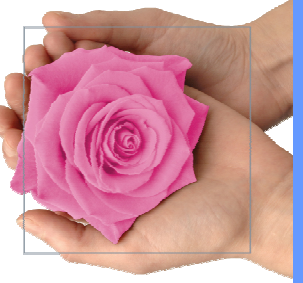
Cambridge University Hospitals NHS
NHS Foundation Trust

Being Positive about being Negative

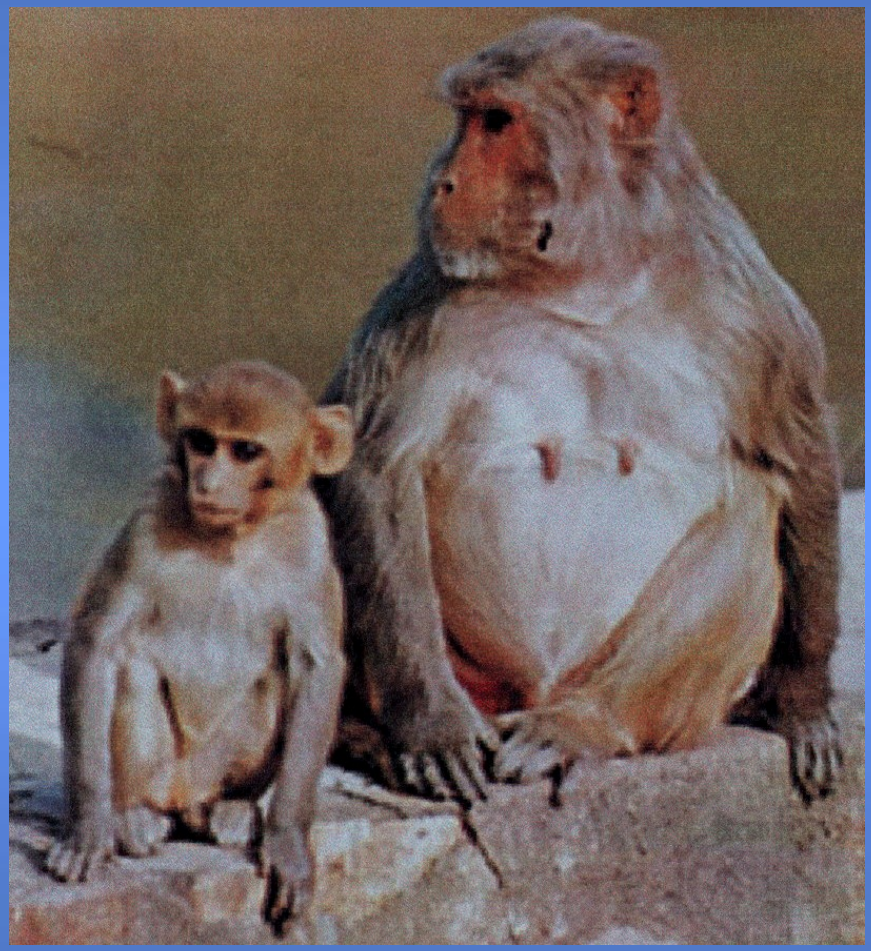
Prevention of Haemolytic Disease of the Fetus/Newborn due to Anti-D





Rh blood group system

Mummy,
when are we having
our cross training?



