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 before 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.

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 mutates at a high frequency so there is no one vaccine. Because the virus keeps mutating, new vaccines must be produced every year.

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

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.