



# Rh-incompatibility, HDFN and Diagnosis of fetal RH via cff-DNA

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# Abbreviations

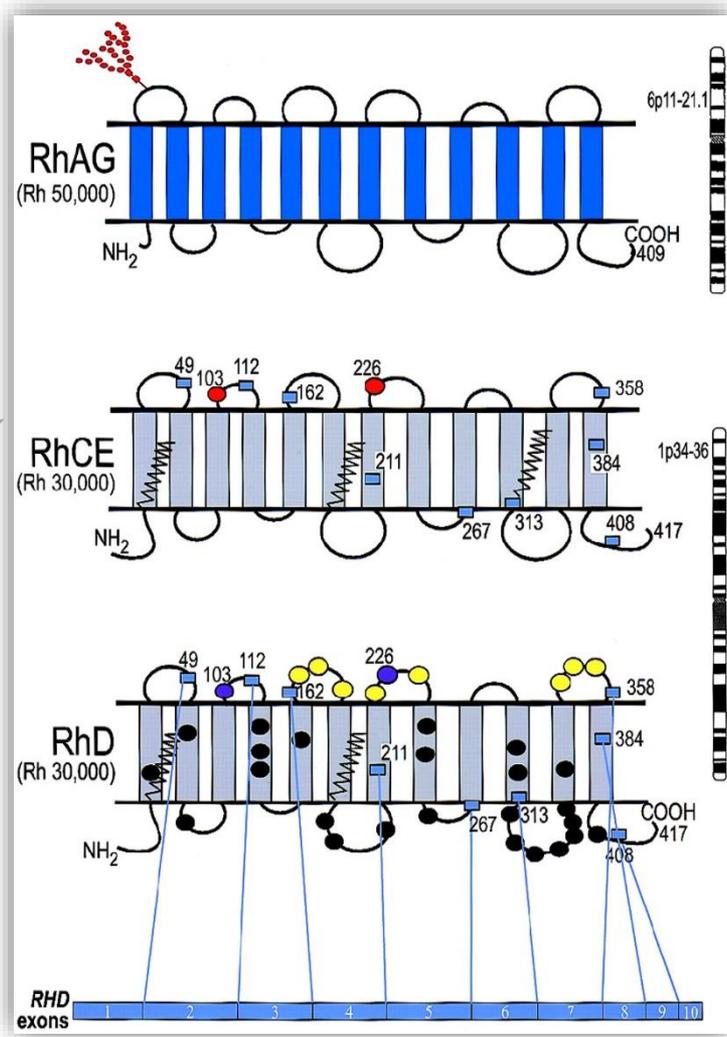
1. HDFN = Haemolytic disease of the fetus and newborn
2. RHAG = Rh-associated glycoprotein
3. FMH = Fetomaternal Hemorrhage
4. NIPT = Non-Invasive Prenatal Testing
5. cff DNA = cell free fetal DNA
6. RHlg = Rh Immune Globulin
7. IUT = Intrauterine transfusion



# Rh structure

*RHD* gene (D allele)  
and *RHCE* gene  
(C,c,E,e alleles)

The antigens of  
this group cross  
**12 times** the  
width of the  
membrane

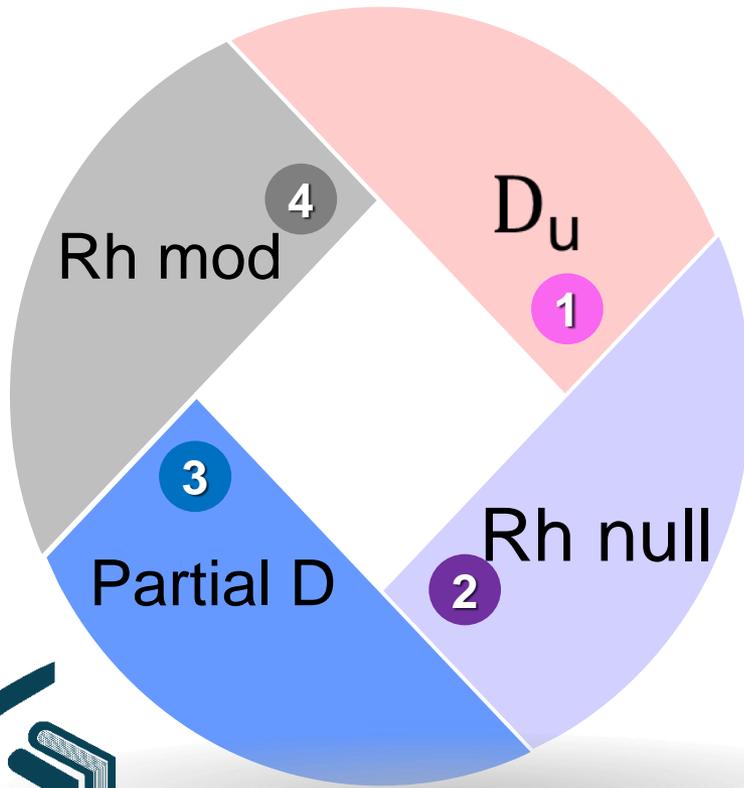


**RHAG** is a  
glycoprotein that  
helps in the  
deposition of  
antigens in the  
membrane

RHD is the  
most  
**immunogenic**  
antigen



# RhD variants



- 1 Decreased number RhD surface
- 2 Lack of expression RHAg
- 3 Altered RhD epitops
- 4 Low expression of RHAg

