

DIAGNOSTIC VALUE OF CYTOKINES MEASUREMENT IN NEWBORNS WITH IMPAIRED KIDNEY FUNCTION DUE TO ASPHYXIA

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Violation of the content and balance of pro- and anti-inflammatory cytokines play a role as in the pathogenesis of antigen-mediated reactions, but also may result in hypoxic complications in newborns, indicating the universality of immune mechanisms. Hypoxia causes a significant increase of mRNA responsible for the synthesis of pro-inflammatory interleukin-1 β (IL-1 β), tumor necrosis factor α (TNF α) and anti-inflammatory cytokines – interleukin-10 (IL-10) in 3 hours after exposure to pathological factors.

Main aim of work is to examine the features of balance between pro- and anti-inflammatory cytokines in full-term infants with impaired kidney function due to asphyxia at birth.

The study involved 252 full-term newborns with disturbed kidney function. Among them 102 children had severe asphyxia and 150 had moderate asphyxia. Comparison group included 20 healthy ones. The level of IL-1 β , IL-6, TNF α and IL-10 in serum were determined on 1–2, 7–8 and 25–30 days of life by ELISA.

Increased level of serum IL-1 β in children with asphyxia in the first days after birth is a universal response to oxygen deficiency which is independent from severity of asphyxia. Both groups demonstrated elevation IL-1 β level in 2.5 times, i.e. newborns with moderate asphyxia had 27.27 ± 2.32 pg/ml, and newborns with severe asphyxia had 29.65 ± 4.68 pg/ml. Only later one could see statistical difference between these groups. That's why its determination in serum is necessary for retrospective investigations of the severity of the asphyxia in newborns since the end of neonatal period.

Serum TNF α content in infants with impaired renal function due to asphyxia, increases quite early (1–2 days of life) and it's specific with level depending on the severity of the asphyxia. Serum TNF α concentration was statistically greater in newborns with severe asphyxia (13.19 ± 0.63 pg/ml) compared to patients with moderate severity (9.87 ± 0.6 pg/ml). Further, subsequently we found progressive decrease in its concentration and serum content and independency from severity of asphyxia in both groups. That's why serum TNF α content should be used only for early diagnosis of kidney disturbance in case of asphyxia.

Interleukin-6 was most informative of the cytokine; its level increased in the first days of life in case of impaired renal function and depended on the severity of asphyxia during all neonatal period. Concentration of IL-6 was 61.23 ± 6.39 pg/ml, 57.29 ± 5.7 pg/ml, 33.96 ± 3.99 pg/ml and 40.95 ± 3.09 pg/ml, 21.03 ± 1.61 pg/ml, 16.28 ± 1.32 pg/ml on 1–2, 7–8 and 25–30 days of life in newborns with severe and moderate asphyxia respectively.

Concentration of anti-inflammatory IL-10 in serum increased proportionally to elevation of pro-inflammatory cytokines. Its level was maximal on 7–8th days of life (16.34 ± 0.96 pg/ml and 11.03 ± 0.64 pg/ml in newborns with severe and moderate asphyxia respectively). Serum level of IL-10 is closely correlated with the levels of pro-inflammatory cytokines in the first days of life in children with impaired renal function due to asphyxia. Character of correlation depends on the prevalence of regulatory or suppressive processes.

Conclusion. Early renal impairment due to asphyxia and degree of severity was well shown by serum TNF α . Concentration of IL-1 β retrospectively showed previous neonatal renal impairment due to birth asphyxia. Interleukin-6 was most informative and universal cytokine. Its level described kidney function impaired and depends on the severity of asphyxia during all neonatal period. The various changes in the cytokines highlighted kidney disturbances and its severity which needed subsequent biochemical investigations (i.e. cystatin C etc.) and measurement of glomerular filtration rate (GFR).

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