Finnish Red Cross
Blood Service

The first year experiences of routine fetal *RHD* screening in Finland

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Katri Haimila

Malla Kuosmanen, Susanna Sainio

Finnish Red Cross
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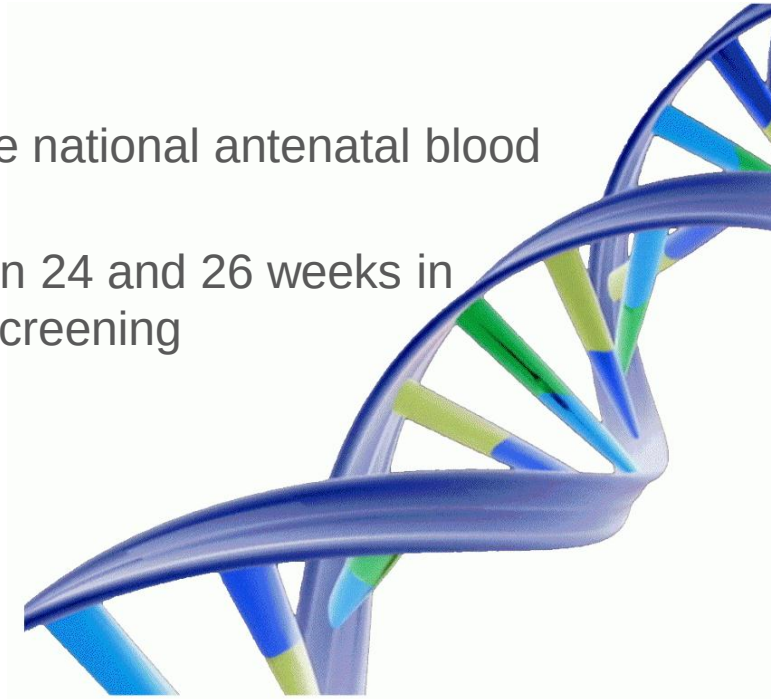
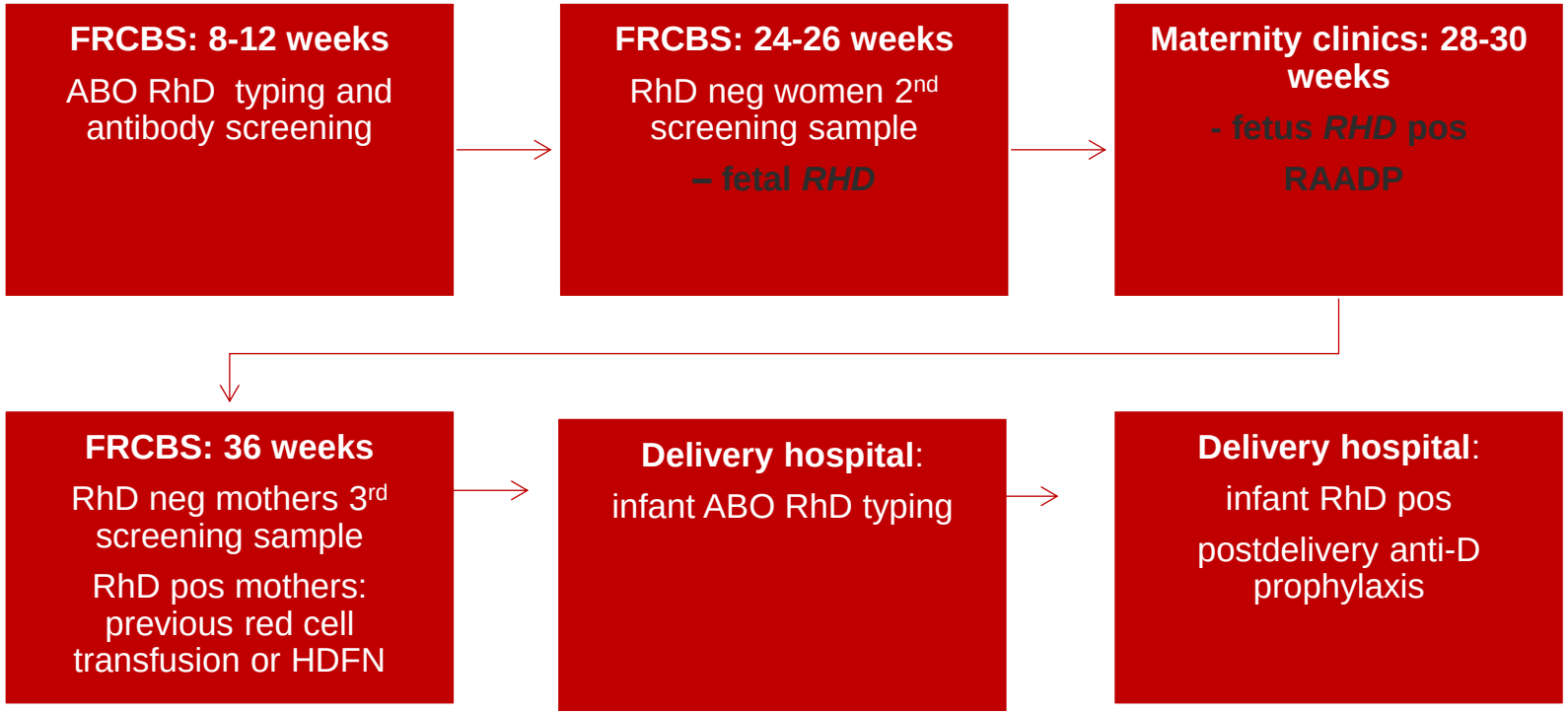
Background