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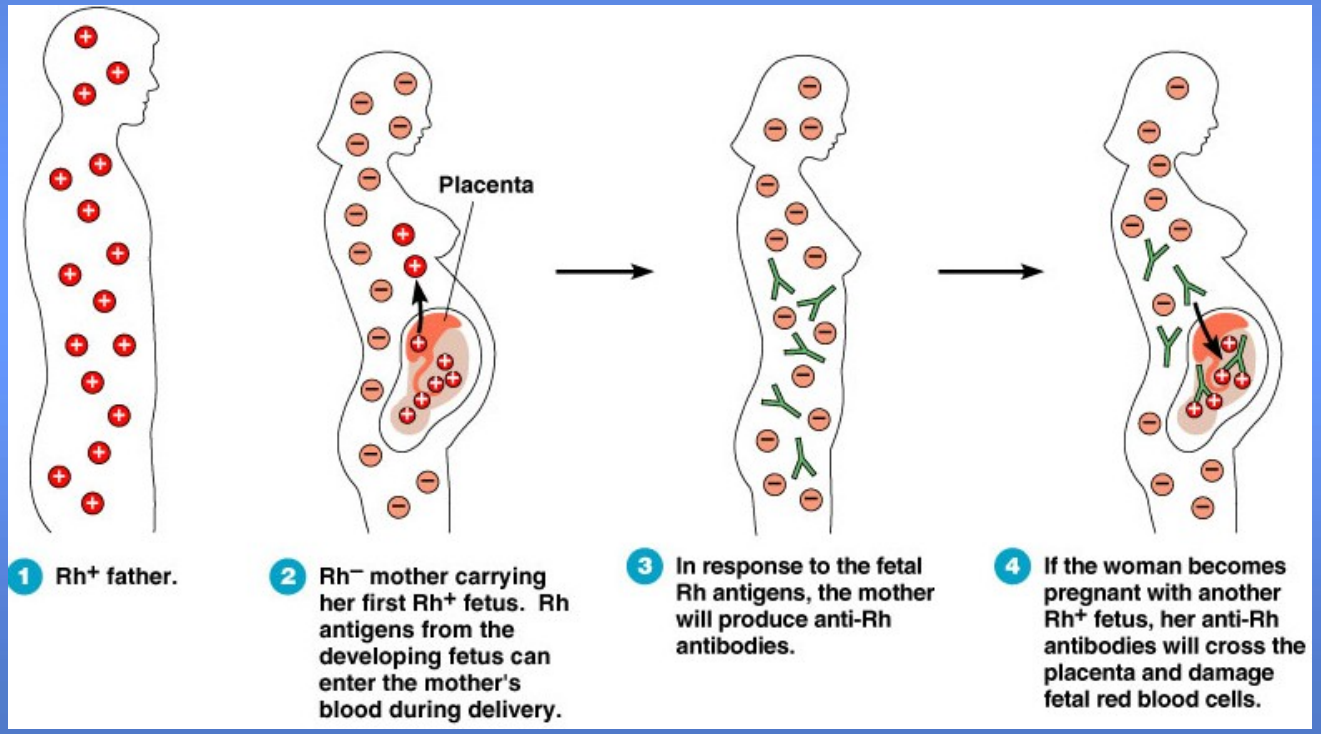
RhD

- Absent in ≈ 17% of individuals
- They can make anti-D on exposure to RhD positive red cells
- Anti-D can cross the placenta and cause red cell destruction in RhD positive fetus

HDN due to Anti-D

- The antibody most commonly implicated in severe HDN is anti-D
- Anti-D can be found in some RhD negative women following pregnancy:



Adapted from faculty.northseattle.edu

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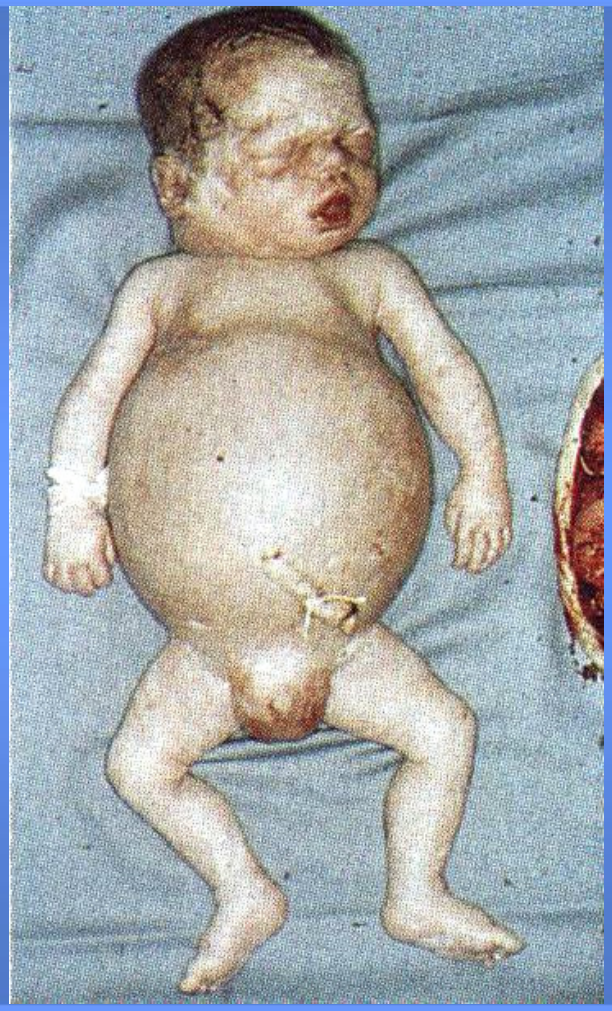
Hydrops fetalis



