SIALIC ACID CONTENT IN INFANT FORMULAS AND THE INTAKE ESTIMATION IN THREE EUROPEAN COUNTRIES

Claumarchirant L[1], Sánchez-Siles LM[2], Matencio E[3], Alegría A[1], Lagarda MJ[1]

[1]Nutrition and Food Science Area, University of Valencia, Valencia, Spain, [2]R+D Hero Group, Lenzburg, Switzerland, [3] R+D Hero Spain, Murcia, Spain.

INTRODUCTION

Human milk (HM) is the optimal feeding for the first months of life of the newborn but when breastfeeding is not possible, many infants are fed with infant formulas (IFs).
Sialic acids (N-acetylneuraminic acid- Neu5Ac and N-glycolylneuraminic-Neu5Gc) are bioactive compounds present in HM and in less concentration in IFs. Sialic acids play an important role in infants' brain development[1], immunity against infections and the development of the digestive system. In order to improve IFs composition to be closer to HM, it is of interest to characterized these compounds in IF.

The aim of this work was to determine the different sialic acids (Neu5Ac and Neu5Gc) content in infant formulas from three European countries, and to estimate sialic acid intakes.

METHODS

- Twelve IFs from three different countries in Europe: Spain (n=5), Czech Republic (n=4) and Sweden (n=3) were analysed.
- A high-performance liquid chromatographic method (HPLC-fluorescence) was applied[2]. Briefly, 0,75 g of IF were hydrolyzed with H_2SO_4 0.05 M, centrifuged (1000xg/4°C/10min), purified by ion exchange (2mL of Dowex 1x8), ultrafiltered (Microcon Ultracel YM-10, 13000xg/4°C/10min) and derivatized (DMB 50°C/2.5h).
- The Neu5Ac and Neu5Gc contents were determined by used calibration curve: Neu5Gc (1,6 - 8 ng/ assay) and Neu5Ac (12,5 – 250,8 ng/assay).
- For estimation of sialic acid intake, average reported milk intake volumes (mL/day) from several clinical studies, including 1113 infants from 1 to 6 months of life were used[3].

RESULTS

- Sialic reproducibility of twelve calibration curves injected on different days (n=12) was evaluated and no significant differences ($p<0,05$) were found. Average: y=17025,27x-8201,33 (R^2=0,9927) for Neu5Ac and y=12892,99x-3912,56 (R^2=0,9987) for Neu5Gc.
- The retention time of Neu5Ac and Neu5Gc were 8,1±0,2 min and 10,2±0,3 min, respectively.
- The minimum and maximum mean contents of the corresponding IFs were: Neu5Ac (126-251,4 mg/L: Spain: 179±33 Czech Republic: 217±29 and Sweden: 169±25) and Neu5Gc (1,4-9,7 mg/L: Spain: 6,7±1,8 Czech Rep: 5,7±0,6 and Sweden: 3,8±1,4).
- The minimum and maximum mean contents of the corresponding IFs intakes were Neu5Ac (95,13-248,89 mg/day) and Neu5Gc (1,07-9,61 mg/day).

CONCLUSIONS

- The contents of sialic acids in IFs were similar to published values using similar methodology but lower than in mature HM.
- More research is need to both increase the levels of Neu5Ac to reach human milk levels, and to evaluate the potential health benefits.
- The highest sialic acid intakes was at 4 and 5 months.

Table 1. Sialic acid in Infant formulas

Product	Country	Neu5Ac (mg/L) Mean±SD	Neu5Gc (mg/L) Mean±SD
A	Sweden	207,05±18,05	5,19±0,20
B	Sweden	149,36±2,43	4,83±0,04
C	Sweden (BMF/MFGM)	151,10±7,38	1,42±0,10
D	Spain (BMF)	126,17±8,95	5,29±0,19
E	Spain	201,95±11,11	9,71±1,84
F	Spain (BMF)	193,83±8,33	6,15±1,40
G	Spain	166,36±10,51	5,48±0,29
H	Spain (BMF/MFGM)	205,24±16,73	6,92±0,27
I	Czech Republic	195,25±12,39	5,49±0,04
J	Czech Republic	208,40±20,39	5,73±0,17
K	Czech Republic (BMF)	213,07±8,52	5,02±0,25
L	Czech Republic	251,40±9,84	6,41±0,06
12 Infant Formulas	**3 countries**	**mean (mg/L) 189,09±11,22**	**mean (mg/L) 5,63±0,40**

BMF: Bovine Milk Fat; MFGM: Milk Fat Globule Membrane; LBSA: Lipid Bound Sialic Acid

Figure 1. Estimation of Neu5Ac mg/day per country

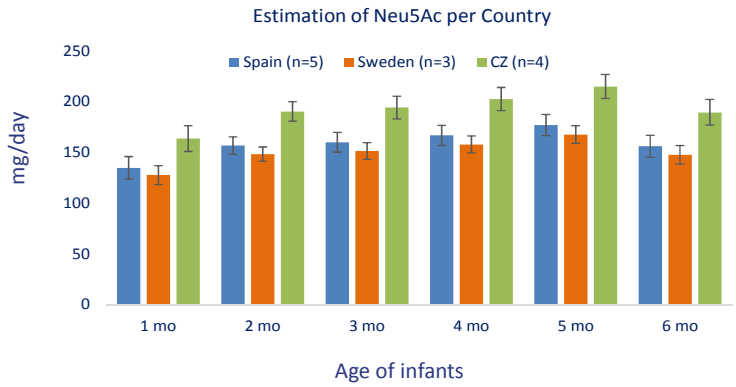
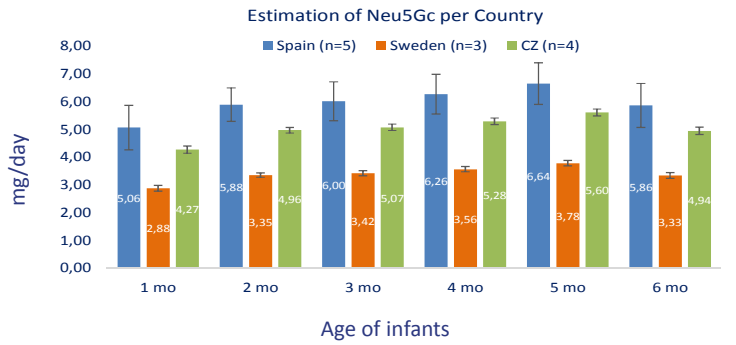


Figure 2. Estimation of Neu5Gc mg/day per country



REFERENCES

1. Wang, B. (2009) Ann.Rev.Nutr.29, 177-222
2. Salcedo et al. (2011). Food Chem. 127,
3. Manuscript under elaboration. Internal project

Disclosure of Interest:
Claumarchirant L, Alegría A & Lagarda MJ: None Declared.
Sánchez-Siles LM & Matencio E: Conflict with: Hero Group.

BioNutest