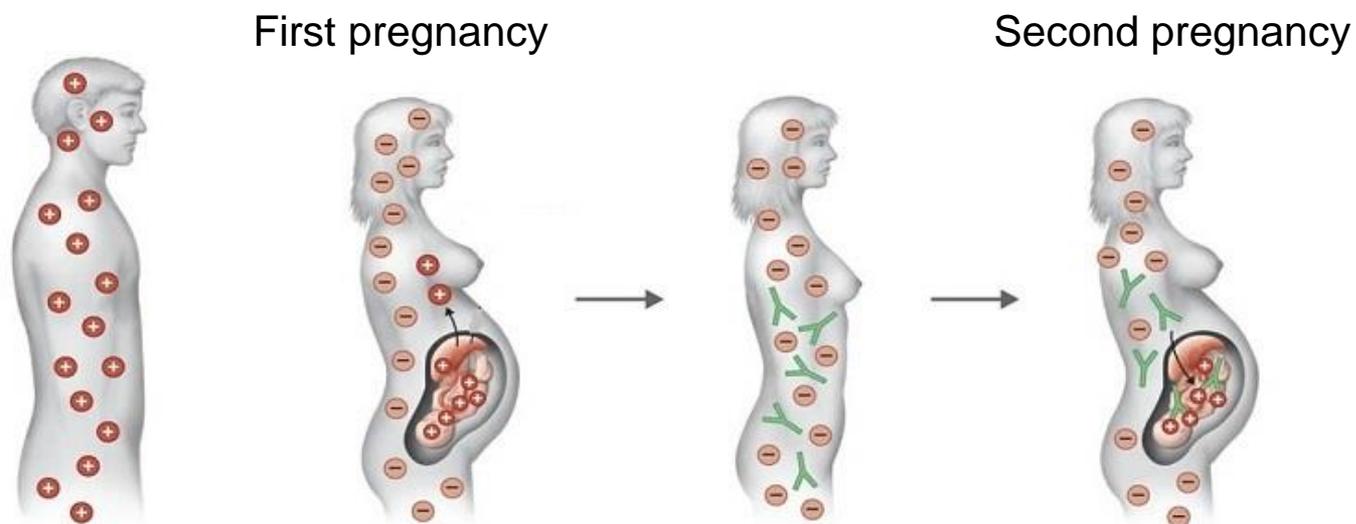


# Etiology:



- Rh-incompatibility
- ABO-incompatibility
- Other systems incompatibility

# Phathogenesis:



FMH

IgG

Placenta

HDFN



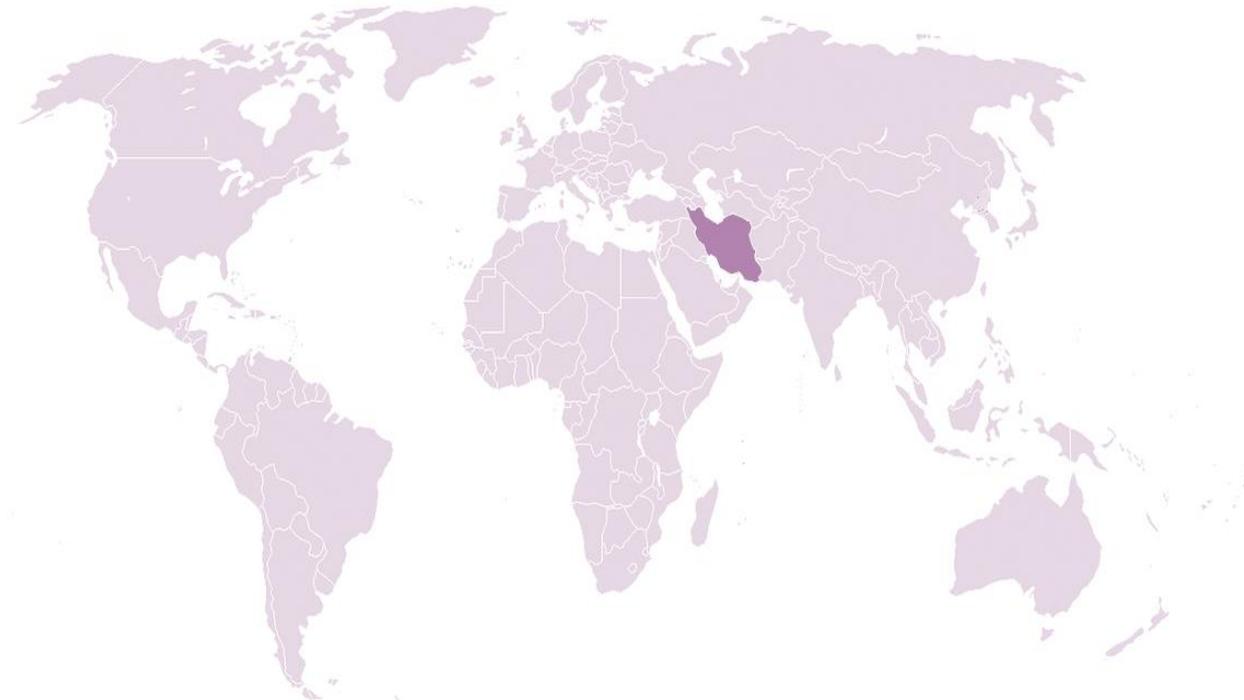
