

Erythrocyte Oleic Acid is Correlated with Increasing Natural Killer Cells in Maternal Blood

AJ Sassine, SP Sivarajasingam, ATH Cocker, Y Wang, N Imami, MA Crawford, MR Johnson

Imperial College London, London, United Kingdom

INTRODUCTION

A relative increase in erythrocyte oleic acid, a monounsaturated fatty acid is a marker for omega-3 and omega-6 fatty acid (FA) deficiency and has been recently shown as a predictor of spontaneous preterm birth. This effect can be attributed to the deficiency of omega-3 in pregnant women, which in turn, modulates a pregnant woman's immune response. The inflammatory cascade is more active in the face of low levels of the anti-inflammatory omega-3 FA and inflammation is thought to be responsible for many cases of preterm delivery. The aim of the study is to assess association between types of erythrocyte FA and natural killer (NK) cells.

METHODS

Peripheral blood was collected from women delivering via elective caesarean sections (term non labour= 13; preterm non labour= 9) at Chelsea and Westminster Hospital. Lymphocytes were isolated from whole blood; flow cytometric analysis was performed to determine NK cell subsets (CD56/CD16). FA were extracted from precipitated red blood cells and transesterified into fatty acid methyl esters, which were then separated by gas chromatograph. FA were identified by comparison of retention times with authentic standards. Peak areas were then quantified by a computer chromatography data system (EZChrom). Regression analysis was performed to assess correlations using Stata/ 14.1 software. Statistical significance was defined as $p < 0.05$.

RESULTS

Omega-9 oleic acid was significantly correlated with total NK cells (Coef: 4.9 ± 2.09 ; $p = 0.03$) in peripheral blood. There were no significant correlations seen between omega-6 arachidonic acid, omega-3 docosahexanoic acid, eicosapentanoic acids and NK cells. NK subsets were identified; however did not correlate with any of the FA.

Correlation was not maintained when sub analysis was undertaken based on gestation at delivery.

CONCLUSION

NK cells are cytotoxic immune cells of the innate immune system. Oleic acid is a marker of omega-6 and omega-3 FA deficiencies. Omega-6 and omega-3 FA are crucial for maintaining the integrity and strength of cell membranes. An association between NK cells and oleic acid may suggest that oleic acid has a

pro-inflammatory effect. One possible explanation is that the lack of omega-3 and omega-6 FA results in weaker, disrupted membranes that may initiate an inflammatory process. To appreciate the impact of oleic acid on preterm birth, more samples will need to be analysed.