



# Fetomaternal haemorrhage in invasive prenatal diagnostic procedures (chorionic villus sampling, amniocentesis)

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## AIM OF THE STUDY

Determine the incidence of fetomaternal hemorrhage (FMH) in invasive prenatal diagnostic procedures (chorionic villus sampling or amniocentesis), determine the volume of fetal erythrocytes that infiltrate maternal circulation, and identify risk factors, which lead to excessive FMH. Establishing these parameters may enable optimization of recommendations for RhD alloimmunization prophylaxis.

## WORKING HYPOTHESIS

A 10 µg dose of IgG anti-D administered intramuscularly should cover 0.5 ml of fetal RhD positive erythrocytes or 1ml of whole blood. In chorionic villus sampling or amniocentesis performed before the 20th week of gestation, less than 2.5 ml of fetal erythrocytes enter maternal circulation (5 ml whole blood, sufficient dose of IgG anti-D 50 µg). If the procedure is performed after the 20th week of gestation, FMH does not surpass 5 ml (10 ml whole fetal blood, sufficient dose of IgG anti-D 100 µg). **This also applies to cases where the needle penetrated the placental tissue during the procedure.**

## METHODS

In the pilot study, a total of **464** examinations were performed. The amount of fetal erythrocytes which infiltrate maternal circulation during amniocentesis was established by flow cytometry using the BDFACSCanto flow cytometer (Becton Dickonson International).

Laboratory processing: Fetal Cell Count™ kit (Diagnosis of Feto-maternal Transfusion by flow cytometry), IQ Products, IQP-379.

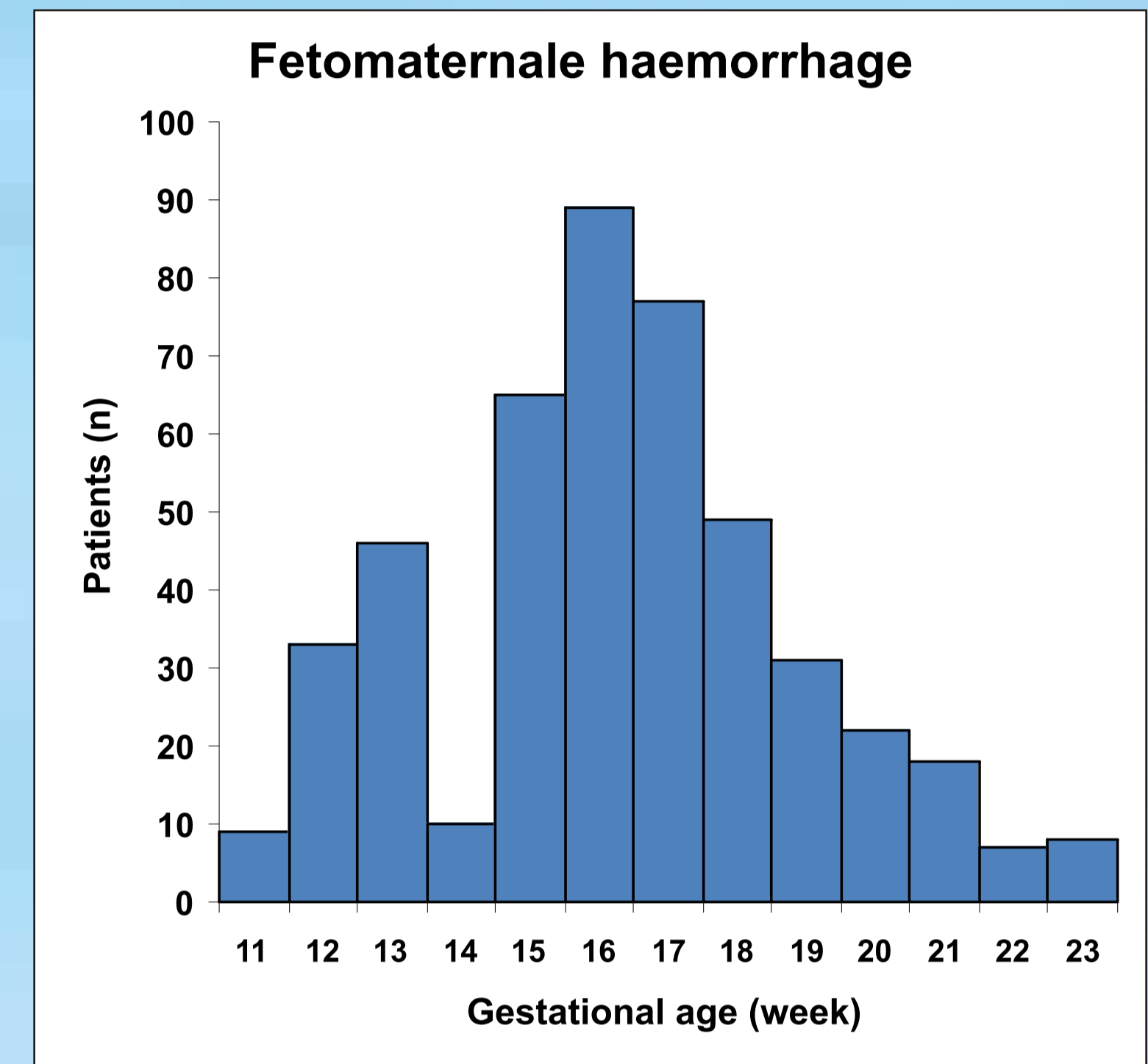
Calculation of the total volume of fetal erythrocytes which infiltrate maternal circulation: Scientific Subcommittee of the Australian and New Zealand Society of Blood Transfusion. Guidelines for laboratory assessment of fetomaternal haemorrhage. 1st ed. Sydney: ANZSBT, 2002: 3-12.

