

Blood grouping

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Immune hemolytic anemia

- Autoimmune hemolytic anemia

Type II hypersensitivity

IgG warm 37C

IgM cold 23 C

- Drug induced hemolytic anemia
- Alloimmune hemolytic anemia

Alloimmune Hemolytic Anemia

- Hemolytic disease of the newborn

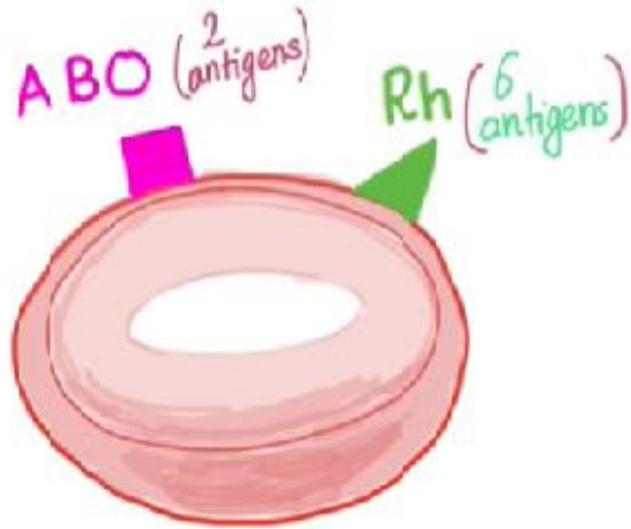
Rh Disease severe Rhesus

ABO incompatibility “the most common”

- Transfusion Reactions

* There are hundreds of antigens on RBC surface

↳ molecule capable of inducing immune response → produce antibodies.



C D E c d e

you have 1 of each of the
3 pairs of Rh antigens

if you have D antigen → you're Rh-positive

if you do not → Rh-negative

ABO system: antigens (agglutinogen) $\xrightarrow{\text{triggers}}$ antibody (agglutinin)

2 antigens "A & B": you can have either, neither or both.

4 blood types: A, B, AB, O (phenotypes)

Genetic locus: 3 alleles: I^A , I^B , I^O
 $\searrow$ different gene forms

Immunoglobulin

A is dominant, B is dominant, O is recessive

A & B together: Codominance

Both alleles contribute to the phenotype of the heterozygote

2 chromosomes: 3 alleles: 6 possible combinations of alleles (Genotypes)
OA, OO, OB, AA, AB, BB



Genotypes	Blood types	Antigens	Anti-A	Anti-B
OO	O	—	+	+
OA / AA	A	A	—	+
OB / BB	B	B	+	—
AB	AB	A & B	—	—

prevalence: O 47% , A 41% , B 9% , AB 3%

Agglutinins (Gamma Globulins):

IgM IgG

- At birth: you have ZERO agglutinin.
 - baby is subjected to antigen: 
 - finger in mouth
 - Breastfeeding
 - food
- 2-8 months later:- agglutinins
- Antibody concentration in plasma peaks at 10 years of age, then gradually declines.

Antigen + Antibody = Agglutination

anti-A

anti-B



∴ Blood group

✓

—

A

—

✓

B

✓

✓

AB

—

—

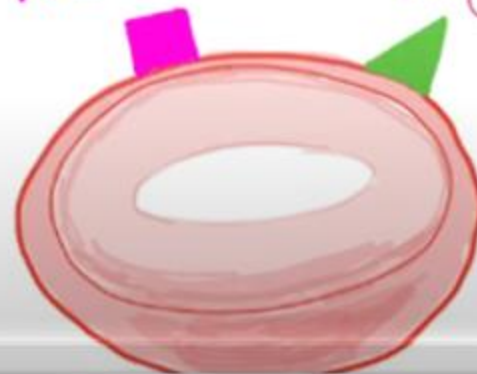
O

Blood Typing

Blood matching

ABO (2 antigens)

Rh (6 antigens)



ABO incompatibility "more common, less severe"

→ can trigger DIC

- MCC of neonatal jaundice in the first day.

phy: Never 1st day
path: 1st day.

- MCC of hemolysis due to mismatched blood transfusion.

