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.

1. Genotype refers to the actual genes on the patient's chromosomes, whereas phenotype refers to the physical characteristics that the patient demonstrates. For example, a homozygous MM genotype appears as an M phenotype, whereas a heterozygous MN genotype appears as a MN phenotype.

   Although a population of people can sometimes have more than two alleles at one locus, one genetic locus has only two possible alleles in one person. Because M and N are alleles and S and s are alleles, M and/or an N allele must always be present, and S and/or an allele also must always be present. Therefore E is correct. E is a double heterozygote. Ask your fellow students to list the other possibilities. (Answer: double homozygotes MMSS, NNSS, MMss, NNss; homozygote-heterozygotes MMSs, NNSs, MNSS, MNss.) A is incorrect since both of the Ss alleles are missing. The presence of three alleles (M,N,N) at the MN locus as represented in answer B and (S,s,s) at the Ss locus as represented in answer C is impossible for a diploid human. B and C are therefore also incorrect. D is incorrect because the phenotype is (Ns) not (NNss).

4. Antibody to blood group antigens stimulated by ubiquitous cross-reacting antigens found on some bacteria is called natural antibody. This natural antibody is against the A and B antigens unless the patient has A and/or B antigen on his RBCs. The Rh, MN, and Ss antigens are not present on these bacteria; hence, people do not have natural antibody to Rh, MN, or Ss. Thus, A is correct.

   Normal humans cannot make antibody against the 0 determinants (H antigen) on RBCs because almost everyone has the antigen and is therefore *tolerant.* Tolerant individuals will not make antibody to the antigen when they are immunized with it. It's easy to understand the survival advantage of not making antibody to one's own tissues! Accordingly, B is not correct.

   In Bombay, India, one family was found that lacked the H antigen on their RBCs; therefore, they were able to make antibody to H antigen. These rare individuals have what is called the Bombay blood type.

   It is important to realize that the ABO antigen system is expressed on most human cells, not just RBCs, so it must be considered in all transplantations, not just blood transfusions.

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 two pages you have one fourth of the data needed to solve the problem. Your colleagues have the remainder. Turn to the data on the next pages 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.

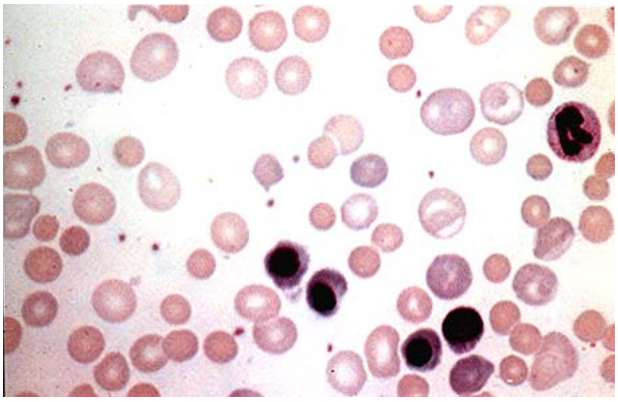
DATA FOR THE CLINICAL PROBLEM

Hemogram

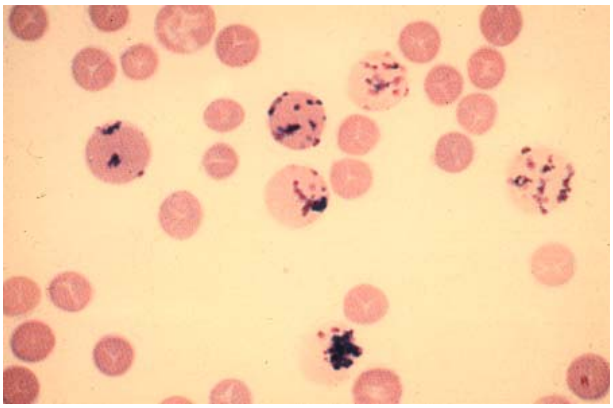
RBC: $1.5x10^6/mm^3$
Hematocrit: 28%

Peripheral blood smear (May-Grunwald/Giemsa stain):

The pictures below depict abnormalities characteristically found in the peripheral blood of newborns with this disease. Please discuss with your group mates what these abnormalities may be



A



B

Serum bilirubin

(a) Direct (conjugated)	0.1 mg/dL (0-0.3 mg/dL)
(b) Total (conjugated+unconjugated)	10 mg/dL (0-7.0 mg/dL)

DATA FOR THE CLINICAL PROBLEM (ctd.)

Blood Typing by Hemagglutination

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

	Mother
Saline + mother's RBCs	⊙
Anti-A + mother's RBCs	⊙
Anti-B + mother's RBCs	⊙
Mother's serum + A RBCs	●
Mother's serum + B RBCs	●
Saline + mother's RBCs	⊙
Mother's serum + D RBCs	⊙
Anti-D + mother's RBCs	⊙
Saline + mother's RBCs	⊙
Anti-M + mother's RBCs	●
Anti-N + mother's RBCs	⊙
Anti-S + mother's RBCs	●
Anti-s + mother's RBCs	●
Mother's serum + M RBCs	⊙
Mother's serum + N RBCs	⊙
Mother's serum + S RBCs	⊙
Mother's serum + s RBCs	⊙

Indirect Coombs Test

Type O Rh^+ RBCs + mother's serum + rabbit anti-human IgG	●
Type O Rh^- RBCs + mother's serum + rabbit anti-human IgG	⊙

Direct Coombs Test

Rabbit anti-human IgG + mother's RBCs	⊙

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