Qualitative and quantitative ductus venosus flow assessment in screening for trisomy 18 and 13

Department of Obstetrics and Perinatology, Medical University of Warsaw, Warsaw, Poland

Objective
The aim of the study was to investigate the efficacy of first trimester screening for trisomy 18 and 13, based on maternal age (MA), nuchal translucency measurement (NT), first trimester biochemistry (BC) and Ductus Venosus flow qualitative (absent or present A-wave) and quantitative (Pulsatility Index measurement – DV PI) assessment.

Methods
We analyzed data from ultrasound scans performed at 11-13+6 wks in 7296 singleton pregnancies by FMF-certified doctors. In all patients CRL, NT and FHR was measured and first trimester anomaly scan was performed. In DV A-wave was assessed (positive or negative) and PI was calculated. After the scan, a blood sample was taken for BC analysis (Delfia Express, Perkin–Elmer) and free β-hCG and PAPP-A levels were expressed in MoMs. The risk for chromosomal defects was calculated with Astraia software. The cut-off value for the high risk was 1/300 in both groups. High-risk patients were offered an invasive test (amniocentesis) for karyotyping. In case the patient gave no consent for invasive investigations, the karyotype was determined after birth when the neonatologists suspected trisomy 18 or 13. There were 7239 normal fetuses and 57 with trisomy 18 or 13. Fetuses with other chromosomal defects or normal karyotype and congenital abnormalities were excluded.

Results
The lowest detection rate (DR) 90.02% for FPR=6.0, was noted with following combination of markers: MA, NT, FHR and BC. After adding qualitative A-wave assessment DR increased to 92.10% for FPR=5.8. The best DR=94.81% for FPR=5.4% was achieved when quantitative DV PI was added. For the latter increasing the cut-off for high risk to 1/200 resulted in DR=89.30 for FPR=3.5, and a further increase to 1/100 resulted in DR=83.90 and FPR=2.5. In the ROC (Receiver Operating Curves) analysis performed we found a significant increase of AUC (Area Under Curve), from 0.9002 for MA+NT+BC to 0.9709 when DV PI was added.

Conclusion
Assessment of DV blood blow at the 11-13+6 weeks scan markedly increases the detection rate in screening for trisomy 18 and 13. This increase is significantly bigger when quantitative rather than qualitative DV flow assessment is added to the screening based on MA, NT, FHR and BC.