Kernicterus

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Laboratory testing

- Blood group to identify RhD negative women who may need anti-D prophylaxis
- Atypical antibody screen at booking and 28 weeks to identify pregnancies at risk of HDN
- Atypical antibodies are quantified periodically to assess their potential effect on the fetus

Anti-D prophylaxis

- An injection of anti-D is given to all RhD negative pregnant women
  - the anti-D will bind to and remove any fetal RhD positive red cells in the circulation

- A large dose (usually 1500 iu) of anti-D is given routinely at 28 weeks and a smaller dose (usually 500 iu) at delivery
- In some hospitals 2 smaller (500 iu) doses are give at 28 and 34 weeks instead of the 1 larger dose

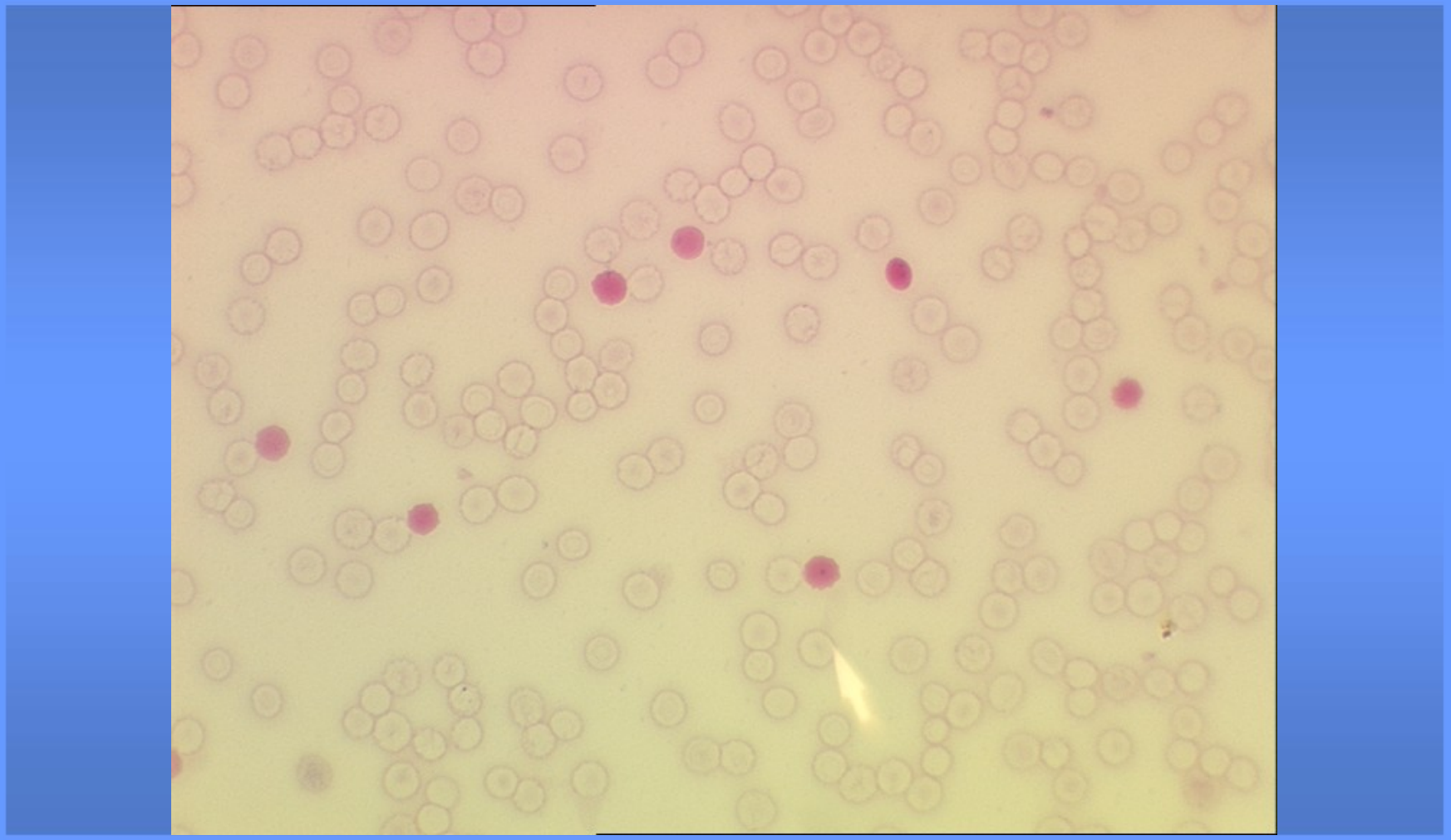
Anti-D prophylaxis

- Anti-D is also given after any ‘event’ that may cause a feto-maternal haemorrhage (bleed between mum and foetus) such as:
  - Abdominal trauma
  - Intrauterine death
  - Spontaneous or therapeutic abortion
- A dose of 500 iu is considered sufficient to treat a bleed of up to 4mls
  - 125 iu anti-D can be given for every additional 1ml bleed
- Before 20 weeks gestation a dose of 250 iu is considered sufficient following each ‘event’

Kleihauer (or acid elution) test

- A Kleihauer test is performed to ensure that the standard dose of anti-D is sufficient
- Method:
  - a blood film made from a maternal sample
  - the film is treated with low pH acid to elute the adult haemoglobin from the maternal cells
    - fetal haemoglobin is resistant to the acid
  - the film is counterstained with eosin and examined microscopically
    - fetal red cells are stained pink by the eosin
    - maternal cells appear like ‘ghost cells’
