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Calcium pump activity in relation mercury and lead exposures in term newborns

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Deregulation of calcium (Ca) homeostasis can produce serious effects on cell functioning due to an alteration of Ca signaling. The calcium homeostasis was shown to be targeted by several environmental toxicants including lead (Pb) and mercury (Hg). Both, inhibitory and activation, effects on Ca pump were demonstrated in experimental studies. The objective of this study was to determine the effect between Pb and Hg exposures on peripheral erythrocyte calcium pump activity in human newborns.

Method: We determined total Hg concentration in 109 hair samples obtained at delivery from pregnant women participating in our prospective longitudinal study. Blood and hair Pb were available from mothers and their newborns. Basal and calmodulin stimulated Ca pump activity was measured in red blood cell membranes from mothers and from cord.

Results: We observed the strong negative relationship between maternal hair Hg and Ca pump activity in cord blood erythrocytes. Pb and Hg were independently negatively correlated to Ca pump activity without any statistically significant interaction. After adjustment for potential confounders, Pb and Hg explain about 30% of total variance of Ca pump activity in newborns.

Conclusion: Our finding agrees with previously reported studies and suggests the use of Ca pump activity as sensible biomarker of calcium mediated toxicity related to environmental in utero exposures.