



# Fetomaternal haemorrhage in vaginal deliveries

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## AIM OF THE STUDY

Determine the incidence of fetomaternal haemorrhage (FMH) in vaginal deliveries, determine the volume of fetal erythrocytes that infiltrate maternal circulation and identify risk factors, which lead to excessive FMH. Establishing these parameters could allow 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 1 ml of whole blood. In the great majority of deliveries, less than 2.5 ml of fetal erythrocytes (5 ml of whole blood, sufficient dose of IgG anti-D 50 µg) enter maternal circulation. During delivery, only rarely does FMH occur, which surpasses 5 ml (10 ml of whole blood, sufficient dose of IgG anti-D 100 µg). The risk of fetal erythrocytes infiltrating maternal circulation is increased in cases of stillbirth, traumatic vaginal delivery, multiple-birth delivery, delivery with signs of placenta previa, delivery with pathology in the third stage of labour, etc.

## METHODS

In the pilot study, a total of **2715** examinations were performed. The amount of fetal erythrocytes which infiltrate maternal circulation during vaginal delivery was established by flow cytometry using the BDFACSCanto flow cytometer (Becton Dickinson International). Laboratory processing: Fetal Cell Count™ kit (Diagnosis of Fetomaternal Transfusion by flow cytometry), IQ Products, IQP-379.

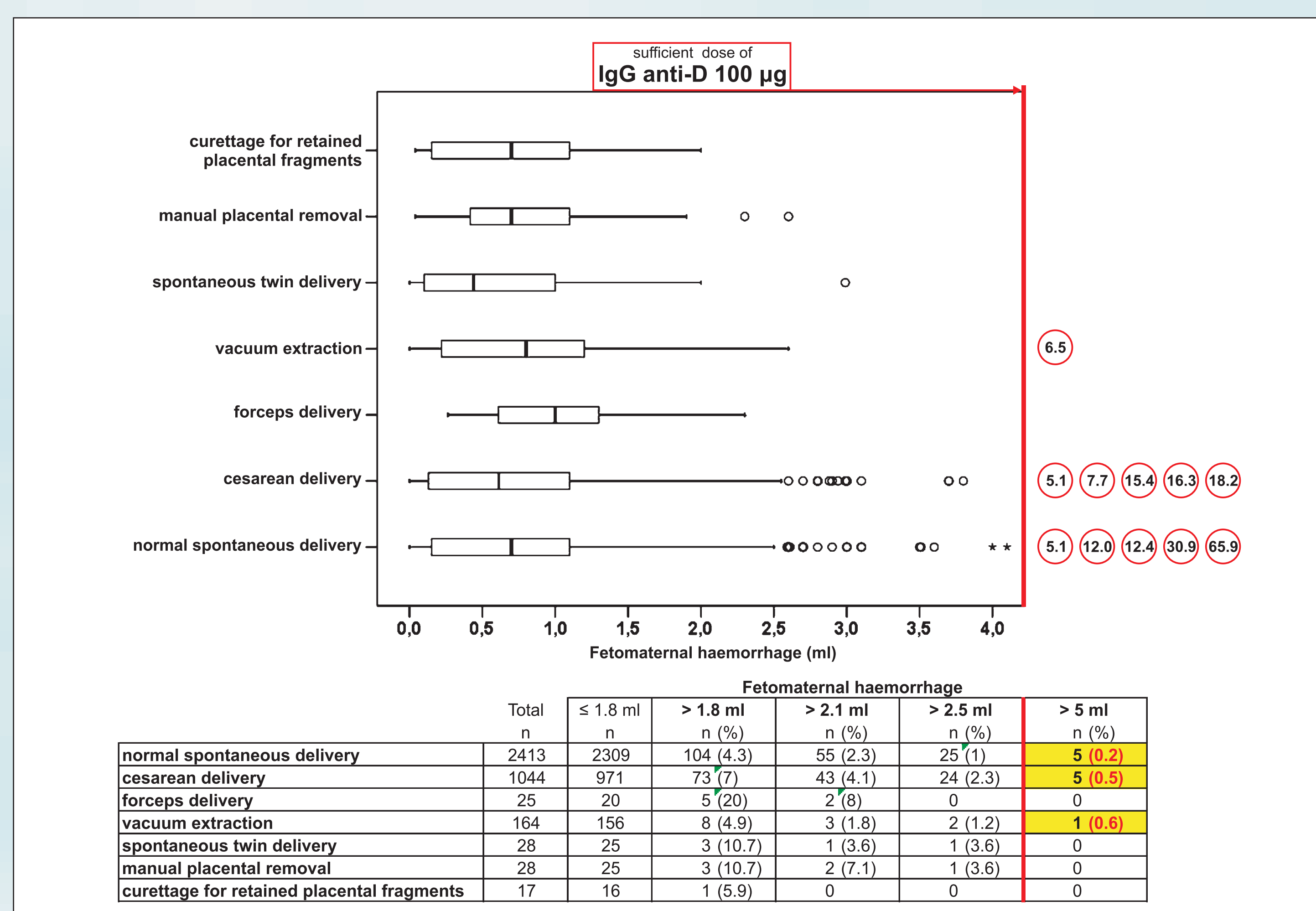
Calculation of the total volume of fetal erythrocytes which infiltrate maternal circulation: Scientific Subcommittee of the Australian and New Zealand Society of Blood Transfusion. Guidelines for laboratory assessment of fetomaternal haemorrhage. 1st ed. Sydney: ANZSBT, 2002: 3-12.