# Prevalence



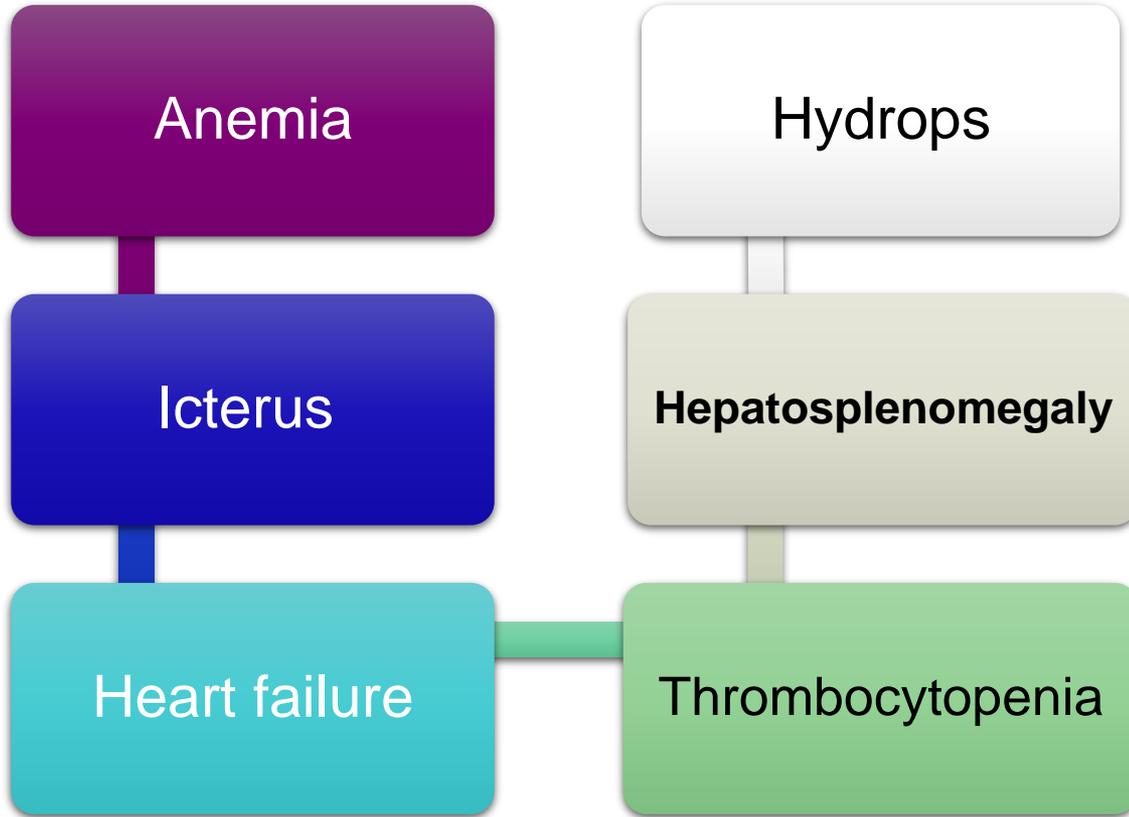
World



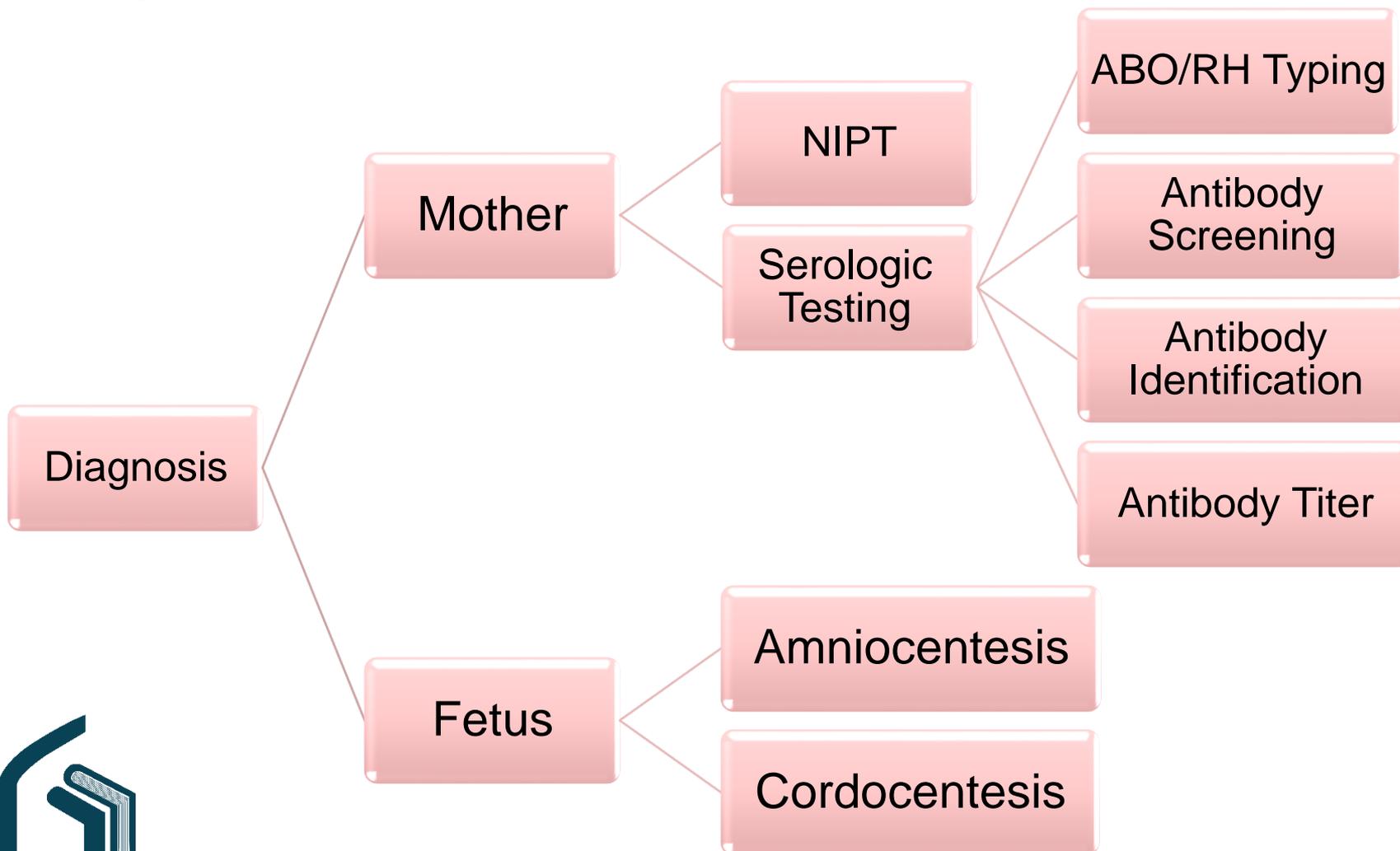
Iran



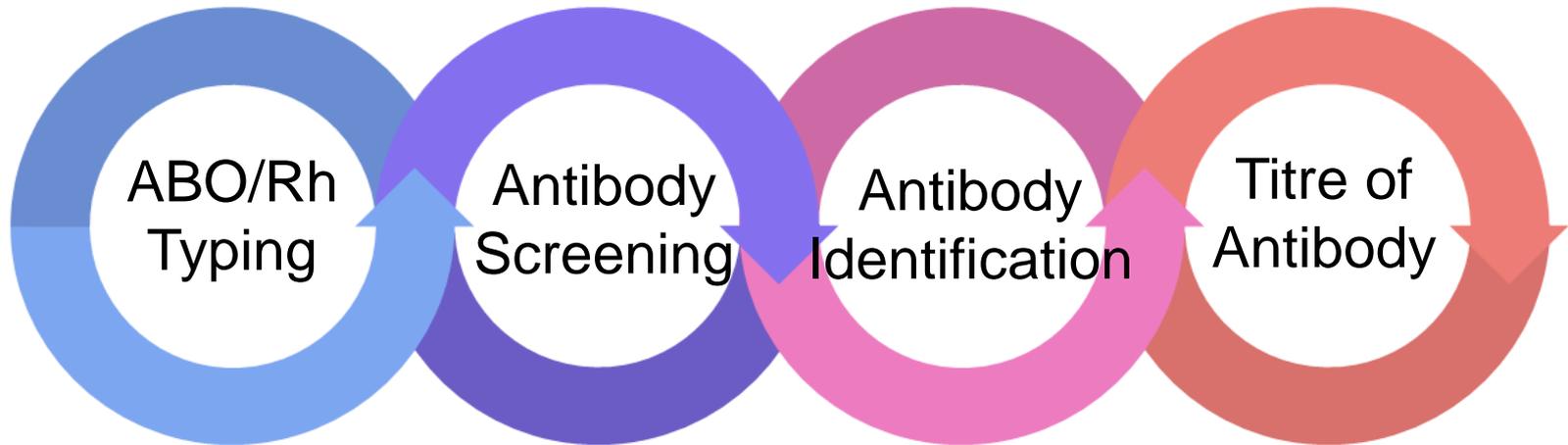
# Clinical Manifestations



# Diagnosis:



