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Increased urinary cystatin-C levels correlate with reduced renal volumes in neonates with intrauterine growth restriction

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Exposure to intrauterine growth retardation (IUGR) can have a negative impact on nephrogenesis resulting in limited fetal kidney development and supporting the hypothesis that IUGR represents a risk for renal function and long-term renal disease. Cystatin C (Cys-C), a strong inhibitor of cysteine proteinases, is freely filtered by the kidney glomerulus and is reabsorbed by the tubulus and totally catabolized; what remains is subsequently eliminated in urine. In tubular diseases and in hyperfiltration conditions, it seems reasonable to postulate that Cys-C degradation waved decrease, and consequently an increase in its urinary elimination would be observed. The aim of this study was to investigate the urinary excretion of Cys-C simultaneously with the assessment of renal volumes in adequate for gestational age (AGE) and IUGR neonates in order to identify its clinical value in IUGR. Urinary Cys-C levels were measured using the enzyme immunoassay Detect X® Human Cystatin C kit in IUGR and AGA neonates. Whole renal and renal cortex volumes were assessed with ultrasounds (Vocal II; Software, GE). Urinary Cys-C levels in UGR were significantly higher than those found in AGA and were negatively correlated to reduce whole renal and renal cortex volumes. The increased levels of Cys-C in the urine of neonates with IUGR were significantly associated with reduced renal/renal cortex volumes, suggesting that Cys-C could be taken as a surrogate nephron mass. It also could be used as an early biochemical marker to identify IUGR neonates at high risk of developing long-term renal disease and to select patients monitoring during childhood.

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The newborn infant is not a miniature adult

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Introduction: Pediatric anatomy has been neglected throughout medical history. In 1973, Professor Crelin published the first atlas of human infant anatomy in medical history. He himself illustrated "Anatomy of the Newborn", a work that took six years to complete. This atlas is accompanied by an 87-page text called "Functional Anatomy of the Newborn". The significance of his works brings new light to the question: Is it not time to revisit pediatric anatomy in view of modern imaging technology?

Resources: The journal *Clinical Anatomy* has recently published its second special edition on surface anatomy with a number of studies on children. This highlighted the differences not only between children and adults, but also throughout growth.

Description: Important examples are the termination of the spinal cord (the conus medullaris) and the duodenojejunal flexure (DJF). The former is at a median level of the L2 vertebra in the neonate compared to the lower border of L1 in adults. Variable anatomy means that in some infants, the conus medullaris may lie as low as L3. The supracristal plane between the highest points of the iliac crests is slightly higher (L3/4); a lumbar puncture in the newborn should not be performed above this level. Another example is the position of the DJF, a marker of intestinal rotation, which was consistently found to the left of midline but at highly variable vertebral levels (T11-L3).

Significance: These two examples demonstrate the urgent need for extensive and systematic research in pediatric anatomy by clinical anatomists around the globe.

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