Anti-D sensitisation
Why is it still happening?

Dr Jane Keidan
What is the link to anti-D?
Development of antibodies in pregnancy
(sensitisation or immunisation)

RhD sensitisation occurs when woman’s blood type is RhD negative and baby’s blood type is RhD positive (inherited from father)
Feto-maternal haemorrhage

If some baby red cells pass into woman's blood stream, her body will produce antibodies in response

This can occur during the pregnancy or at delivery
Haemolytic disease of fetus and newborn

Anti-D made by the woman can pass through the placenta and destroy the baby’s red blood cells, causing anaemia and jaundice either in this or in future D positive pregnancies.

*In severe cases brain damage or death of the baby can occur.*
Causes of feto-maternal haemorrhage

- NORMAL delivery (post partum)
- Recognisable “sensitising” events during pregnancy
- NORMAL pregnancy (antenatal)
Anti-D prophylaxis

- Exact mechanism of action unclear but if given in correct dose at correct time, passive anti-D can prevent sensitisation to D antigen and subsequent HDFN
- **Correct dose** depends on stage of pregnancy and size of FMH
- **Correct time** requires recognition of potentially sensitising events and administering anti-D within 72 hours

**REF.** BCSH guideline for the use of anti-D immunoglobulin for the prevention of haemolytic disease of the fetus and newborn  H. Qureshi et al Transfusion Medicine, 2014, 24, 8–20 or www.bcshguidelines.com
Anti-D prophylaxis

• **Post-delivery**
  Began in UK in 1969. Deaths attributed to HDFN due to anti-D fell from 46/100 000 births before 1969 to 18.4/100 000 in 1977

• **Antepartum after sensitising events**
  Introduced in 1976 Deaths attributed to HDFN due to anti-D fell further to 1.6/100 000 births by 1990

• **Routine antenatal anti-D prophylaxis (RAADP)**
  Introduced in 2002
National Comparative audit of anti-D immunoglobulin prophylaxis 2013

- 99% of eligible women received RAADP
- Single dose regimen - 89.9% received right dose at right time
- Two dose regimen - 58.6% received right dose at right time
- 98.5% received post delivery anti-D
  91.6% received right dose at right time
- 95.7% compliance post sensitising events
  79% received required dose within 72 hrs
Types of error

- **Errors of omission:** failing to do something that has the potential to prevent an undesirable outcome (not doing something that should be done)
  
  *Omission /late administration of anti-D*

- **Errors of execution:** doing something that should be done, but doing it incorrectly

  *Wrong dose of anti-D*

- **Errors of commission:** doing something that has the potential to result in an undesirable outcome (doing something that shouldn’t be done)

  *Inappropriate administration of anti-D*
Anti-D errors reported to SHOT
n=354
Anti D errors reported to SHOT
n=354

- Omission/late administration of anti D immunoglobulin 277
- Wrong dose of anti D Ig given according to local policy 9
- Inappropriate administration of anti D immunoglobulin 59
to a RhD positive woman 23
to a woman with immune anti D 21
erroneously to a mother of a RhD negative infant 11
given to the wrong woman 4
- Handling and storage errors relating to anti D Ig 9

286 cases had potential to cause sensitisation
Omission or late administration of anti-D Ig WHO?
Omission or late administration of anti-D Ig WHERE?
Omission or late administration of anti-D Ig
WHEN?
VIGNETTES
Transcription error when recording results

The laboratory telephoned results to the clinical area, advising that anti-D Ig was required for a woman who had delivered a RhD positive baby. The post-natal ward staff entered the maternal blood group into the results section for the baby, and the woman was discharged without receiving any anti-D Ig. On follow-up by the laboratory as to why the anti-D Ig had not been collected, the error was realised and it was eventually administered 5 days post delivery.
Poor knowledge of prescribing doctor results in failure to administer anti-D Ig

A woman suffered a faint and fall with abdominal trauma at 34 weeks. She was reviewed by a speciality trainee in obstetrics who incorrectly informed her that as she had received RAADP at 28 weeks, no further anti-D Ig was required until after delivery.
Misuse of Kleihauer test results in failure to administer anti-D Ig for a sensitising event

A woman presented with a vaginal bleed at 36/40 but was discharged without prophylactic anti-D Ig. Her midwife had recorded in the notes that as the woman had received RAADP at 28 weeks, and the Kleihauer test was ‘negative’, there was no need to administer further anti-D Ig.
GP administers anti-D Ig in error

A pregnant woman attended her GP surgery for a routine visit. On the basis of an alleged family history of Rh immunisation, the GP went to another practice next door, requested a dose of anti-D Ig and proceeded to inject the woman without ever checking her blood grouping results. She was RhD positive.
Recommendations

• There must be robust systems in place to identify women eligible for anti-D Ig prophylaxis and to communicate this information effectively to relevant care teams.

• Anti-D Ig must be made readily available for administration to women when they present with potentially sensitising events, rather than putting the onus on them to return for the injection at a later date.
BUT

No long term follow up data on women who did not receive optimal care

*Did the error lead to sensitisation affecting future pregnancies?*
So what?
Cley marshes
Gathering clouds around anti-D

- Lack of detectable anti-D at delivery despite optimal RAADP (Clout 2008, Davies et al 2011)
- Sensitisation despite “perfect care” in 16% cases of immune anti-D (Amirthanayagam and Regan 2013)
- Concerns re dose and route in obese women
- Concerns re pharmacokinetics if >40 weeks gestation
Anti-D immunisation reporting to SHOT

- Aim is to gain a better understanding of the causes of continuing anti-D immunisations
- Report women who have produced immune anti-D that is detectable for the FIRST time in the current pregnancy
- Any stage from booking to delivery
- For each case, there are supplementary questions about previous pregnancies, recorded sensitising events, anti-D prophylaxis, and pregnancy outcome
PRIMAGRAVIDAE n=10

Gestation when anti-D first detected
Booking weight
RAADP details – dose route timing
Sensitising events
Peak anti-D

Outcome of pregnancy
No pregnancies required antepartum intervention
All pregnancies resulted in live births, of which 6 had no complications, 3 babies required phototherapy and 1 baby required exchange transfusion
MULTIPAROUS cases n=21

Details of previous pregnancy
  Booking weight
    RAADP
      Sensitising events
        Method of delivery
          Gestation at delivery
            Post partum prophylaxis
MULTIPAROUS cases n=21

Index pregnancy
  Date anti-D first detected
  Booking weight in current pregnancy
  RAADP in current pregnancy
  Sensitising events in current pregnancy
  Peak anti-D

Outcome data for 7 cases
  Antepartum intervention required in one woman
  7 live births, 2 babies phototherapy, 1 baby exchange transfusion
CONCLUSIONS and RECOMMENDATIONS

- Marked progress in management of HDFN
- Process errors continue to occur and must be reported to SHOT
- Robust systems must be in place to identify woman eligible for anti-D prophylaxis and to communicate this information effectively to relevant care teams
- Anti-D must be readily available for administration to women presenting with potentially sensitising events
- New SHOT questionnaire will provide data on the reasons for continuing anti-D sensitisation including process errors, maternal weight, length of gestation, dose, route and timing of anti-D prophylaxis
OVER TO YOU!
What is the link to anti-D?
Rhesus Macaque

What dose?
When should I have given it?

Better tell SHOT!