  - a calculation is performed to determine the volume of fetal red cells present and the amount of anti-D to be given to the mother

Kleihauer



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Flow cytometry

- If a bleed of more than 2ml is suspected the sample should be sent to a specialist laboratory to confirm the result using flow cytometry

- Flow cytometry
  - detects RhD positive cells within an RhD negative maternal sample using anti-D antibodies
  - automated
    - more sensitive
    - less room for error
    - expensive

Tests at delivery

- Cord sample of:
  - infants of RhD negative women
    - tested for blood group
    - if RhD positive, mother needs post delivery anti-D prophylaxis
    - if RhD negative, no anti-D prophylaxis is required
  - infants with clinical jaundice
    - tested for blood group and DAT to try to establish the cause
  - infants of mother with clinically significant antibody
    - tested for blood group and DAT to determine if HDN is present

Tests at delivery

- Maternal sample
  - tested for blood group
  - tested for presence of feto-maternal haemorrhage (Kleihauer) to determine if the standard anti-D dose is sufficient or to calculate the additional dose of anti-D required

Further information

- BCSH guidelines (2009) Guidelines for the estimation of feto-maternal haemorrhage [online] Available at: http://www.bcshguidelines.com/documents/BCSH_FMH_bcsh_sept2009.pdf
- BCSH guidelines (2006) Guidelines for use of prophylactic anti-D [online] Available at: http://www.bcshguidelines.com/documents/Anti-D_bcsh_07062006.pdf
- BCSH guidelines (2006) Guidelines for blood grouping and antibody testing in pregnancy [online] Available at: http://www.bcshguidelines.com/documents/antibody_testing_pregnancy_bcsh_07062006.pdf