BLOOD GROUPS AND BLOOD TYPING
Text Reference: Chapter 19 and review from lab.

Much of this material will be covered in lab. Please try to work through this using your text and your lab studies before coming to class.

I. Blood Groups and Blood Types
   A. Antigens are found on the surface of _______________.
   B. They are also called _______________.
   C. The presence or absence of these antigens is _______________ determined.
   D. There may be several different blood _________ within a blood group.
   E. The presence of specific __________ on the surface of RBC’s determines a person’s blood __________ within that specific blood group.
   F. We sometimes refer to the various blood groups as blood typing systems.
   G. The two most common blood typing systems (blood groups) are 
      1. 
      2. 
   H. There are at least 24 different blood groups (blood typing systems). Name 6 others (there are only 4 listed in your book—so pay attention in class).

I. Just to make sure you know this: The blood type is determined by the presence (or absence) of a specific ___________ on the surface of the _______________ (also called erythrocytes).

II. ABO group (study Figure 19.12, pg. 686 very well)
   A. ABO group is based on the presence (or absence) of which antigens?
   B. These antigens, if present, would be found on the surface of every one of your _______________.
   C. Determine which Antigens are present (or absent) on the RBC’s of people with the following blood types:

<table>
<thead>
<tr>
<th>Antigen on RBC</th>
<th>Antibody in Plasma</th>
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</thead>
<tbody>
<tr>
<td>1. Type A</td>
<td></td>
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<tr>
<td>2. Type B</td>
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<tr>
<td>3. Type AB</td>
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<td>4. Type O</td>
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</tbody>
</table>

   D. Certain antibodies (also called _______________) against the A or B antigens are usually present in the blood ________________.
   E. They occur in your blood automatically and spontaneously (we don’t know why) a few months after birth and will always be there throughout the rest of a person’s life.
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F. You do NOT make antibodies against your own blood antigens—just against the ones that you don’t have. This means that the blood types listed above will have which antibodies in their plasma?

G. These antibodies are very large IgM type antibodies (this will become significant shortly and again when we talk about the immune system)

III. Transfusions and the ABO system—now this really is something to consider!!!
A. Transfusion background
   1. Define transfusion
   2. Why do we give transfusions?
   3. What are our concerns?
      a. Safe blood (HIV, hepatitis)
      b. Donors blood is the “life-saver” so don’t mess it up!!!
      c. Antigen-antibody reactions
      d. Agglutination of recipient’s blood
      e. Hemolysis of recipient’s blood
      f. Hemoglobin
      g. Kidney damage

B. Who should get what? (Refer also to lab work).
   Agglutination +   No agglutination -

<table>
<thead>
<tr>
<th>RECIPIENT'S ANTIGENS</th>
<th>A</th>
<th>B</th>
<th>AB</th>
<th>O</th>
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<tbody>
<tr>
<td>A</td>
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</table>

C. This was used to avoid a “major transfusion reaction.” Explain.

D. Let’s consider a “minor transfusion reaction”
   1. Donor’s plasma + recipients cells.
   2. Not as bad, but still BAD. Explain.
   3. What about whole blood vs. washed packed cells?

E. Answer these questions:
   1. Who is the “universal donor?”
   2. Who is the “universal recipient?”
   3. Why are these terms misleading and actually dangerous?

F. Remember—so far we have only considered the ABO system.
IV. Rh Blood Group
   A. This blood group gets its name because of the associated research done on
   B. The Rh blood group is based on the presence or absence of the Rh __________,
      (also called antigen ______) on the _______________.
   C. A person who is ________ has the
   D. A person who is ________ does not have
   E. Now let’s talk Rh antibodies (antibody-d or anti-d or anti-Rh)
      1. A person who is Rh⁺ or Rh⁻ does NOT automatically and spontaneously
         and for no reason make anti-d (antibodies against the Rh antigen)
      2. This means that no one should have Rh antibodies in their plasma.(Yes
         or no?)
      3. How does this compare to the ABO system?
      4. The Rh⁺ person NEVER has the ability to make Rh __________
      5. The _____ person has the ability to make anti-Rh (anti-D)—but
         ONLY if exposed to the ________________.
      6. Exposure means that the person has to have had the Rh antigen get into
         their blood.
      7. How might an Rh⁻ person be exposed to the Rh antigen? Give several
         examples:

