

also known as **agglutinogens**, substances capable of producing an immune response if recognized by the body as foreign. The reciprocal relationship between antigens on RBCs and antibodies in the plasma causes **agglutination** (clumping). In other words, antibodies in the plasma of one blood group (except the AB group, which contains no antibodies) produce agglutination when mixed with antigens of a different blood group. In the **ABO blood group system**, the antibodies occur naturally. In the **Rh system**, the person must be exposed to the Rh antigen before significant antibody formation takes place and causes a sensitivity response known as **isoimmunization**.

### **Rh Incompatibility (Isoimmunization)**

The Rh blood group consists of several antigens (with D being the most prevalent). For simplicity, only the terms **Rh positive** (presence of antigen) and **Rh negative** (absence of antigen) are used in this discussion. The presence or absence of the naturally occurring Rh factor determines the blood type.

Ordinarily, no problems are anticipated when the Rh blood types are the same in both the mother and the fetus or when the mother is Rh positive and the infant is Rh negative. Difficulty may arise when the mother is Rh negative and the infant is Rh positive. Although the maternal and fetal circulations are separate, there is evidence that fetal RBCs and cell-free DNA can enter the maternal circulation during pregnancy ([Moise, 2012](#)). More commonly, however, fetal RBCs enter into the maternal circulation at the time of delivery. The mother's natural defense mechanism responds to these alien cells by producing anti-Rh antibodies.

Under normal circumstances, this process of isoimmunization has no effect during the first pregnancy with an Rh-positive fetus, because the initial sensitization to Rh antigens rarely occurs before the onset of labor. However, with the increased risk of fetal blood being transferred to the maternal circulation during placental separation, maternal antibody production is stimulated. During a subsequent pregnancy with an Rh-positive fetus, these previously formed maternal antibodies to Rh-positive blood cells may enter the fetal circulation, where they attack and destroy fetal erythrocytes ([Fig. 8-18](#)). Multiple gestation, abruptio placentae, placenta previa, manual removal of the placenta, and cesarean delivery increase the