## RESULTS

Fetomaternal haemorrhage (FMH) ≤ 2.5 ml (5ml of whole blood) was present in **98.8%** cases of vaginal deliveries (2682/2715), and the sufficient dose of IgG anti-D was **50 µg**. FMH ≤ 5 ml (10 ml of whole blood) was seen in **99.7%** cases (2708/2715), and the sufficient dose of IgG anti-D was **100 µg**. In the remaining seven cases, the FMH was 5.1 ml, 6.5 ml, 12.0 ml, 12.4 ml, 24.8 ml, 30.9 ml and 65.9 ml (11 ml, 13 ml, 24 ml, 25ml, 50 ml, 62 ml and 132 ml of whole blood), the sufficient dose of IgG anti-D was 110 µg, 130 µg, 240 µg, 250 µg, 500 µg, 620 µg and 1320 µg respectively. In the majority of cases, no risk factor, which would enable prediction of excessive FMH, was determined (only vacuum extraction - 6.5 ml and still birth - 24.8 ml).

## CONCLUSION

In vaginal deliveries where an RhD negative mother gives birth to an RhD positive child, it is appropriate to establish the volume of fetomaternal haemorrhage (FMH) in order to determine the dose of IgG anti-D necessary for the prevention of RhD alloimmunization. In 99.7% of cases, an IgG anti-D dose of 100 µg was sufficient; contrarily, in the remaining **0.3%** of cases, there was an **excessive volume of FMH** and it was necessary to administer a **dose severalfold higher**. In most cases, however, no risk factor which would enable prediction of excessive FMH, was determined.



### cesarean delivery (CD)

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 1.8	73/1044 (7)	104/2413 (4.3)	1.7	1.2	2.3	0.001
> 2.1	43/1044 (4.1)	55/2413 (2.3)	1.8	1.2	2.8	0.003
> 2.5	24/1044 (2.3)	25/2413 (1)	2.2	1.3	4	0.004
> 5	5/1044 (0.5)	5/2413 (0.2)	2.3	0.7	8	0.172

### forceps delivery

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 1.8	5/25 (20)	104/2413 (4.3)	5.6	2	15.1	0.004
> 2.1	2/25 (8)	55/2413 (2.3)	3.7	0.9	16.2	0.06
> 2.5	0	25/2413 (1)				
> 5	0	5/2413 (0.2)				

### vacuum extraction

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 1.8	8/164 (4.9)	104/2413 (4.3)	1.1	0.5	2.4	0.691
> 2.1	3/164 (1.8)	55/2413 (2.3)	0.8	0.2	0.3	0.707
> 2.5	2/164 (1.2)	25/2413 (1)	1.2	0.3	5	0.689
> 5	1/164 (0.6)	5/2413 (0.2)	3	0.3	25.4	0.301

### spontaneous twin delivery

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 1.8	3/28 (10.7)	104/2413 (4.3)	2.7	0.8	9	0.1
> 2.1	1/28 (3.6)	55/2413 (2.3)	1.6	0.2	11.9	0.48
> 2.5	1/28 (3.6)	25/2413 (1)	3.5	0.5	27	0.194
> 5	0					

### manual placental removal

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 1.8	3/28 (10.7)	104/2413 (4.3)	2.7	0.8	9	0.1
> 2.1	2/28 (7.1)	55/2413 (2.3)	3.3	0.8	14.2	0.09
> 2.5	1/28 (3.6)	25/2413 (1)	3.5	0.5	27.1	0.194
> 5	0					

### curettage for retained placental fragments

FMH (ml)	n (%)	Control group n (%)	Odds Ratio	95% Confidence Interval Lower	Upper	P value
> 1.8	1/17 (5.9)	104/2413 (4.3)	1.4	0.2	10.6	0.529
> 2.1	0					
> 2.5	0					
> 5	0					