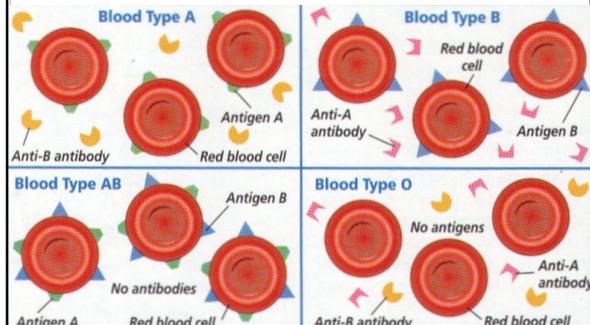
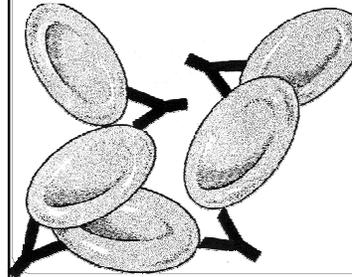


Antibodies and Antigens



Clumping (agglutination) is a problem...



Rh Factor

- Rh factor is antigen present on RBC of 85% of pop. of US.
- Rh positive and Rh negative
- Rh neg pregnant woman may develop antibodies to the Rh protein of her Rh-positive fetus.
- hemolytic disease of the newborn
- prevented with RhoGAM (anti-RhD immune serum)



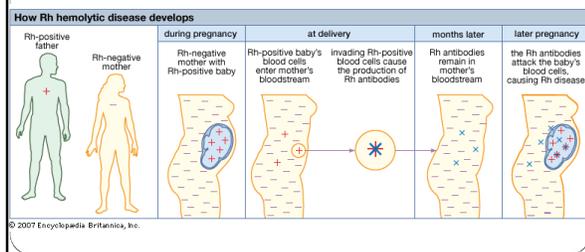
Erythroblastosis Fetalis

- Toward the end of pregnancy (usually during delivery), fetal blood may leak through the placenta and mix with the mother's blood.
- If the mother is Rh- and the baby is Rh+, the mother usually produces antibodies against the baby's Rh+ antigens.
- These antibodies do not usually cause a problem *during the first pregnancy* because the baby is usually born by the time the mother produces sufficient antibodies.
- In *subsequent pregnancies*, antibodies may be produced quickly and in large numbers. These antibodies cross the placenta and cause clumping (**agglutination**) of the fetus' red blood cells (**erythrocytes**). This condition is called **Erythroblastosis Fetalis**, commonly referred to as "blue baby" → caused by decreased O₂-rich blood flow to tissues.

Treatment:

- slowly removing the newborn's blood and replacing it with Rh- blood. This removes the mother's antibodies and provides RBC's that will not be attacked by the remaining antibodies.
- Erythroblastosis Fetalis can be prevented if the mother is injected with a preparation that contains antibodies against Rh+ antigens. It will bind to the fetus' red blood cells that crossed over to the mother. Therefore the mother will not produce Rh+ antibodies.

Erythroblastosis Fetalis



....The IMMUNE System: Immunity and the Prevention of Diseases

Vaccines

- The principle of active immunity is used in the administering of vaccines.
- A vaccine is a solution prepared from weakened or dead microorganisms, viruses or toxins.
- Injection of the vaccine tricks the body into forming antibodies, or cytotoxic T Cells.
- The vaccine may make a person feel a bit ill.
- If a person later is exposed to the real pathogen, a quick response is made by your immune system to destroy it.
- We have vaccines for polio, measles, mumps, tetanus, etc.
- The cold viruses mutate at a high frequency so there is no one vaccine. Because the virus keeps mutating, new vaccines must be produced every year.

vaccination



....The IMMUNE System: Immunity and the Prevention of Diseases
Active Immunity

- The first response to a particular antigen can take a few days for your immune system to produce plasma cells or cytotoxic T Cells. Eventually, your immune system rids your body of the pathogens and you feel better.
- After the first exposure to a particular antigen, memory cells are produced which may stay in your body for months, years or for the rest of your life. (you need a tetanus shot every 10 years).
- Memory cells allow your body to react very quickly if you're exposed to the pathogen in the future. The pathogen is destroyed before you feel sick! You are "immune". (**active immunity**) Ex chicken pox, measles.

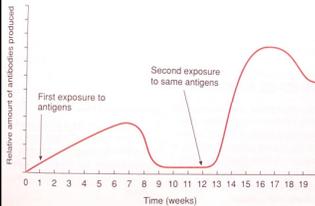


Figure 23-20 Memory B cells have antibodies for antigens that have attacked your body in the past. Memory cytotoxic T cells have receptors. Both types of memory cells allow the immune system to respond quickly to new infections of the same antigen.



....The IMMUNE System: Immunity and the Prevention of Diseases

Passive Immunity

- Immunity resulting from the transfer of antibodies or antiserum (a serum that contains antibodies) produced by another individual.
- It works quickly.

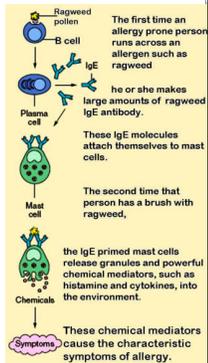
Examples:

- Human infants have passive immunity at birth. Some antibodies crossed from mother to baby through the placenta.
- Breastfeeding is good for babies because the mothers antibodies are passed to the infant along with the breast milk.



Allergies

- An allergy is the result of an over-reactive immune system.
- Substances such as peanut protein, dust, pollen, ragweed etc are mistakenly recognized by your immune system as something harmful.
- The **allergen** is taken up by the antigen-presenting cell which presents it to a T cell.
- T cells activate B cells which produce **IgE antibodies**
- The IgE antibodies attach (tails) to **mast cells**.
- Upon the **next** exposure to the antigen, the allergen attaches to antibodies on mast cell, cross linking them
- Histamine and other chemical are released → inflammation in nasal area → stuffy runny nose, sneezing.
- Antihistamines → block histamine receptors
- **Anaphylactic reaction** is a severe allergic reaction.



Allergic response