## RESULTS

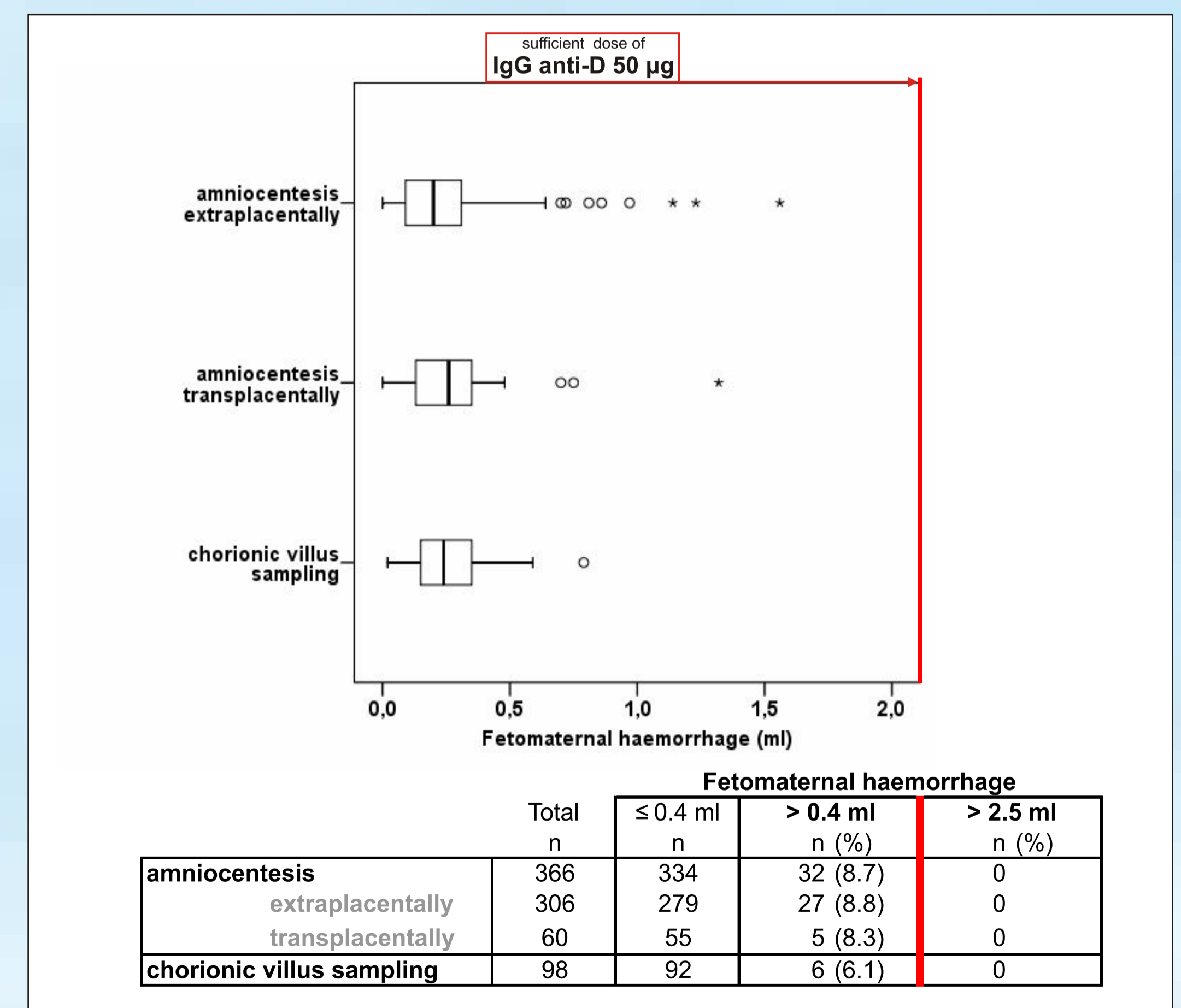
In chorionic villus sampling or amniocentesis, fetomaternal hemorrhage (FMH) ≤ 2.5 ml (5ml whole blood) was present in **100%** of cases (464/464), the sufficient dose of IgG anti-D was **50 µg**. The control group, amniocentesis in which the needle entered extraplacentally during the procedure (n=306), FMH median 0.2 ml (≤ 0.01-1.6), FMH 90 perc. (0.4 ml). The risk groups: amniocentesis in which the needle entered transplacentally (n=60), FMH > 0.4 ml (P 1.0; OR 0.94, 95% CI 0.35-2.55); chorionic villus sampling (n=98), FMH > 0.4 ml (P 0.5; OR 0.67, 95% CI 0.27-1.69). The age of the pregnant women at the time of the procedure 17-44 years (median 34), gestational age 11-23 weeks (median 17).