# Mom's testing



# Amniocentesis:

The embryo is surrounded by **amniotic fluid**

The fetus makes the fluid enter the **lungs**

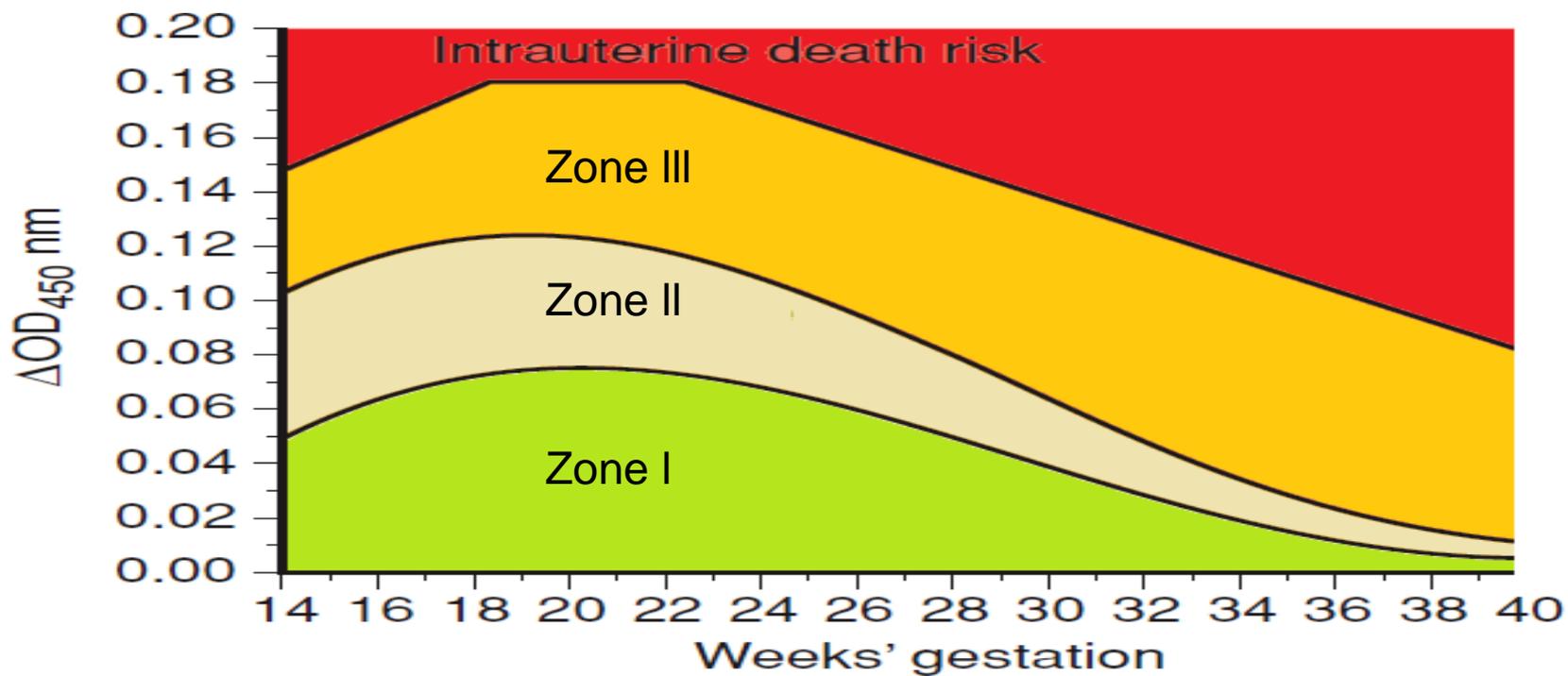
Then repelled through the **kidneys**