- FRCBS started actively lobbying for RAADP in 2011
- National Institute for Health and Welfare announced recommendations to give RAADP to all RhD-neg women between 28 and 30 weeks in October 2013
- 13% RhD-negative women
  - 36% fetuses RhD-negative
- screening of fetal *RHD* was implemented to the national antenatal blood group antibody screening program (FRCBS)
- a fetal *RHD* screening sample is taken between 24 and 26 weeks in connection with taking a sample for antibody screening



Antenatal red cell antibody screening



Background

- full support for maternity clinics
  - call center in FRCBS
  - lectures, educational sessions etc. for maternal clinics, delivery hospitals, laboratories
  - reviews in main national medical publications
  - website
  - patient information

Anti-D prophylaxis

for RhD-negative mothers

- Information for RhD-negative pregnant mothers

29.10.2013

HOW DOES A MOTHER'S RHD NEGATIVE BLOOD GROUP AFFECT PREGNANCY?

It is common for a baby's red blood cells to enter the mother's bloodstream during delivery. If the baby has inherited an RhD-positive blood group from the father, the immune system of an RhD-negative mother may start producing anti-D antibodies against the blood group factor. This is called immunization.

In addition, in the second half of pregnancy, small numbers of fetal red blood cells often cross the placenta to the mother's bloodstream without causing any symptoms. Some procedures and complications during pregnancy can also lead to immunization. Blood group immunization does not usually cause any problems to the unborn baby in the first pregnancy, but in subsequent pregnancies it can lead to the haemolytic disease of the fetus and newborn.

Anti-D antibodies are the main cause of the severe haemolytic disease of the fetus and newborn. When mild, the disease is asymptomatic but if left untreated the more severe forms of the disease can lead to disability in the fetus or newborn or even death. Because of modern treatment methods, the prognosis for the disease is usually good, but the prevention of immunization with anti-D immunoglobulin is still the most important means of reducing disabilities and deaths caused by the disease.

WHAT IS ANTI-D PROPHYLAXIS?

The production of anti-D antibodies can be prevented by giving the mother anti-D immunoglobulin as injections. Anti-D immunoglobulin works by destroying the baby's red blood cells that enter the mother's bloodstream before the mother's immune system has time to launch a reaction against them.

WHEN IS AN RHD-NEGATIVE MOTHER GIVEN ANTI-D IMMUNOGLOBULIN?

Always after delivery if the newborn is RhD positive

- The baby's blood group is always confirmed after delivery from a blood sample taken from the umbilical cord.
- The mother is given an anti-D injection at the maternity hospital within 72 hours of delivery before leaving the hospital.

If not given anti-D immunoglobulin after delivery, 16 % of RhD-negative mothers become immunized. The post-delivery anti-D injection has been in use in Finland since 1969.

Between 28 and 30 weeks of pregnancy to all RhD-negative mothers if the baby's blood group is not known

- To prevent immunization at the later stages of pregnancy.
- The injection is given at the maternity clinic during a regular check-up.
- To avoid giving anti-D immunoglobulin unnecessarily, the baby's RhD status can be checked from the mother's blood sample between 24 and 26 weeks of pregnancy when a sample is taken at the maternity clinic for the blood group antibody screening. These tests will start in 2014.

Despite receiving an anti-D injection after delivery, up to 2 % of RhD-negative mothers become immunized. To prevent these cases of immunization, maternity clinics will start giving RhD-negative mothers anti-D immunoglobulin during pregnancy in 2013.

