**Introduction.** Asphyxia in newborns is characterized by impaired respiratory function and blood circulation, which is accompanied by metabolic "fire", which determines the severity of the child's condition in the early neonatal period. However, despite the applied standard therapy, as reflected in the protocols of the treatment of acute asphyxia, the effectiveness of treatment varies from complete recovery, recovery with signs of neurologic deficit to lethal outcome. This allowed us to assume that a certain role in the course of the disease belongs to the systemic inflammatory response (SIR). The aim of this work was to study the biochemical pattern of systemic inflammation in infants who had sustained severe asphyxia at birth.

**Materials and Methods:** There were examined 34 full-term newborns who were treated at ICU of Kharkiv Regional Children Hospital №1 with the diagnosis of severe asphyxia. The patients were transported by a team of emergency medical care for newborns, from Kharkiv regional health care institutions. Originally they were in an extremely critical condition due to acute respiratory and cerebral failure on the background of the absence of inflammatory foci. Substitution of the respiratory function was carried out from the first minutes of life by means of modern respirators. Continuous monitoring of the patient using the follow-up devices, standard para-clinical, biochemical and bacteriological investigations was conducted.

In children following markers of inflammation were studied: interleukin-6 (IL-6), interleukin-1 (IL-1β), interleukin-4 (IL-4) and tumor necrosis factor (TN) at 3, 5 and 7th day of life (disease) by ELISA. In order to identify the relationship between inflammatory process and endogenous intoxication the level of average weight molecules (AWM) by means of a spectrophotometric method (by Badd) was studied.

The results were processed using the software package Statistica for Windows version 6.0, to obtain descriptive statistics for the indicators measured in quantitative scales. Following non-parametric statistical methods were used: the Kolmogorov-Smirnov test, Mann-Whitney criterion. Comparative evaluation of the data was based on the reliability of p≤0,05.

**Results.** The obtained data from recovered patients showed stable grades of IL-6, IL-1, TNF against the background of higher levels of IL-4 to the 7th day of life, i.e. the course of SIR in the recovered newborns was represented by anti-inflammatory cytokine IL-4 activity. A different picture was observed in the group of children who died: it was characterized by high initial levels of IL-4, IL-6 and IL-1 on the third day of life, compared with the previous group, followed by a uniform reduction in IL-4 to the 7th day of life, and a sharp decrease in IL-1 and IL-6 levels on the 7th day. Dynamic study of TNF was characterized by stable index in both groups, but the group of recovered children had significantly higher grade than in those who died, as far as one and a half times higher (55.51 pg / ml vs 36.87 pg / ml). Comparative estimation of cytokines levels on day 3 showed that those of IL-4 and IL-6 in the group of children recovered were significantly less than in the group of died. It was revealed the presence of endogenous intoxication of the degree I in the
recovered children from the 3rd to the 7th day, while the children who died had growing endogenous intoxication (up to the second degree) on the 7th day of life on the background of a sharp decline of IL-4 and IL-6. Studies carried out have revealed that in died newborns SIR was more pronounced on the third day. In recovered newborns SIR was accompanied by activation of anti-inflammatory cytokine IL-4, which may have prevented the progression of SIR and development of endogenous intoxication, and the stability of pro-inflammatory cytokines showed the adequacy of the systemic inflammatory response.

The course of SIR in the group of died newborns was characterized by activation of either anti-inflammatory and pro-inflammatory cytokines with the parallel development of endogenous intoxication and abrupt inhibition of synthesis of all studied cytokines accompanied by the further progression of endogenous intoxication on the 7th day of life.

Stability of pro-inflammatory cytokines (TNF, IL-6, IL-1) on the background of the dynamic activation of anti-inflammatory cytokine IL-4 generates a certain cytokine balance. The predominance of pro-inflammatory cytokines, accompanied by inhibition of the synthesis of anti-inflammatory cytokine on the 5th day in deceased patients, was indicative of a cytokine imbalance, resulting in the depletion of the cytokine system to the 7th day of life in the form of falling levels of all cytokines investigated.

**Conclusions.** The stability of the levels of studied pro-inflammatory cytokines during the seven days of life in infants who have had severe asphyxia at birth, indicated a favorable course of SIR. In the group of died newborns sustained severe asphyxia at birth, SIR was characterized by the development of cytokine imbalance and severe endogenous intoxication, which therefore testify an unfavorable prognostic sign for the recovery of the patient.