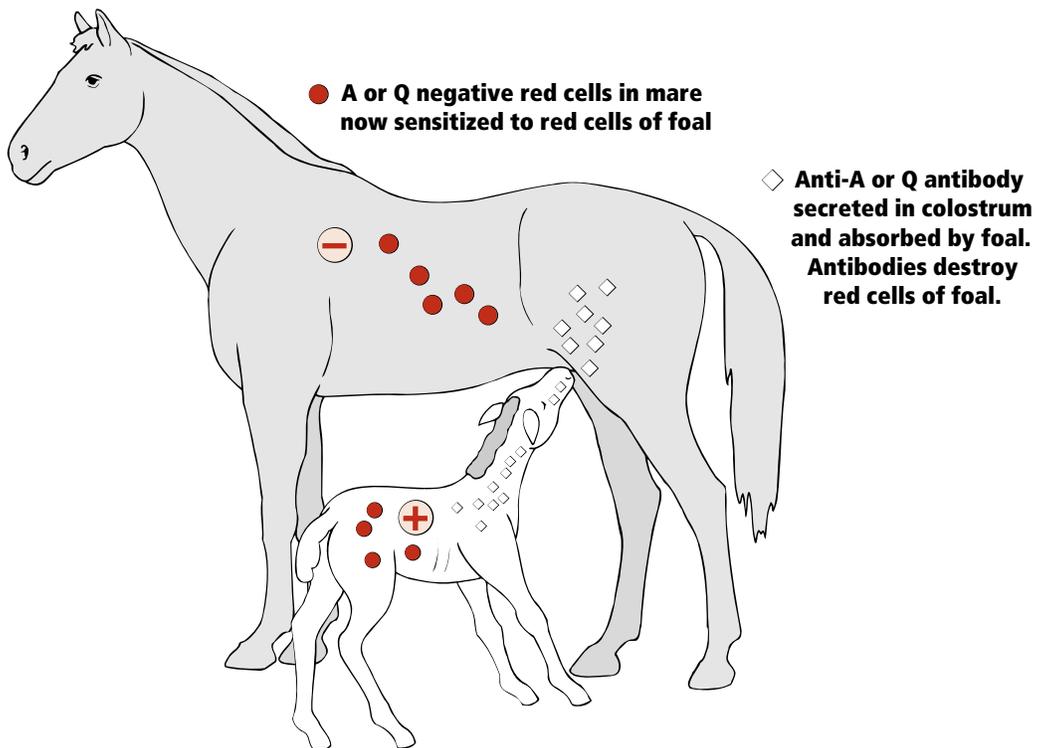
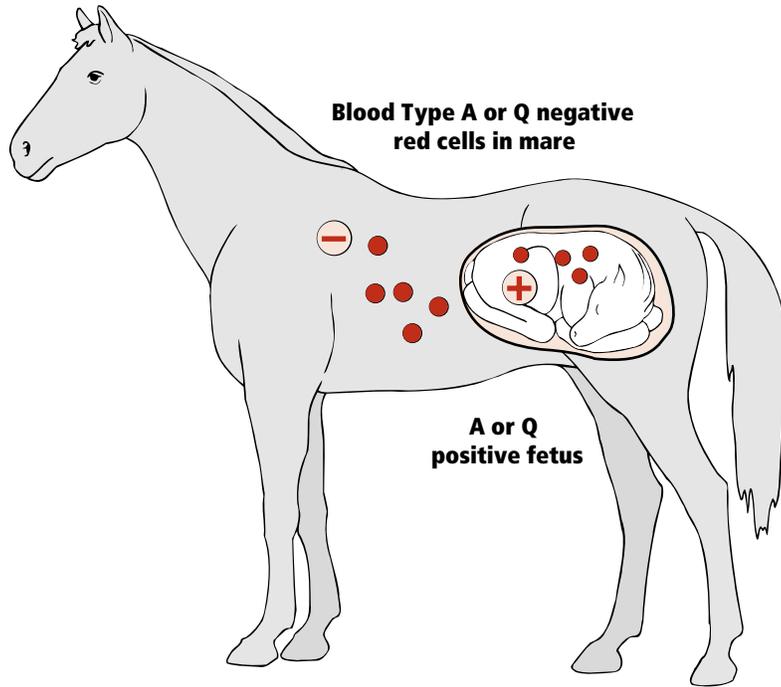