Bilirubin is measured in amniotic fluid by **spectrophotometry** and it has the best absorption at **450nm** wavelength.

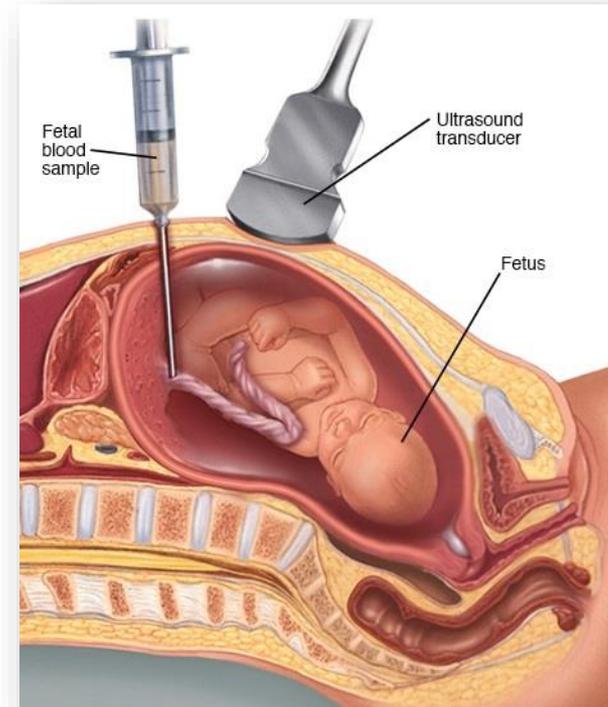
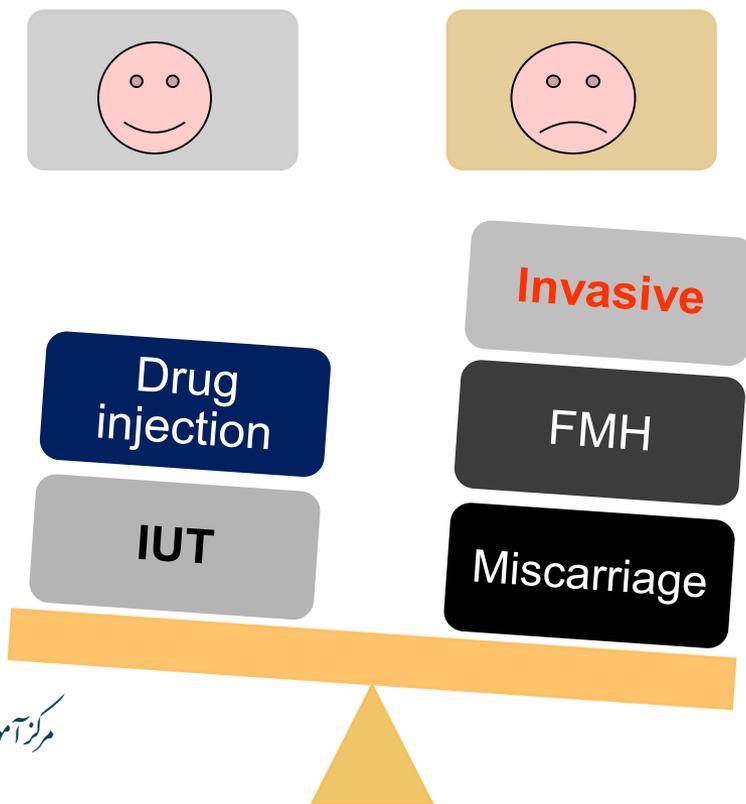


