**BLOOD BANK CASE 1**

**DONOR 1**

Karen D., a 30-year-old female prospective donor, had the following relevant data from her physical examination and medical history:

- Last donation: 6 months
- Hemoglobin: 12.2 g/dL
- Hematocrit: 37.0%
- Pulse: 85 beats/min
- Blood pressure: 150/80
- Weight: 120 lbs
- Temperature: 99.9 °F

She had her ears pierced with a second hole 4 months ago, and she was recovering from a cold.

1) a) Do any of the values in the physical examination or answers to the questions in her medical history fall outside the acceptable limits established by American Association of Blood Banks (AABB)? How many?

Four results in the PE and medical Hx fall outside of acceptable limits set by the AABB.

b) If any, list the value or criteria and the acceptable limit.

- **AABB Guidelines**
  - Hb
    - Minimum 12.5 g/dL
  - Hct
    - Minimum 38%
  - Temp
    - 99.5 °F
  - Ear piercing
    - 12 months
  - 4 months

2) a) Would Karen be accepted, temporarily deferred, or permanently deferred?

Karen would be temporarily deferred for an additional 8 months because of her ear piercing (4 months + 8 months).

b) If deferred for a certain period of time, how long?

At that time she can be reevaluated for eligibility. Her hematocrit will have to increase at least 1%, to 38%, to meet the minimum guideline. The slightly increased temperature could be as a result of the cold she is still fighting.

3) Is the fact that Karen has a cold a reason for temporary deferral?

No, a cold is not a reason for temporary deferral, unless the donor has an elevated temperature (as in this case) or is clearly not feeling well.

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**DONOR 2**

Mike H., a 41 year-old male prospective donor, who was a college professor, presented with the following physical examination and medical history:

- Last donation: 10 weeks ago
- Hemoglobin: 13.4 g/dL
- Hematocrit: 42.2%
- Pulse: 78 beats/min
- Blood pressure: 140/88
- Weight: 165 lbs
- Temperature: 98.8 °F

He answered “Yes” to the question “In the last 12 months, have you had close contact with a person with jaundice or hepatitis?"

4) a) Do any of the values in the physical examination or answers to the questions in the medical history fall outside of the acceptable limits established by AABB? How many?

Mike’s PE are within the AABB guidelines.

b) If any, list the criteria and the acceptable limit.

- The only factor that might be outside acceptable limits is his “close contact with a person with jaundice or hepatitis.” This would be evaluated as a possible exposure to hepatitis and temporary deferral for 12 months.

5) What group is considered exempt from the question regarding “close contact with a person with jaundice or hepatitis”?

Medical personnel are exempt because of their work with patients, some of whom may have hepatitis. If they were not exempt, it would exclude a large group of donors from the donor pool.

Upon further questioning, it was determined that Mike’s wife had been diagnosed with Hepatitis C 3 months ago.

6) a) Would Mike be accepted, temporarily deferred, or permanently deferred?

Mike is not in the exempt category, therefore, he would be temporarily deferred.

b) If deferred for a certain period of time, how long?

Temporary deferral would be for 12 months from the time of initial contact, which in this case is an additional 9 months.
BLOOD BANK CASE 2

PATIENT 1

Anne L., a 48-year-old woman (5 ft 4 in, 125 lb), reported to her gynecologist that she had been extremely tired, physically weak, and did not have the energy to do her job. Upon questioning, she noted having very heavy menstrual periods lasting for 1 ½ to 2 weeks. Her hemoglobin was 6.1 g/dL; hematocrit 19%; MCV 70 fl; MCHC 27 g/dL.

1. Does Anne need a transfusion? Explain why or why not.
   Yes, Anne’s hemoglobin is close to the critical level of 6 g/dL for surgical and leukemic patients, even though she is not having surgery. She is symptomatic, and the anemia is definitely affecting her quality of life.

2. Support the viewpoint opposite to the one you expressed in question 1. Give a reason why a physician would take this stand.
   No, there are no absolutes in transfusion therapy for a patient who is not actively hemorrhaging. Anne could take iron supplements and have her hemoglobin monitored regularly. The physician and patient should discuss the pros and cons of transfusion and alternative therapy, and the patient should be allowed to make the correct decision in her case. Of course, treating the case of the anemia should be a primary concern.

3. What type of anemia is indicated by Anne’s complete blood count (CBC) and medical history?
   The results of her CBC and medical Hx indicate an IDA, hypochromic and microcytic.

4. If Anne is transfused, what would be the recommended component and how many?
   Anne needs the oxygen-carrying capacity of RBCs to relieve her symptoms, indicating packed RBCs would be the component of choice. To raise her hemoglobin to 10 g/dL, she would need a minimum of 3 U (1.5 x 3 = 4.5 g/dL)

5. a. If she is transfused with 3 units (U) of packed cells, what would you estimate her hemoglobin and hematocrit to be following transfusion?
   Each unit of pRBCs will raise the hemoglobin of a 70-kg man to 1.5 g/dL; therefore, 3 U should raise her Hb by at least 3 g/dL, from 6.1 g/dL to 9.1 g/dL. The maximum would be 1.5 g/dL x 3 = 4.5 g/dL = 6.1 = 10.6 g/dL

   b. Would you expect the elevation to be slightly higher or lower than normal based on her size?

In the case of smaller individuals (< 155 lbs/70 kg), the increase should be slightly greater.