Ch16

Hemolytic Disease of the Newborn



Hemolytic disease of the newborn, also known as neonatal isoerythrolysis (NI), and in humans as erythroblastosis fetalis or Rh disease, is another cause of alloimmune hemolysis. Maternal antibodies form when the mother is sensitized to foreign antigens on the red cells of her fetus. These red cells have been inherited from the sire (**Figure**).

Pathogenesis

Human mothers may become sensitized to certain antigens, most commonly Rh through exposure to fetal red cells during pregnancy or at parturition. Sensitization could also occur from a prior transfusion. If fetal red cells in subsequent pregnancies contain these antigens, maternal antibody may pass through the placenta and cause hemolysis before birth of the fetus. Although Rh is the most common cause of hemolysis in human fetuses, other less-well-known blood group antigens also can cause the same syndrome. Hemolytic disease of the newborn can be caused in the same way in other primates that have the same placental structure as humans.

In other species of animals, the pathogenesis differs in that placental structure does not allow passage of maternal antibodies. Instead, these antibodies are passed in colostrum, and newborn animals can absorb them through the intestine during the first day of life. Gestation is normal and animals are born healthy but develop Coombs-positive hemolytic anemia within hours to days after the first ingestion of colostrum. In horses, this problem has been recognized for 200 years, although the cause was not understood until our knowledge of blood groups developed. The mare is sensitized most commonly by leakage of fetal cells during a prior pregnancy and at parturition, although mares have been known to become sensitized as early as 56 days after conception. First-born foals are seldomly affected. The risk increases with every subsequent pregnancy involving the same sire or one with an identical blood group antigen. The antigens most commonly involved are A, C, and Q. Although hemolytic disease of the newborn can occur in any foal, it is most frequent in thoroughbreds and especially in mules because of greater differences between horse and donkey red cell antigens.

In type B cats, hemolysis can occur in kittens inheriting the A antigen from the sire. The anti-A antibody is

present in high titer in all type B cats so prior pregnancy or transfusion is not required for antibodies to form, and hemolysis may occur in the first pregnancy. The anti-B antibody present in Type A cats is not strong enough to cause this problem.

In cattle, use of vaccines (e.g., anaplasmosis) containing blood products has resulted in cows becoming sensitized. If the bull has the same red cell antigens as the vaccine donor, then the calf may share these antigens and develop hemolysis. In dogs, transfusion of DEA 1.1-positive blood can sensitize negative bitches and be a cause of hemolysis should she be bred to a positive male.

In horses, one can detect sensitization of the mare by performing a Coombs' test (*see* Chapter 14) on the sire's red cells mixed with the serum of the mare either before breeding or during pregnancy. If the test result is positive, or if the sire is not available, the red cells of the newborn foal can be tested at birth by reacting them with the serum of the mare. A positive test result indicates that the foal has inherited the sire's antigen and the foal is not allowed to ingest colostrum from the dam. Since the failure to receive colostrum leaves the newborn animal without passive antibody protection from diseases, alternative means of protection must be used. Colostrum negative for antibodies may be stored frozen and used for this purpose or plasma transfusion is given. After the first 48 hours of life, the newborn animal may be allowed to nurse from the dam since antibodies can no longer be absorbed.

In kittens born to a mating of a type B queen and type A tom, typing of the kittens' blood can be done before they are allowed to nurse. Only type B kittens should receive colostrum. Cat breeders are aware of this problem and typically try to breed type B queens to type B males.

Treatment

Affected newborns of any species show evidence of a Coombs-positive intravascular hemolysis developing usually within 12–48 hours after birth. The most vigorous newborn animals may be most severely affected because they take in the greatest quantity of colostrum. Treatment consists of compatible transfusions and supportive care. Saline-washed red cells of the mare are most often used for transfusion. The antibodies are removed with the plasma during washing.