- MCC of HDN " ~ 25% of all pregnancies. — only 10% anemia req. ttt



- Antigen - Antibody reaction → agglutination

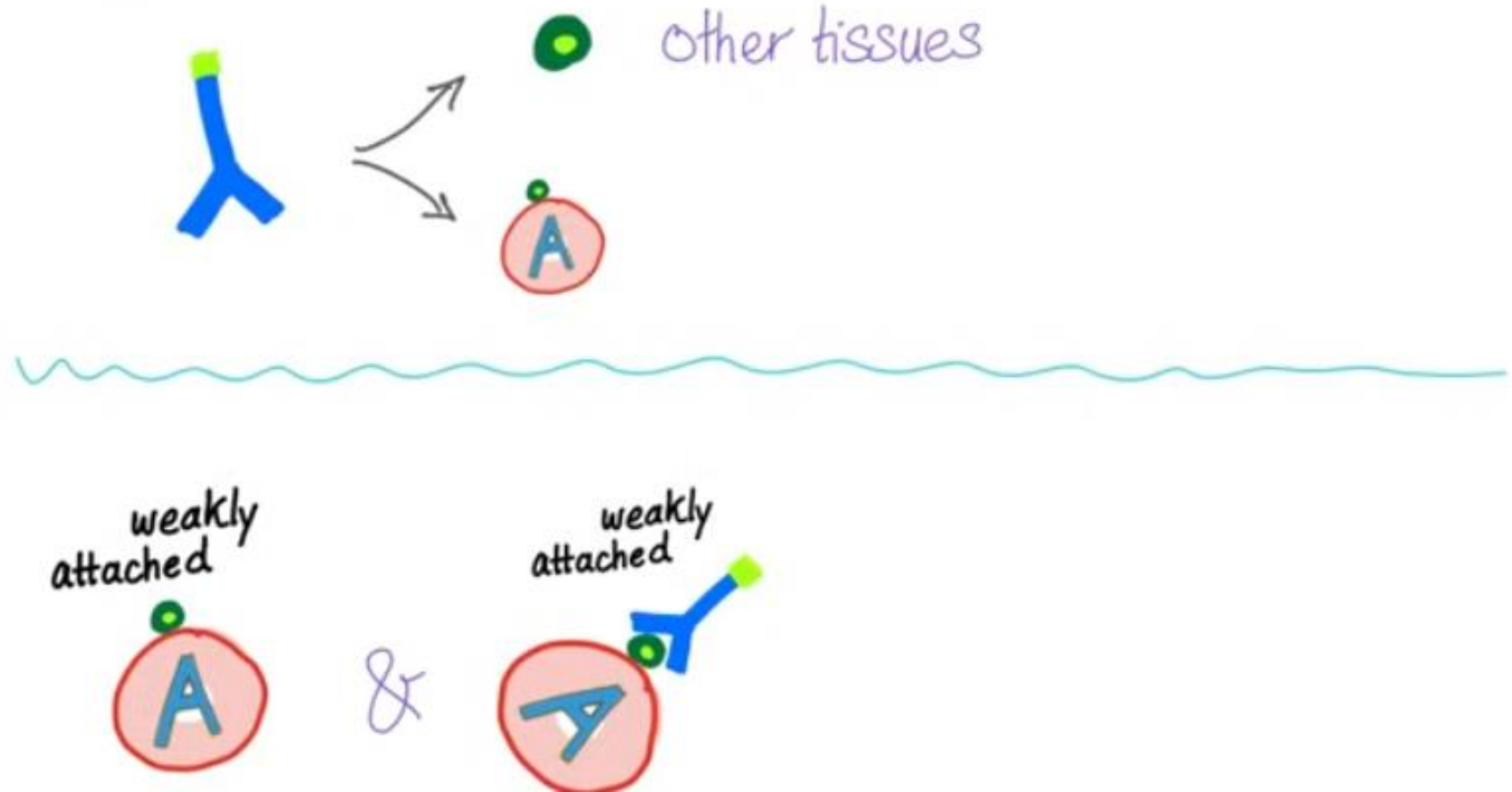
∴ No need for previous exposure "sensitization"

∴ (1) ABO HDN can occur during first pregnancy & subsequent pregnancies

(2) you cannot prevent it.

In **ABO incompatibility**, anemia is mild or non-existent.

Why?



Diagnosis

clinically + investigation

Blood film
"Spherocytes"
[in the cord blood]

