Introduction

In the newborns it is essential to assess the obtained intrauterine fetal growth according to gestational age. Comparing to full-term infants, nutrition of the premature infants is very complex, and it de-
pends on the organs immaturity as well as on the special energetic and nutritional needs of these infants. Real needs of preterms are also greater than in full-terms. For that reason, nowadays, we use a plan of a nutritional supplement identical to the intrauterine. In that way we try to reach a growth at the same dynamics as it was intrauterine. Sometimes, feeding the premature infants with human milk is not caloric enough, so it is necessary to increase intake of proteins and essential fatty acids using human milk fortifie or specialized formulas (1, 2).

**Material and Methods**

In the Institute of Neonatology a prospective study was conducted which included monitoring of the biochemical and anthropometric parameters in two groups of premature infants. One group of infants was fed with human milk, and the other with the specialized formula preImpamil. In the study that lasted four months, we successively included infants (gestational age less than 36 weeks and body mass less than 2500 g) to whom it was possible to apply complete parenteral intake in the first 3 days of life.

In the study period of 4 weeks, we evaluated the tolerance of the formula and infant growth according to body length, as well as the head and thorax circumference.

At the same time, biochemical, hematological and blood gas analyses were followed-up in infants during the investigated period.

The study included 80 infants (45 male and 35 female), gestational age 32–36 weeks, having organized enteral feeding in the first 3 days of life. 48 infants were eutrophic and 32 were with intrauterine growth retardation. Apgar score and gestational age were the basic prognostic factors in making the decision about the right time for starting enteral feeding.

Control group consisted of 24 infants being fed only with mother’s milk, and, depending on the maturation of the infants, they were fed by gastric tube or with bottles (Table I).

We made a comparison of the human milk components from mothers having premature birth with the components of specialized formula preImpamil, which we used to fortify mother’s milk.

We also investigated the osmolality of each meal prepared from required amounts of preImpamil added to mother’s milk to obtain 5–12% mixture, reaching in that way the recommended values for caloric and nutritive intake in infants. In this way, infants received high energetic and nutritive intake in smaller volume with permitted optimal osmolality 244–315 mOsmol/L. (Osmolality was measured by the cryoscopy method) (Table II).

Feeding was organized as full volume intake in mL/kg/day, from 70 mL/kg/day at the beginning of the feeding, up to 150 mL/kg/day at the 5th day of feeding, and 170–200 mL/kg/day at the 10th day. At the beginning of the study (P₀) and once per week (P₁–P₄) we performed:

- Blood gas analyses from »arterialized« capillary blood on ABL 625 Blood Gas System-Radiometer.
- Hematological status through values of hemoglobin, hematocrit, erythrocyte and platelet count on COBAS MICROS OT-ROCHE-ABX.
- Biochemical monitoring included: proteins (colorimetric Biuret method), albumin (BCG-Bromcresol green), urea (UV-kinetic method), ionized calcium (ion selective electrode), phosphorus (UV-method with ammonium molybdate), and glucose level (GOD-PAP method).

At the beginning and at the end of the study, for the evaluation of nutrition effects, we measured the values of prealbumine and transferrine by the nephelometric »end-point« immunoprecipitation method (test »Orion-Diagnostica«).

For all analyses mentioned above, we used 300 μL of serum, and 150 μL of blood.

All data have been statistically analyzed using descriptive and parametrical testing and ANOVA testing on one-factorial analyses of variance.

| Parameter, Units | Mother’s milk | preImpamil (16%) |
|-----------------|---------------|------------------|
| E, Kcal/100 mL  | 67            | 79.2             |
| Osmolality, mOsmol/L | 300–308      | 315              |
| Carbohydrates, g/100 mL | 7.0       | 9.0              |
| Proteins, g/100 mL  | 1.2          | 2.4              |
| Ca, mg/100 mL   | 34            | 108              |
| P₇, mg/100 mL   | 14            | 65.2             |

Table II Comparative components of mother’s milk and examined formula.
Results

Investigated infants improved in body mass 10–75 g/day, and during the whole study 600–800 g. Initial decrease in body weight in 7–9% of birth weight was physiological, and time for gaining weight at birth was statistically less significant in preImpamil group (p<0.01) comparing to the control one (Table III).