PATIENT 2

Carl M., a 50-year-old man, was scheduled for a colon resection. The preop orders included a CBC and crossmatch for 2 U. The CBC report was WBCs, 14.5 x 10^9/L; hemoglobin 14 g/dL; hematocrit, 43%; platelet count, 19,000/uL. The blood bank technologist typed him as O positive and crossmatched 2 U of O-positive packed cells.

6. Is additional component therapy other than the 2 U crossmatch indicated? Why?
   Yes, a platelet count of 19,000/uL would indicate a need for platelet transfusion before surgery. A platelet count under 20,000/uL is usually the criterion for prophylactic platelet transfusion, especially for surgical patient.

7. How many units of the second component should be ordered?
   Each unit of platelets will raise the platelet count by 5,000 to 10,000/uL in a 70 kg man. A platelet count of 50,000/uL is considered minimal for an invasive procedure; therefore, 4 U of platelets should be administered (7,500/uL x 4 = 30,000/uL)

8. Calculate the approximate platelet count following transfusion, assuming a 70-kg man.
   Carl’s platelet count 1 hour post-transfusion should be at least 50,000/uL

9. What are the storage temperature and shelf-life of platelets?
   Platelets are stored at room temp (20 to 24C) with constant agitation and have a shelf-life of 5 days in a closed system. If the seal is broken, the shelf-life is reduced to 4 hours.

BLOOD BANK CASE 3

Paul D., a 63-year-old man, was admitted with a hemoglobin and hematocrit of 62 g/L (RV = 135 to 175 g/L) and .19 (RV = .41 to .53 L/L), respectively. He exhibited symptoms of fatigue, dizziness on standing, weakness, and chest pain. His physician ordered a type and crossmatch for 2 U. Paul was O positive, and the following results were reported:

| ANTIBODY SCREEN |
|-----------------|-----------------|-----------------|-----------------|
| Screening cell I | Screening cell II | Screening cell III | Crossmatch |
| IS | AHG | CC | IS | AHG | CC | IS | AHG | CC | IS | AHG | CC |
| 37 | 37 | 37 | 37 |

In the case of smaller individuals (< 155 lbs/70 kg), the increase should be slightly greater.
1. What additional testing is indicated?  
A DAT should be performed.

**DIRECT ANTIGLOBULIN TEST**

<table>
<thead>
<tr>
<th>Polyspecific AHG</th>
<th>Paul D.</th>
<th>CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyspecific IgG</td>
<td>2+</td>
<td></td>
</tr>
<tr>
<td>Anti-IgG</td>
<td>2+</td>
<td></td>
</tr>
<tr>
<td>Anti-C3</td>
<td>0</td>
<td>2+</td>
</tr>
</tbody>
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2. What is the most probable explanation for this antibody problem?  
The results of the DAT indicate a warm autoantibody. The DAT panel is positive with polyspecific IgG and anti-IgG and negative with anti-C3 in WAIHA.

3. List at least five conditions that have been associated with this group of antibodies.  
1. Infectious disease (viral syndromes)  
2. Reticuloendothelial neoplasms  
3. Collagen diseases (SLE, RA, scleroderma) (Hodgkin's disease, CLL)  
4. Hypoaggamaglobulinemia and other immune-deficiency syndromes  
5. Pregnancy  
6. Gastrointestinal disease (ulcerative colitis)

4. How would you resolve this problem? What three pieces of information would you need in order to determine how to proceed?  
The three pieces of information are the patient’s DX, drug/Mdx used, and transfusion Hx. If the patient was a female, you would also want to know if she had ever been pregnant including miscarriages; if yes, how many? If the patient had received blood or blood products and/or been pregnant, there would be a possibility of an underlying alloantibody.

Paul’s blood bank results were reviewed, and the patient and his family were interviewed. He had no record of a recent transfusion; therefore a warm autoabsorption was performed. An antibody ID was performed on the warm autoabsorbed serum. The results are reported in Figure 1, “Antibody Panel, Case 3.”

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5. Define absorption. The process used to remove unwanted antibodies from the serum.

6. What is the difference between warm autoabsorption and differential (allogenic) absorption?  
Warm autoabsorption is performed by incubating the patient’s RBCs and serum for 30 to 60 mins. The warm autoantibody should absorb onto the RBCs, leaving the serum free of autoantibody. The serum is then tested to ensure the autoantibody has been removed. Warm autoabsorption can be used if the patient had NOT been transfused in the last 3 months.

7. When is allogenic absorption used?  
If the patient has been transfused within 3 months, a differential/allogenic absorption must be performed. Differential absorption uses three different RBCs that match the patient’s phenotype or that will absorb specific antibody(ies) from the patient’s serum. The purpose of these procedures is to rule out the presence of alloantibodies, which may be masked by the presence of the warm autoantibody.

8. What do the results indicate?  
Yes, Paul has a warm autoantibody along with an alloantibody.

9. Does Paul have an underlying alloantibody(ies)? If so, what are they?  
Paul has an alloantibody, which is anti-K (anti-Kell).

10. Will transfused RBCs have normal RBC survival?  
No, if Paul’s serum is used for crossmatching, the warm autoantibody will be present and the units will appear incompatible. To find crossmatch-compatible units, the warm autoabsorbed serum should be used to perform the crossmatching.
No, Paul’s own cells have shortened survival because the antibody is an autoantibody, likewise, donor cells will also have shortened RBC survival. It is best not to transfuse px’s with warm autoantibodies. A consultation with a hematologist is recommended. If the px is symptomatic, as Paul is, a decision to transfuse is appropriate.