

STABILITY OF LIPID EMULSION IN PEDIATRIC PARENTERAL NUTRITION WITH HIGH ELECTROLYTIC LOAD.



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INTRODUCTION

Ternary mixtures in parenteral nutrition (PN) have a complex composition, so interactions between components lead to instability compromising its safety. Fat globules larger than 5 microns can cause thromboembolisms. Critical aggregation number (CAN) is used to predict stability (calculated with cations concentration).

PURPOSE

- To analyse the stability of the lipid emulsion in PN samples with high CAN using globule size measurements.
- To evaluate the influence of temperature and time on emulsion stability.

MATERIAL AND METHODS

We studied 4 samples according to the nutritional requirements of a 1Kg neonate during the first days of life. Micronutrients amounts were greater than those recommended and vitamins and zinc were also added. Samples were prepared in duplicate.

The globule size was measured by Laser Diffraction (BeckmanCoulter LS-13-320) on the preparation day (day 0) and after 7 days. The samples were stored at refrigeration and room temperature.

CAN was calculated based on the concentrations of cations present in each PN.

Statistical analysis was performed using the Student's t- test (statistical significance $p < 0.05$).

RESULTS

PN composition:

SAMPLE (100mL)	nitrogen (g/L)	glucose (g/L)	lipids (g/L)	sodium (mMol/L)	potassium (mMol/L)	magnesium (mMol/L)	calcium (mMol/L)	Phosphorus (mMol/L)	CAN (mMol/L)
PN1	3,7	92,6	17,5	40,0	30,0	3,0	20,0	20,0	1542
PN2	4,2	106,8	21,6	40,0	30,0	3,0	20,0	20,0	1542
PN3	4,7	121,0	25,8	50,0	35,0	3,5	22,5	25,0	1749
PN4	5,2	135,2	29,9	60,0	40,0	4,0	25,0	30,0	1956

Average globule size (microns):

SAMPLE	SIZE DAY 0	SIZE DAY 7 (25°C)	SIZE DAY 7 (4°)
PN1	0,251±0,086	0,263±0,099	0,244±0,081
PN2	0,269±0,115	0,248±0,086	0,257±0,095
PN3	0,266±0,098	0,268±0,112	0,270±0,102
PN4	0,270±0,101	0,273±0,111	0,257±0,082

No significant differences were observed between the globule size at day 0 and day 7 ($p=0.896$) and neither on samples stored at room temperature or in a refrigerator ($p=0.171$).

CONCLUSIONS

- Average globule size was stable despite high CAN of samples, but more sensitive analytical techniques may be necessary to detect changes in the fraction of large globules.
- The study time and the different storage temperature didn't influence the average globule size of our samples.
- To establish the overall stability of the PN, more complete studies should be carried out, which analyse more stability-dependent processes.

