Evaluation of the single or the combined impact of prematurity and IUGR on renal development in paired Twins

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Abstract

Background: Twin pregnancies are at significantly increased risk for prematurity and intrauterine growth restriction (IUGR), two conditions characterized by low birth weight which is considered a risk factor for impaired nephrogenesis, normally completed between 32 and 36 weeks of gestation. At the end of this period, each kidney has a number of nephrons that can vary widely, in correlation with birth weight. Once the nephrogenesis has stopped, there is no possibility of forming new nephrons later in life. In this study we investigated renal volumes and urinary Cys-C in a cohort of twins classified in different groups (preterm and at term, with and without IUGR) in order to evaluate the single or the combined impact of prematurity and IUGR on renal development /damage, eliminating maternal conditions. **Methods**: this study was carried out on 30 twins at 30-40 days of corrected age. Urinary Cys-C levels were measured using The EIA DetectX® Human Cystatin C kit. Whole kidney and renal cortex volumes were assessed with ultrasounds (Vocal II; Software, GE). **Results:** Multiple regression analysis showed the strongest correlation between renal volume and birth weight ($p<0.00001$). IUGR twins showed urinary Cys-C levels significantly higher than those found in the respective preterm twins, in conjunction with a reduced renal volume. **Conclusions:** the increased levels of Cys-C in the urine of neonates with IUGR, significantly associated to a reduced renal/renal cortex volumes. IUGR condition affected the volume and the renal functionality in a more definitive way than prematurity; a high percent of preterm twins not affected by IUGR, at 30-40 days of corrected age, did not show statistically significant difference from newborns at term.