# Liley Graph



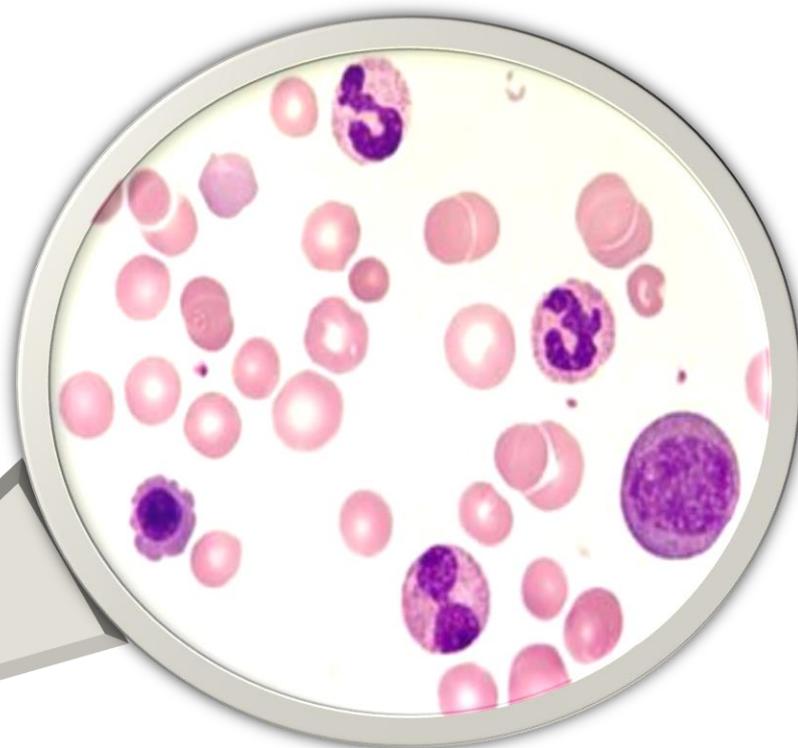
# Cordocentesis:

- Umbilical vein phlebotomy for **hemoglobin** measurement.



# Leukoerythroblastic smear

nRBC  
Myeloid progenitor cell  
Erythroid progenitor cell



# Prevention with RHlg

- RHlg injected to all of the  $Rh^-$  mothers at 28th week of the pregnancy



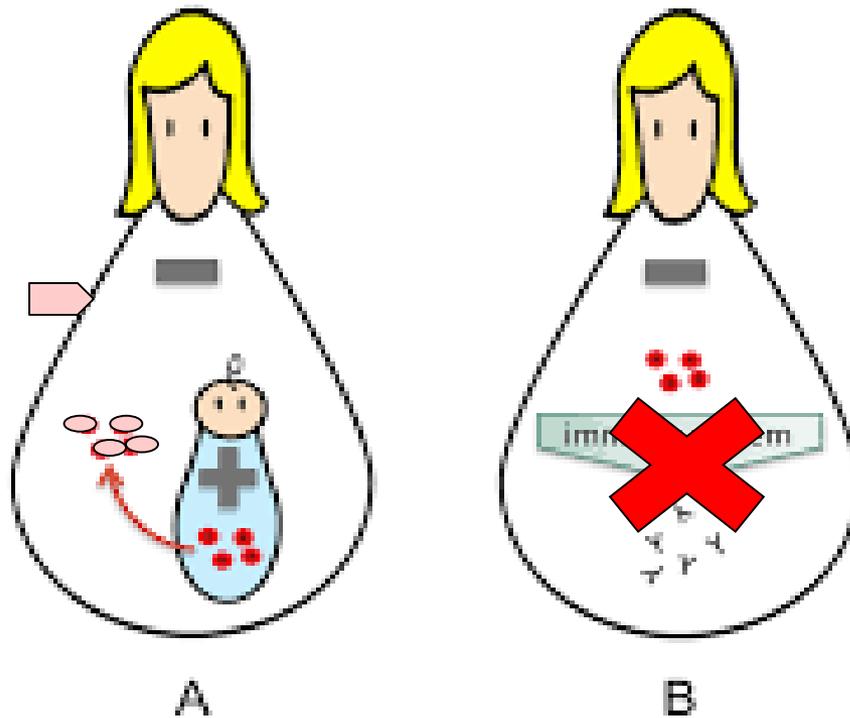
The usual dose is equal to 1500IU

RHlg half-life is 25 days

Transmits viral/bacterial infection



# Mechanism of RHlg



# Treatment with IUT

IUT is performed in 2 ways:

