Validation study of non-invasive procedures for fetal sex and RhD status determination
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Objective
The diagnosis of fetal sex is indicated in X-linked genetic conditions, while fetal RhD determination has a diagnostic value for RhD negative women to identify pregnancies at risk of haemolytic disease of the fetus and newborn. The aims of the study were: 1) the optimization of a rapid and easily applicable procedure for non-invasive fetal gender and RhD determination; 2) the validation of these procedures on a large cohort of pregnant women between 8 and 11 weeks of gestation, in order to establish the accuracy of the methods and therefore its applicability to clinical practice.

Methods
1533 pregnant women undergoing first trimester screening (8-11 weeks of gestation) have been enrolled and cell-free DNA has been isolated for each sample. To date 526 samples have been analysed for fetal gender by multiplex QRT-PCR targeting Y chromosome-specific sequences (SRY-DYS14). 164 samples from RhD negative women were also analysed for fetal RhD status by targeting two exons of the RhD gene. Results were compared with QF-PCR/karyotype results after invasive testing (if available) and/or with neonatal follow-up data.

Results
Concerning fetal sex determination we obtained conclusive results in 519 of 526 samples (98.7%); follow-up data were available for 312 samples and were 100% concordant with QRT-PCR results. As for the RhD study, the recollection of follow-up data is presently ongoing.

Conclusion
Our preliminary data show that non-invasive fetal sex determination is highly accurate and clinically applicable. The introduction of these procedures will allow us to: 1) avoid unnecessary invasive testing for carriers of X-linked diseases in case of female fetus that would be, at worst, carrier of the disease; 2) reduce the administration of anti-D prophylaxis by avoiding the treatment in women with RhD negative fetuses.