To all RhD-negative mothers whose baby's blood group is not known in situations that involve an increased risk of bleeding

- Chorionic villus sampling, amniocentesis or external cephalic version (a procedure performed to turn a breech baby to a head-down position)
- Abdominal trauma or bleeding during pregnancy
- Miscarriage, termination of pregnancy or ectopic pregnancy

Anti-D immunoglobulin is given either at the hospital or the maternity clinic depending on the place of treatment even if the mother has received an injection at the maternity clinic between 28 and 30 weeks of pregnancy.

CAN ANTI-D IMMUNOGLOBULIN BE HARMFUL?

The injection place may be sensitive or red for a couple of days but serious allergic reactions are rare. Anti-D immunoglobulin is not harmful to the fetus.

Anti-D immunoglobulin can show up in the blood group antibody screening test even after several months, therefore information on the injection must be indicated on the laboratory referral.

The anti-D prophylaxis of RhD-negative mothers in Finland is carried out according to the recommendations by the National Institute for Health and Welfare maternity care expert group.

www.[illegible].fi/www/[illegible]

Procedure

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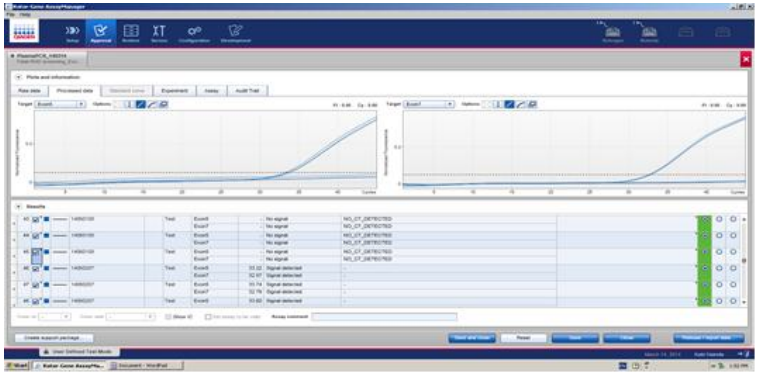
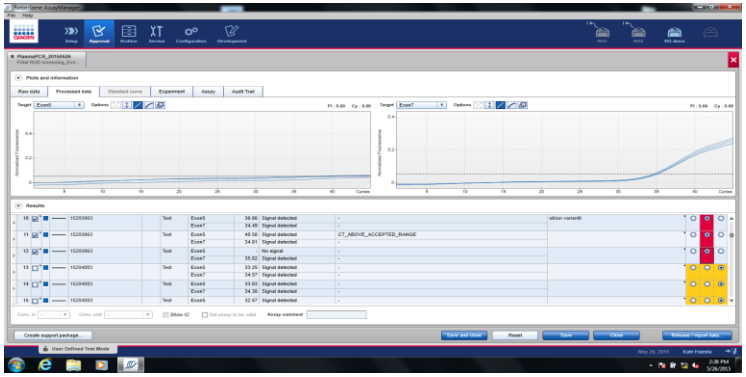
- DNA extraction
  - 1 ml of maternal plasma
  - by the QIAsymphony automate
  - within 7 days of sampling
- rt PCR
  - exons 5 and 7 (separating labels)
  - in duplex triplicate reactions
- results are automatically transferred





