Renal vascularization and fetal hemodynamics in fetuses with growth restriction

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Objective
To evaluate three-dimensional renal volume and vascularization in relation to fetal and placental hemodynamics in fetuses with growth restriction.

Methods
Fetuses with estimated fetal weight below the 10th percentile were evaluated once. Bidimensional ultrasound and threedimensional power Doppler with VOCAL technique were used in order to study the correlation between renal indexes (VI, FI and VFI), renal volume and placental and fetal hemodynamics (pulsability index of umbilical arteries, middle cerebral artery and ductus venosus). Partial correlation analysis (controlled for renal depth and gestational age when indicated) was performed in order to evaluate correlation between each Doppler velocimetric index and the mean of each renal vascularization index.

Results
From the initial sample of 83 fetuses two were excluded because they presented only one kidney, remaining 81 fetuses. VI, FI and VFI showed negative correlation with the ductus venosus pulsatility index (rho = -0.41, -0.42 e -0.45, respectively, p <0.0001). VI and VFI showed positive low correlation with the amniotic fluid index (rho = 0.30 e 0.29, respectively). There was no correlation between the vasculatization indexes and the Doppler velocimetric findings of the umbilical arteries and middle cerebral artery; also, there was no correlation between the renal arteries pulsatility index, renal volume and renal flow index with the amniotic fluid index. The group of fetuses with the worst hemodynamic picture (abnormal umbilical arteries, middle cerebral artery and ductus venosus pulsatility indexes) showed means of vascularization, and vascularization and renal flow indexes significantly lower than the group with no changes in these pulsatility indexes.

Conclusion
Renal vascularization indexes were inversely correlated to ductus venosus pulsatility indexes and were diminished in fetuses showing hemodynamics compromise. This changes might be related to post-natal renal impairment in those fetuses.