

Chapter 35:

Blood Types; Transfusion;
Tissue and Organ Transplantation

Blood Groups

Red blood cell surface antigens: glycolipids or glycoproteins

A-B-O System

agglutinogens: surface antigens (A,B)

genes (A, B, O)

inherited (two surface chromosomes

OO OA OB AA BB AB

also present on all cells in the body

agglutinins: gamma globulins, anti-A, anti-B, IgM,IgG

Blood Groups

| GENOTYPE | BLOOD TYPE | AGGLUTINOGENS | AGGLUTININS |
|----------|------------|---------------|----------------------|
| OO | O | ----- | ANTI-A and ANTI-B |
| OA or AA | A | A | ANTI-B |
| OB or BB | B | B | ANTI-A |
| AB | AB | AB | ----- |

Blood Typing

| BLOOD TYPE | ANTI-A | ANTI-B |
|------------|--------|--------|
| O | ----- | ----- |
| A | + | ----- |
| B | ----- | + |
| AB | + | + |

Blood Groups

Rhesus System

agglutinogens: 6 rhesus factors (C, D, E, c, d, e)

inherited as triplets

CDE, CDe, Cde, CdE, cDE, cDe, cde

antigen D = Rhesus positive

agglutinins: do not occur spontaneously, only after exposure to Rh antigens

Rh+ blood into Rh negative person:

sensitization to further Rh+ transfusion

Hemolytic Disease of the Newborn or Erythroblastosis fetalis

Fetal blood enters maternal circulation

- Rh positive fetus and a Rh negative mother
 - Anti-D agglutinins form in mother
 - More critical with 2nd Rh positive child
 - Treatment- injection of IgG anti-D into mother after delivery to destroy fetal RBCs
- O mother and A or B fetus
 - IgG anti-A and anti-B cross placenta
 - very mild effects

Transfusion Reaction

Transfusion reaction due to agglutination of donor blood

Agglutination of red blood cells due to antigen-antibody reaction

Activation of complement system

Agglutination destroyed by white cells, with hemoglobin released into plasma

Shock, chills, fever, shortness of breath, renal shutdown

Transplantation

HLA System ----- surface antigens >100
on all nucleated cells

Rejection ---- mainly due to activation of T-cells

Suppressive therapy---- inhibit immune response

glucocorticoids-- limits movement of granulocytes into tissue

azathioprine - inhibits the functioning lymphocytes

cyclosporine --- specific for T-cell