Results

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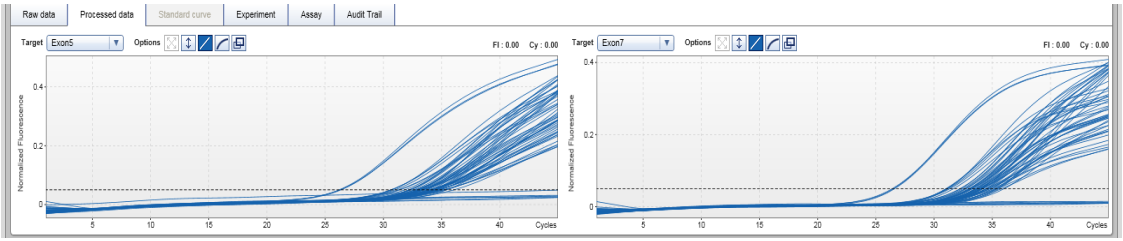
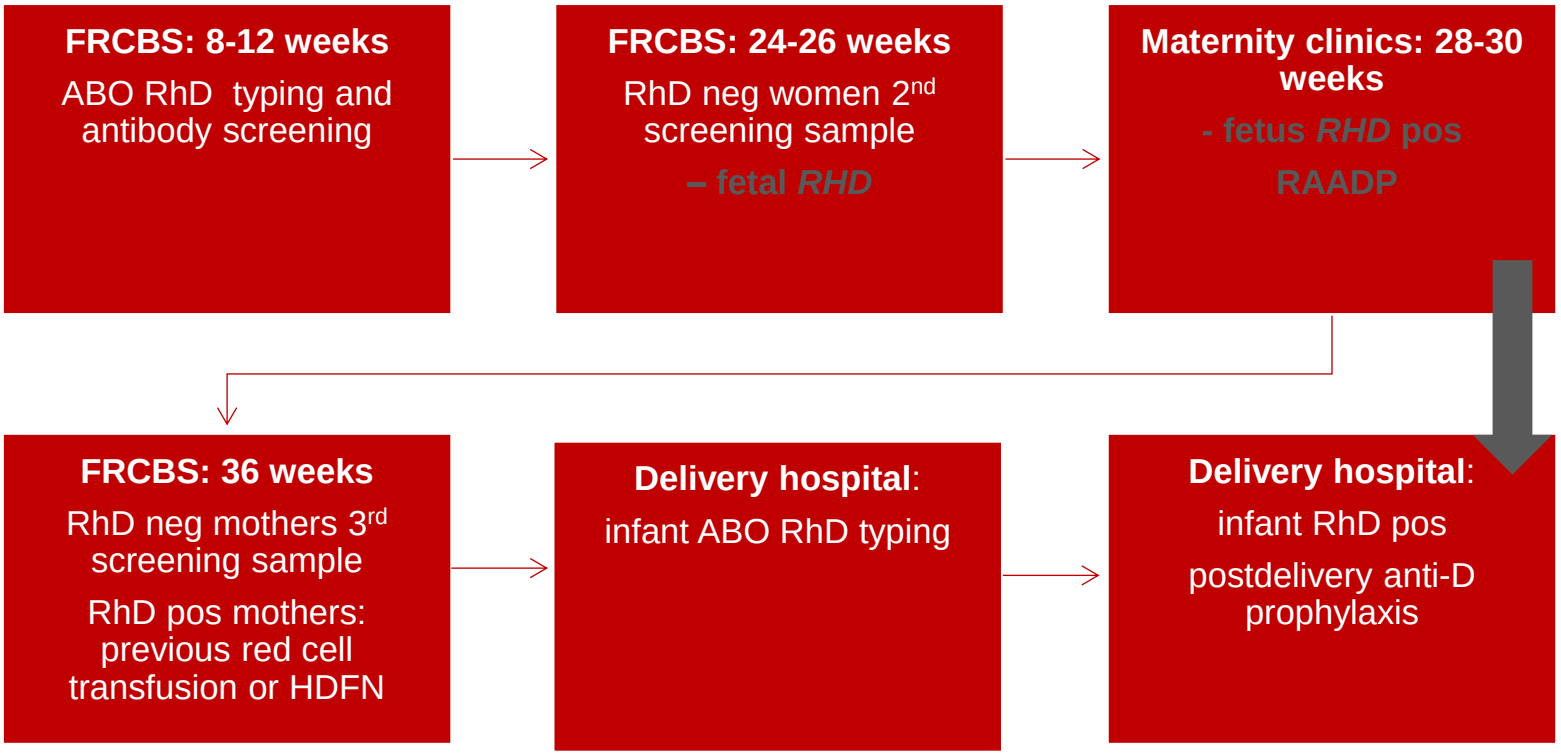
- the first screening year 2/2014-1/2015
  - 4,637 samples
    - ~70% of the expected number
  - ~60% reported electronically
- results
  - positive: 3,083 (66.5%)
  - negative: 1,524 (32.9%)
  - inconclusive: 30 (0.6%)
  - 1 false negative
  - 3 false positive
  - sensitivity was 99.97% (95% CI: 99.82-100)
  - specificity 99.80% (95% CI: 99.43-99.96)
  - result checking by the delivery hospitals



Future aims


FRCBS: 8-12 weeks
ABO RhD typing and antibody screening
FRCBS: 24-26 weeks
RhD neg women 2nd screening sample
– fetal RHD
Maternity clinics: 28-30 weeks
- fetus RHD pos
RAADP
FRCBS: 36 weeks
RhD neg mothers 3rd screening sample
RhD pos mothers: previous red cell transfusion or HDFN
Delivery hospital:
infant ABO RhD typing
Delivery hospital:
infant RhD pos
postdelivery anti-D prophylaxis