The results of pH and BE during the investigated period show no statistically significant differences proving the stable acidobase status, which is a good point for the tolerance of preImpamil. This study has not shown appearance of the postacidotic syndrome (Table IV).

During the growth, there was a statistically significant decrease in hemoglobin concentration (Hb), erythrocyte (Er) and hematocrit (Hct), p<0.001, and a statistically significant increase in platelet count (PLT), p<0.001. These changes in hematological values are physiological for premature infants, so there is a recommendation for addition of Fe in formulas, with continuous follow-up of parameters for anemia assessment in the first six months of infant’s life (3) (Table V).

Biochemical parameters estimated once a week show no significant differences in glucose level, while the fraction of ionized calcium was significantly lower, so calcium was added parenterally. Values of phosphorus and alkaline phosphatase were significantly higher (p<0.01) at the end of the first and second week (4) (Table VI).

Level of protein fraction has been analyzed by measuring values of proteins, albumin, prealbumine, transfereine and urea (Table VII).

Values of total proteins and albumin fraction were statistically significantly higher (p<0.01) in the second study week, when the beginning of growth

### Table III Variable of body mass.

| Parameter                        | Mothers milk | preImpamil (16%) |
|----------------------------------|--------------|------------------|
| Initial decrease of BM (%)       | 8.7 ± 3.1    | 7.02 ± 1.89      |
| Gaining birth BM (day)           | 26 ± 1.7     | 12.48 ± 5.34*    |
| Improvement (g/day)              | 11.4 ± 4.4   | 24.88 ± 5.79*    |
| Increase in length (cm)          | 2.2 ± 0.2    | 3.68 ± 1.7*      |

* p < 0.01

### Table IV Acidobase parameters.

| Measurement | pH  | BE  |
|-------------|-----|-----|
| P₀          | 7.37| -1.29|
| P₁          | 7.39| 0.01|
| P₂          | 7.39| 0.04|
| P₃          | 7.39| 0.32|
| P₄          | 7.40| 0.42|

### Table V Hematological status.

| Measurement | Hb    | Er    | Hct    | PLT   |
|-------------|-------|-------|--------|-------|
| P₀          | 183   | 5.14  | 0.53   | 260   |
| P₁          | 146   | 4.44  | 0.43   | 424   |
| P₂          | 136   | 4.09  | 0.39   | 450   |
| P₃          | 129   | 3.97  | 0.37   | 413   |
| P₄          | 121*  | 3.79* | 0.35*  | 424*  |

* p < 0.001

### Table VI Biochemical monitoring.

| Measurement | Glucose mmol/L | Ca²⁺ mmol/L | P mmol/L | Alkaline phosphatase, U/L |
|-------------|----------------|-------------|----------|---------------------------|
| P₀          | 3.77           | 1.14*       | 2.11     | 55.36                     |
| P₁          | 4.01           | 1.21        | 2.41*    | 57.68*                    |
| P₂          | 3.84           | 1.22        | 2.43*    | 56.44*                    |
| P₃          | 3.77           | 1.16        | 2.22     | 54.56                     |
| P₄          | 4.09           | 1.14        | 2.29     | 54.49                     |

* p < 0.01

### Table VII Monitoring of protein fractions.

| Measurement | Proteins, g/L | Albumin, g/L | Prealbumine, g/L | Transferin, g/L | Urea, mmol/L |
|-------------|---------------|--------------|------------------|----------------|--------------|
| P₀          | 55.36         | 35.01        | 0.103            | 0.998          | 4.77         |
| P₁          | 57.68*        | 37.05*       | 3.52             |                |              |
| P₂          | 56.44*        | 36.80        | 3.25             |                |              |
| P₃          | 54.56         | 36.47        | 3.31             |                |              |
| P₄          | 54.49         | 36.76        | 0.171            | 1.078          | 3.48         |

* p < 0.01
effect is obvious (5). Concentrations of prealbumin and transferin increase with growth, but with no statistically significant differences. There was a decrease of urea value during the investigated four weeks within the reference ranges, showing good protein intake.

**Discussion**

Human milk fortified with the special domestic formula preImpamil stimulates growth in premature infants during the neonatal period.

Time necessary for gaining birth weight is statistically significantly shorter in infants fed with preImpamil.

**References**

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