## CONCLUSION

In chorionic villus sampling or amniocentesis, fetomaternal hemorrhage exceeding 5 ml of whole blood does not occur, therefore an IgG anti-D dose of 50 µg is sufficient for RhD alloimmunization prophylaxis in RhD negative women. **Transplacental needle penetration is not a risk factor for excessive FMH.**



| Characteristics      | Total | Control group                  |                                | Risk groups               |                                |
|----------------------|-------|--------------------------------|--------------------------------|---------------------------|--------------------------------|
|                      |       | amniocentesis extraplacentally | amniocentesis transplacentally | chorionic villus sampling | amniocentesis transplacentally |
| n                    | 464   | 306                            | 60                             | 98                        | 0                              |
| maternal age (years) |       |                                |                                |                           |                                |
| minimum              | 17    | 17                             | 20                             | 20                        |                                |
| maximum              | 44    | 44                             | 41                             | 44                        |                                |
| median               | 34    | 34                             | 34                             | 34                        |                                |
| mean                 | 33.0  | 33.0                           | 32.6                           | 33.6                      |                                |
| SD                   | 5.3   | 5.3                            | 5.1                            | 5.4                       |                                |
| GA (days)            |       |                                |                                |                           |                                |
| minimum              | 78    | 105                            | 105                            | 78                        |                                |
| maximum              | 163   | 162                            | 163                            | 103                       |                                |
| median               | 117   | 121                            | 121                            | 92                        |                                |
| mean                 | 117.0 | 124.0                          | 123.6                          | 91.0                      |                                |
| SD                   | 18.3  | 13.7                           | 14.5                           | 5.2                       |                                |
| FMH (ml)             |       |                                |                                |                           |                                |
| minimum              | 0     | 0                              | 0                              | 0                         |                                |
| maximum              | 1.6   | 1.6                            | 1.3                            | 0.8                       |                                |
| median               | 0.2   | 0.2                            | 0.3                            | 0.2                       |                                |
| mean                 | 0.24  | 0.23                           | 0.27                           | 0.26                      |                                |
| SD                   | 0.19  | 0.20                           | 0.21                           | 0.13                      |                                |



| amniocentesis - transplacental needle penetration |            |                     |            |                         |                    |
|---|------------|---------------------|------------|-------------------------|--------------------|
| FMH (ml)  | n (%)      | Control group n (%) | Odds Ratio | 95% Confidence Interval | P value            |
| > 0.4   | 5/60 (8.3) | 27/306 (8.8)        | 0.94       | Lower: 0.35 Upper: 2.55 | 1.000 <sup>a</sup> |
| > 2.5   | 0          |                     |            |                         |                    |
| chorionic villus sampling                         |            |                     |            |                         |                    |
| FMH (ml)  | n (%)      | Control group n (%) | Odds Ratio | 95% Confidence Interval | P value            |
| > 0.4   | 6/98 (6.1) | 27/306 (8.8)        | 0.67       | Lower: 0.27 Upper: 1.69 | 0.526 <sup>a</sup> |
| > 2.5   | 0          |                     |            |                         |                    |

<sup>a</sup>Fisher's exact test