1. Injected into the peritoneal cavity (**Common**)
2. Injected into the umbilical vein



**Fresh**

↓ Concentration of potassium

**CMV**

**Compatible**

# Treatment with phototherapy

- Main treatment for neonatal hyperbilirubinemia
- Optimal wavelength range is 460–490 nm

Skin rashes

Greenish  
Stools

Water loss

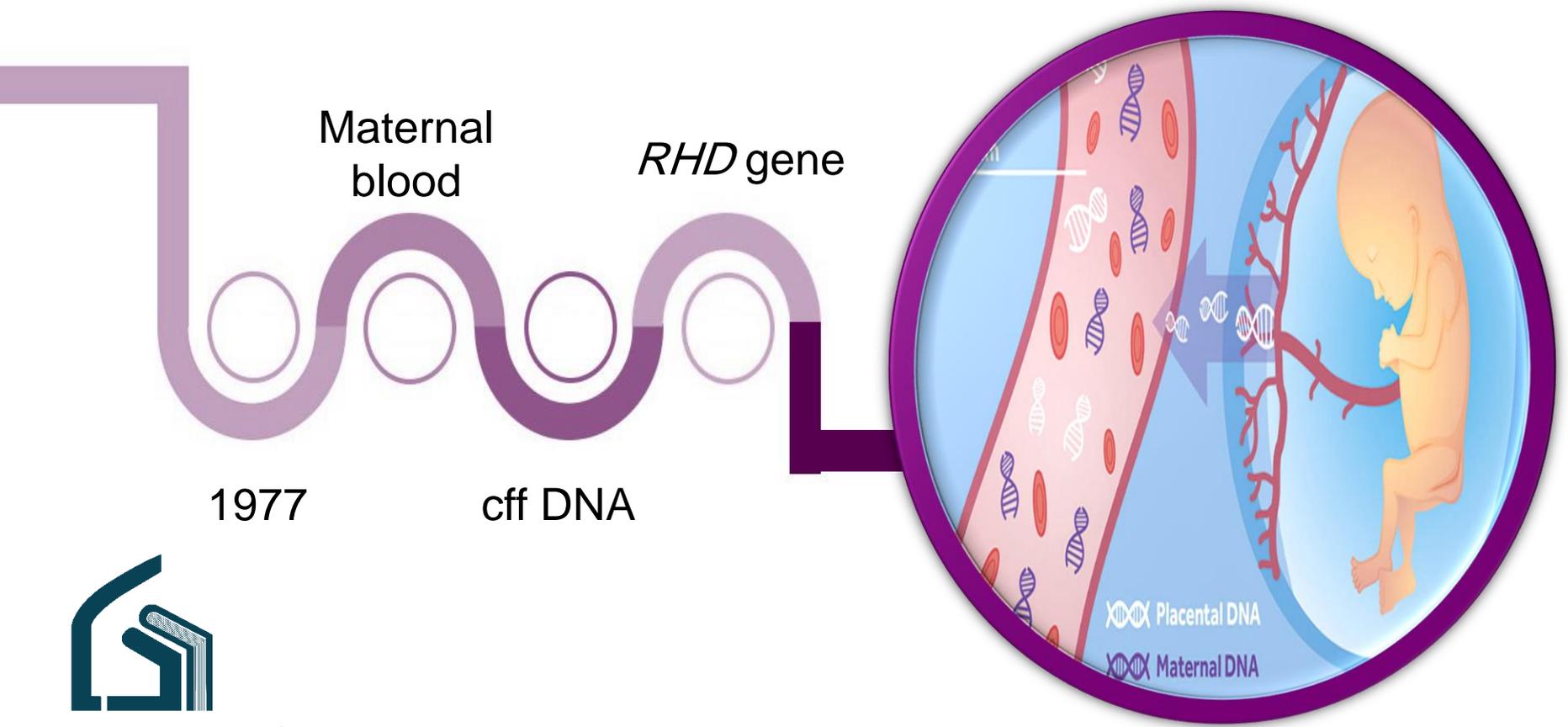
Inexpensive

Easy to use

Nontoxic



