposure to HLA antigens on white cells that may cause the formation of HLA antibodies. Potential kidney recipients who have HLA antibodies experience a greater challenge of finding a compatible kidney.

4. The oncology unit has requested that platelets be available for a patient scheduled to undergo chemotherapy for breast cancer. The request for leukocyte-reduced apheresis platelets is common and often extends for a week or more every 2 to 3 days. Why is this product necessary, and what are potential problems associated with platelet transfusions with regard to antibodies? (2 points)

Patients undergoing chemotherapy and/or radiation treatment often require platelet support because the cancer therapy reduces the platelet count to a number that may lead to hemorrhage. Repeated platelet transfusions may stimulate the production of antibodies to human leukocyte antigens (HLAs) on the white cells in the platelet concentrate. For this reason, platelets that have significantly reduced leukocyte counts are beneficial in avoiding this complication. Patients with antibodies do not respond (become refractory) to platelet transfusions and may require HLA-matched platelets to obtain a therapeutic effect.

5. A sample from a 4-year-old patient with sickle cell diseases was sent to the blood bank with a request for 2 units of phenotypically matched red blood cells. The patient’s blood needs to be typed, and a unit needs to be located. Why are closely matched red blood cells important for this child? Will it be difficult to find red blood cells for this patient? (2 points)

Patients with sickle cell disease depend on repeated red blood cell transfusions throughout their lives to overcome the effects of severe anemia. Because of exposure to antigens dissimilar to their own, production of red cell antibodies is common among this group of patients. One way to avoid antibody production is to give red blood cells that are phenotypically matched with their red cells. Because common red cell antigens vary with race, many facilities encourage donations from the black population to support sickle cell patients and make it easier to locate rarer units.
### Matching

Match the component with the indications for use. Each can be used more than once. (10 points)

- A. Cryoprecipitated AHF
- B. Fresh frozen plasma
- C. Red blood cells
- D. Platelets
- E. Leukoreduced blood components
- F. Washed red blood cells
- G. Albumin/plasma protein fraction
- H. Factor concentrates
- I. Plasma, cryoprecipitate reduced
- J. Irradiated blood products

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<tr>
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<th>1. Intravascular volume expansion</th>
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<tr>
<td>G</td>
<td>2. Bleeding due to thrombocytopenia</td>
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<td>D</td>
<td>3. Decreases immunization to leukocytes</td>
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<td>E</td>
<td>4. Reduce the risk of allergic reactions</td>
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<td>F</td>
<td>5. Treatment of symptomatic anemia</td>
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<td>C</td>
<td>6. Specific clotting deficiencies of VIII, V, and X</td>
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<td>H</td>
<td>7. Deficiency of factors II, V, X, and XI</td>
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<tr>
<td>B</td>
<td>8. Thrombotic thrombocytopenic purpura</td>
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<tr>
<td>I</td>
<td>9. Avoid graft-versus-host disease</td>
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<tr>
<td>J</td>
<td>10. Deficiency of factor XIII and von Willebrand’s factor</td>
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