CBC

Hb ↓ Hct ↓ MCV -
Retic. count - ↑

LDH ↑
UCB ↑
Haptoglobin ↓

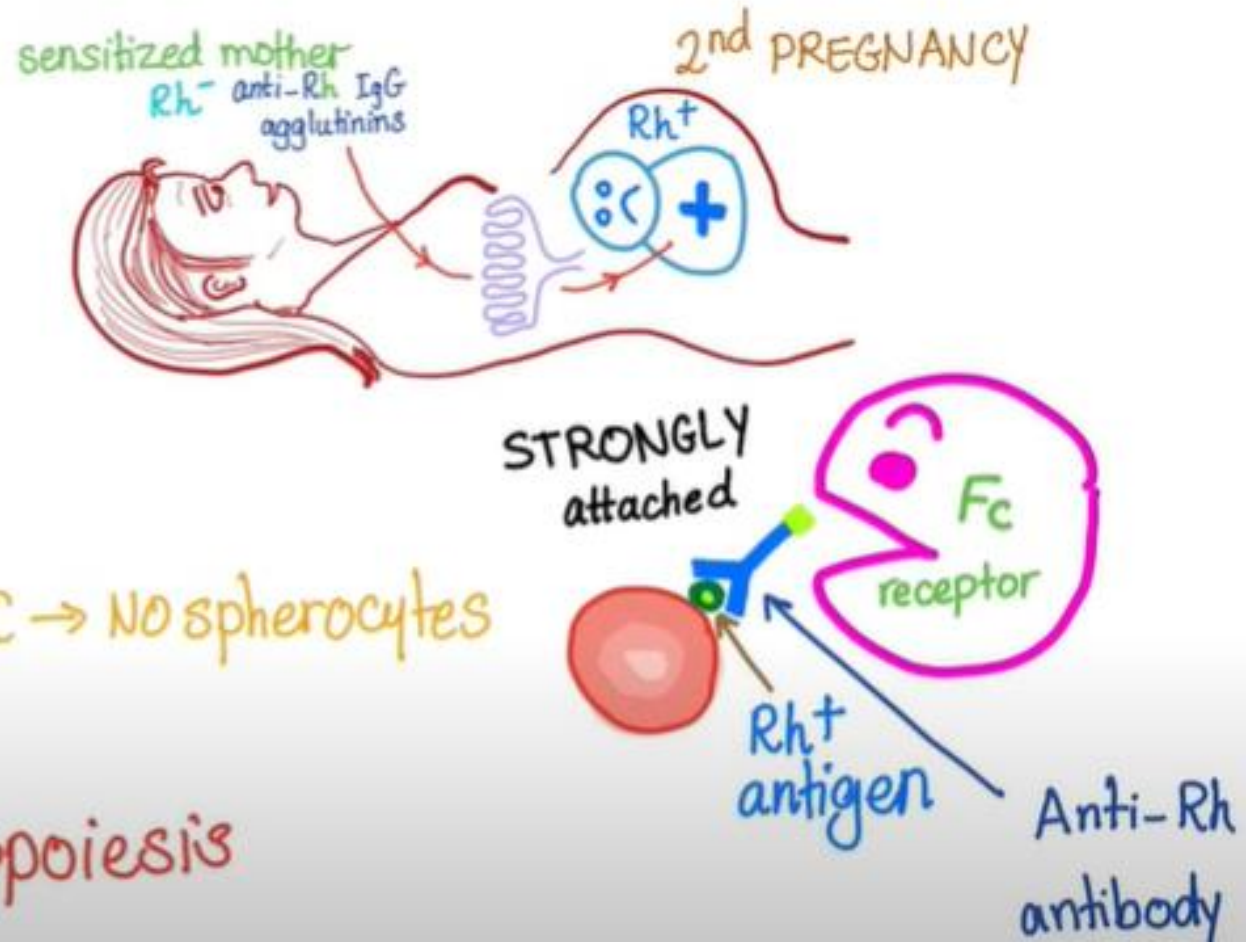
Direct

Coombs test weakly
(Direct Antiglobulin test) Positive



PATHOGENESIS

- (1) Diffusion
- (2) Attachment
- (3) Agglutination
- (4) Lysis
- (5) Phagocytosis: whole RBC $\rightarrow$ NO spherocytes
- (6) UCB $\rightarrow$ CB
- (7) Extramedullary Hematopoiesis



Diagnosis

clinically + investigation

CBC

Hb ↓ Hct ↓ MCV -
Retic. count ↑↑↑

LDH ↑

UCB ↑

Haptoglobin ↓

cord bilirubin. 3-5 mg/dL

↓↓ Albumin

Direct & Indirect Coombs test **Strongly Positive**
(Direct Antiglobulin test)

Blood film

NO "Spherocytes"
[in the cord blood]
Nucleated RBC



PREVENTION:- "in the unsensitized mother"

 Rho(D)immunoglobulin
[RhoGAM]

28-30 weeks of
gestation

- Do Atypical
Antibody
Test at
28 weeks

 Rho(D)immunoglobulin
[RhoGAM]

when mum delivers
an Rh+ baby.

prevent
sensitization

We give her the antibody,
so she doesn't have to
make it :> # analogy

ABO system

- Spontaneous agglutinins

Not require previous exposure

Rh system

- No spontaneous agglutinins
- Requires previous exposure

SENSITIZED

↓
2nd response will be faster
and stronger