V. Transfusions and Rh Blood Group (see also Lab 5—Transfusion Matching Kit)
   A. A person who is ________ has (basically) nothing to worry about when
      considering a transfusion of blood and the Rh blood group. Explain.

   B. The concern for transfusion of blood when considering the Rh group is for the
      person with ________ blood type. Why?
      1. The first transfusion
      2. The second transfusion—that could be the killer. Why? Explain
         thoroughly.

   C. Doing this (see B above) would be a horrendous mistake and is totally
      preventable. Explain.
D. Why is there less concern about giving whole blood that is Rh to an Rh+ person? What would you want to check for first?

VI. Hemolytic Disease of the Newborn
A. Rh+ mother—is she at risk? Explain.

B. Rh− mother—is she at risk? How? (See Fig. 19.13, pg. 687—detail)
   1. Let’s set up a scenario of pregnancies. Explain what probably happened and why (which babies have HDN and may die).
      a. First pregnancy—Rh−
      b. Second pregnancy—Rh+
      c. Third pregnancy—Rh−
      d. Fourth pregnancy—Rh−
   2. Remember—who is really at risk?

C. Also called erythroblastosis fetalis
   1. Why is it also called this.
   2. Describe the condition.
   3. What is the treatment (if the baby lives—and why does it work?—this will be covered in lecture)
      a. Describe an Rh− blood exchange transfusion.

      b. What does it do? Explain.

D. How can all of this be totally avoided?
   1. RhoGAM
   2. Explain how it works.
   3. When should it be given?
   4. Other than at delivery?
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E. Some other questions.
   1. Why is the Rh\(^+\) mother not a concern in this picture?

   2. Why is there no risk to Rh\(^-\) babies?

   3. Why is there usually not a risk to the first Rh\(^+\) baby?

   4. How would a previous (BAD BAD BAD) Rh\(^+\) transfusion change this picture?

   5. Why is there usually no mother-fetus incompatibility when considering the ABO system and opposing blood types between mother and baby (although there may be some icterus neonatorum)

VII. Typing and Cross-Matching Blood
A. Typing your blood in lab.
   1. Define antiserum—serum that contains ______________.
   2. You used antisera containing which antibodies
   3. These antibodies were used to detect the presence of specific ____________ in the blood (actually, they would be on the RBC’s).
   4. Agglutination indicates
   5. No agglutination indicates
   6. The difficult question—does the blood type match with the type of antibodies that caused agglutination?

B. Cross matching
   1. What does this mean when considering a transfusion?

   2. Why would it also be a good idea to cross the donor plasma with the recipient’s cells when considering giving whole blood as the transfusion?

C. Check out Table 19. 6—it summarizes all this.
D. Check out Table 19.5—it tells you about the incidence of blood types among various populations.
   1. Which is/are the most common blood type(s) in the ABO system?
   2. In the Rh system?
   3. Which is the rarest?
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VIII. Some lab problems.
A. The genetics behind the problems
   1. Genotype
   2. Phenotype
   3. Recessive vs. dominant
   4. ABO phenotypes and possible genotypes
      a. A = AA or AO
      b. B = BB or BO
      c. AB = AB
      d. O = OO
   5. Rh system
      a. Rh\(^+\) = DD or Dd
      b. Rh\(^-\) = dd (recessive)

6. Diagram some parent and offspring possibilities with the ABO and Rh systems. Remember one gene has to come from each parent. Each parent contributes one gene to the offspring.

B. Who’s baby is it? (See lab sheets).
C. Who could the father be? (See lab sheets)—and notice how this is phrased!!!!