



Evaluation of magnesium, copper and lead in amniotic fluid and maternal serum at birth

Kocylowski R, Grzesiak M, Gaj Z, Lorenc W, Bakinowska E, Barakiewicz D, von Kaisenberg CS, Suliburska J
Department of Obstetrics, Perinatology and Gynecology, Polish Mother's Memorial Hospital Research Institute, Lodz, Poland

Objective

To determine the concentration and the reference ranges of magnesium (Mg), copper (Cu) and lead (Pb) in amniotic fluid (AF) and maternal serum (MS) at birth.

Methods

The study was conducted among 175 healthy pregnant caucasian women aged 18-42. Amniotic fluid and maternal blood samples were collected during delivery. An inductively coupled plasma mass spectrometry (ICP-MS) technique was used to determine the levels of Mg, Cu and Pb, in AF and MS. The reference values ranges were calculated for all analyzed elements in the serum and amniotic fluid.

Results

The mean concentrations of Mg and Cu were higher in MS than in AF. Opposite result was obtained for Pb in MS and AF. Multiple regression analysis showed that maternal/neonatal body mass (MBM/NBM) ratio was a strong negative predictor (among maternal age (MA) and gravidity (G)) of Mg concentration in amniotic fluid. In the serum, MBN/NBM was a strong positive predictor of Cu concentration.

Conclusion

The reference value ranges of Mg, Cu and Pb were established in AF and MS among a population of healthy pregnant Polish women at birth. The level of Mg, and Cu in AF and MS may be determined by maternal age and maternal/neonatal body mass ratio.

Table 1. Elements concentration in maternal serum (MS) and amniotic fluid (AF) [μgL^{-1}].

	Min	Max	Median	Mean	SD	Reference values range (2.5 th -97.5 th percentile)
Maternal serum						
Mg	9617	20976	15849	15567	2377	15189- 15945
Cu	1094	2869	2097	2103	366.8	2043 - 2163
Pb	0.203	7.93	1.30	1.62	1.29	1.40 - 1.85
Amniotic fluid						
Mg	3267	13377	9297	9004	2085	8686 - 9321
Cu	17.88	108.8	64.92	67.73	18.56	64.84 -70.61
Pb	0.088	99.70	3.36	10.23	17.32	7.43 - 13.03

Min-minimum value; max-maximum value; SD-standard deviation;

Table 2. The estimators of the multiple regression of minerals concentration in amniotic fluid (AF).

	Mg	Cu
Maternal age	0.023	0.22
Maternal/newborn body mass	-113.92*	-0.064
Gravidity	127.05	1.09

(*) p=0.05

Table 3. The estimators of the multiple regression of minerals concentration in maternal serum (MS).

	Mg	Cu
Maternal age	-15.57	-6.49
Maternal/newborn body mass	-8.78	26.40*
Gravidity	-272.84	48.81

(*) p=0.01