

**Correlation between second trimester 3D-placental volumetry and vascularization, cytokines in the amniotic fluid and fetal weight at birth**

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**Objective:** The placenta is of utmost importance for fetal growth and well-being. Defective placentation and impaired placental circulation may result in anomalies of fetal growth. Placental volume in the second trimester appears to be closely related to neonatal weight. Placental vascularization can be studied by 3D power Doppler. Growth factors and cytokines in the amniotic fluid may reflect changes in placental function and fetal growth. We therefore investigated whether 3D-placental volume parameters, intraplacental circulation (3D power Doppler angiography) and different cytokines in the amniotic fluid were associated with fetal birth weight.

**Methods:** Included were 211 patients with singleton pregnancy and gestational age between 15+0 and 17+6 weeks. Fetal biometry with regard to biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femur length (FL) was routinely performed. Placental volume and vascularization were assessed by 3D ultrasound and 3D Power Doppler. Placental volume (PV), four different placental ratios (PR1=PV/BPD; PR2=PV/HC; PR3=PV/AC, PR4=PV/FL) and vascularization flow (VFI) indices were calculated. Visfatin, leptin, endoglin, VEGF and PIGF were measured in the amniotic fluid.

**Results:** PV and all placental ratios had a highly significant influence on fetal weight at birth. No significant effects could be shown for VFI. Leptin in the amniotic fluid was significantly associated with fetal biometric parameters (AC, HC and FL) in the second trimester and the percentile of fetal birth weight. VEGF was significantly correlated with VFI.

**Conclusions:** Second trimester placental volume parameters show a strong correlation with fetal birth weight. Leptin in the amniotic fluid is associated with fetal development. Therefore, placental volume and levels of amniotic cytokines may predict fetal growth.