Jaundiced baby

This is a Patient-Oriented Problem-Solving session designed for four students. You should have previously studied the pretest and a set of objectives designed to help prepare you for this session. Each of you has one of four booklets labelled “A” through “D”. Read these booklets and follow the directions. If your group has only three students, one of you should have two booklets.

PRETEST: CORRECT ANSWERS

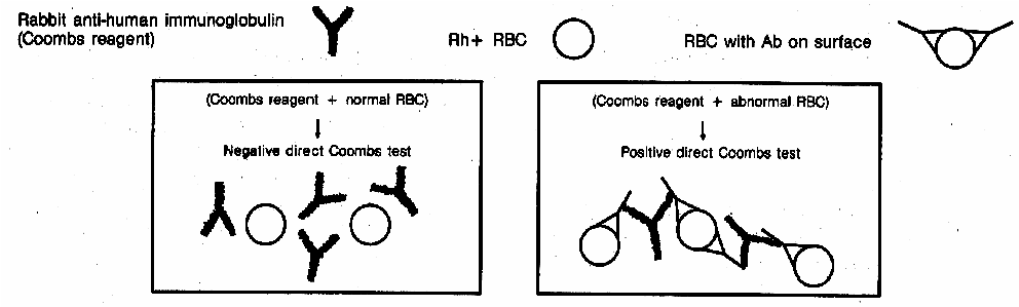
You have the answers to some of the ten pretest questions, and other members of your group have the remainder. This arrangement is designed to encourage all members of your group to actively exchange ideas and concepts. First, study the answers in your booklet and then EXPLAIN them to your group. Please don't just read them to your classmates, and don't let your classmates read their answers to you. In explaining something to another person, most people gain a better understanding of it and often transmit a better understanding. The *pretest discussion and patient-oriented problem-solving parts of this activity are "open book"* **Be sure to refer to textbooks, notes, and other written resources whenever questions arise.**

You will probably want to make notes on your pretest to help you review questions that you missed. Avoid "collecting pages" for "later study and understanding." Learn the concepts now so that later you will only need to review them.

6. The RBCs from a Rh+ human have antigen D on their surfaces. During the expulsion of the placenta following the birth of an Rh+ child carried by an Rh- mother, fetal RBCs may enter the mother's circulation and may elicit the production of anti-D antibody by the mother. During subsequent pregnancies, this circulating IgG anti-D antibody can cross the placenta, enter the fetal circulation, react with the fetus's RBCs, and cause hemolysis. The resulting disease is called erythroblastosis fetalis. C is therefore correct. B is incorrect since children from Rh- parents cannot be Rh+. A and E are incorrect because the mother cannot make anti-D antibody, and the child cannot elicit its production. D is incorrect since the natural anti-B antibody is of the IgM class that does not cross the placenta and therefore does not cause problems for the fetus. However, group 0 mothers occasionally do make IgG antibody to A and B that can cross the placenta. This can cause mild erythroblastosis fetalis even in first babies. It is not known why some 0 mothers and not A or B mothers make IgG and anti-A and/or anti-B in addition to the IgM. In most cases the anti-A and anti-B antibodies are trapped in the placenta, where the A and B blood group antigens are also expressed. Therefore, only some 0 mothers with IgG anti-A or B have anemic babies.

8. The **direct Coombs test** is used to detect "incomplete" or nonagglutinating antibody on RBCs. In this test, antibody to human immunoglobulin is mixed with the patient's RBCs. If the RBCs agglutinate, there is human antibody on the surface of the RBCs. The term "incomplete" is actually a misnomer, as there is nothing missing from these IgG molecules. One confusing question is why didn't the antibody on the RBCs cause agglutination itself? The best answer seems to be that both antibody-combining sites "grab" the same RBC and do not bridge between RBCs. This is called "monogamous binding." Another possibility is that the antigenic site is in a "valley" on the cell surface and that the other combining site cannot reach another RBC.

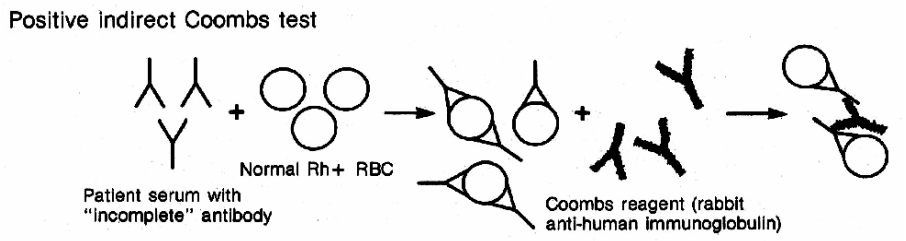
Positive direct Coombs Test



Antibody on the surface of the RBCs leads to in vivo destruction of the RBCs (hemolytic anemia). Therefore, in question 8, answer C is true. A is false, since in anemia due to blood loss (e.g., intestinal bleeding in ulcer patients) the remaining RBCs are normal and have no antibody on their surfaces.

Indirect Coombs test

The *indirect* Coombs test is classically used to detect antibody to fetal RBCs in maternal serum and thereby to identify babies who may be suffering from hemolytic anemia in utero. In the indirect Coombs test, one is testing for the presence of anti-RBC antibody in the serum (not on the RBC). This is done by adding the mother's serum to Rh+ RBCs from a normal person, washing the RBCs to remove excess antibody and immunoglobulin, and then adding the anti-immunoglobulin antiserum (Coombs reagent)



Answers B and D are false, since there is no reason to expect a patient who cannot make RBCs or a patient who is losing RBCs to have antibody to RBCs in his serum or on the RBCs. E is false since the three causes are all-inclusive. Each can, of course, be further subdivided.

INSTRUCTIONS FOR THE CLINICAL PROBLEM

Ms. Jones had had problems with her pregnancies. . The last three of Ms. Jones' five previous pregnancies had resulted in stillbirths. Her newborn, a baby girl by the name of Debbie, was born with jaundice that became more severe during the first few hours of life.

On the next page you have one fourth of the data needed to solve the problem. Your colleagues have the remainder. Turn to the data on the next page and determine the blood type and other relevant data. Then share this information with your colleagues and begin answering the group questions in the next section of the workbook.

DATA FOR THE CLINICAL PROBLEM

Blood Typing by Hemagglutination

Use the controls to determine which pattern (⊙ vs. ●) represents agglutination *versus* non-agglutination

Child's Cord Blood

(Cord blood is blood drawn from the umbilical cord shortly after birth. Getting the blood from a newborn's veins elsewhere can be difficult.)

Saline + child's RBCs	⊙
Anti-A + child's RBCs	⊙
Anti-B + child's RBCs	⊙
Child's serum + A RBCs	⊙
Child's serum + B RBCs -	⊙
Saline + child's RBCs	⊙
Anti-D + child's RBCs	●
Child's serum + D RBCs	⊙
Saline + child's RBCs	⊙
Anti-M + child's RBCs	●
Anti-N + child's RBCs	⊙
Anti-S + child's RBCs	●
Anti-s + child's RBCs	⊙
Child's serum + M RBCs	⊙
Child's serum + N RBC:s	⊙
Child's serum + S RBCs	⊙
Child's serum + s RBCs	⊙

Direct Coombs Test

Rabbit anti-human IgG + child's RBCs	●

Review your data, and then fill out the "Group Question Sheet."