# NIPT



# NIPT



**D<sub>u</sub>**



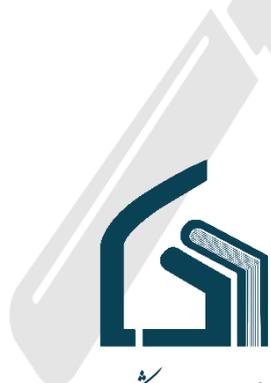
**5,7,10 exons**



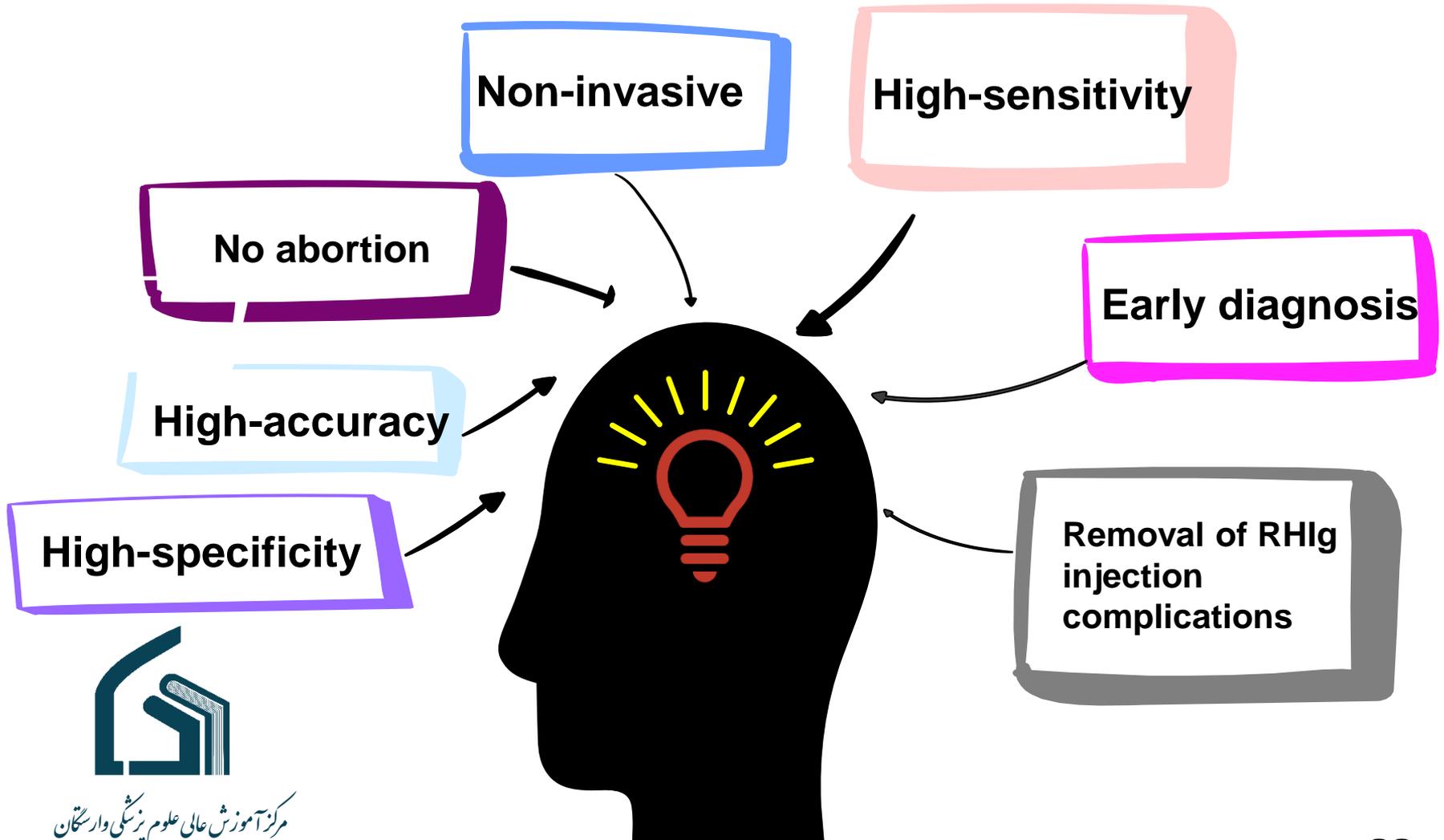
**RHD1227A**



**q-PCR**



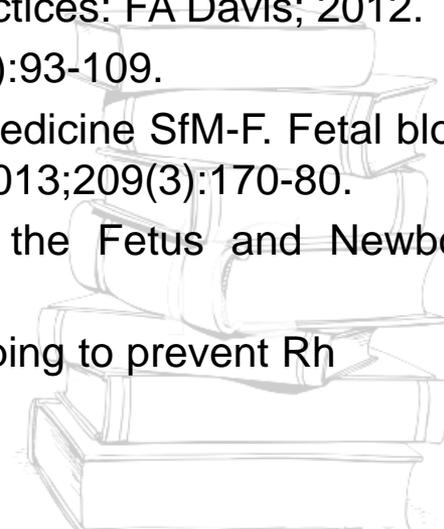
# Conclusion





# References

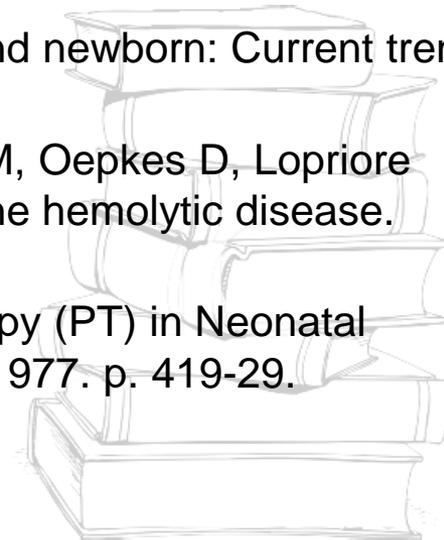
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# That's it

Thank you for your time and attention!



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