STRONG CHILDREN'S RESEARCH CENTER

Summer 2015 Research Scholar

Name: Emily Fitzgerald

School: University of Rochester Medical Center

Mentor: Mary Caserta, MD

ABSTRACT

Title: ***The Effect of Childhood Socioeconomic Stress on the Developing Innate Immune System***

Background: There is extensive animal and adult human evidence suggesting that stress exposure has negative effects on the immune system. However, there is a lack of research investigating whether or not early-life socioeconomic stressors have a more immediate impact on immune function in childhood.

Objective: To determine if childhood socioeconomic status (SES) is associated with increases in IL-6, CRP, and TNF-alpha serum concentrations, suggesting a pro-inflammatory state due to family psychosocial stressors.

Design/Methods: The Family Life Project (FLP) enrolled infants living in six different poor, rural counties in North Carolina and Pennsylvania in 2002. Starting in 2014, parents and children in this study were interviewed during home visits, completed questionnaires collecting demographic and socioeconomic information and the children underwent phlebotomy. Serum was separated in the field and shipped overnight to URMC. Concentrations of CRP, TNF-alpha, and IL-6 cytokines present in 198 serum samples were measured using Quantikine enzyme-linked immunoassay (ELISA) (Minneapolis, MN); high sensitivity kits were used to measure IL-6 and TNF-alpha.

Results: The FLP team collected complete socioeconomic and demographic data on 181 of the children whose serum was processed. Most children were white (69%), male (54%), with an average BMI of 19.89, an average age of 10.59 years, and 80% of children were healthy in the two weeks prior to sample collection. Their average family income was $36k-$45k and the average parent interviewed had less than 2 years of college education. A regression analysis between each of the three cytokines and maternal education (a marker of SES), taking into account child sickness in the prior two weeks, BMI, age, gender, and race, was performed. The analyses revealed that less maternal education was significantly associated with greater IL-6 and TNF-alpha serum concentrations (B=-0.030, P=0.041 and B=-0.28, P=0.006 respectively). CRP concentration was not significantly associated with maternal education (B=-0.072, P=0.28). The same analyses were repeated using family income as the SES marker; lower parent income was associated with greater IL-6 serum concentration (B=-0.025, P=0.055). CRP and TNF-alpha serum concentrations were not significantly associated with family income (B=0.032, P=0.581 and B=-0.012, P=0.175 respectively).

Conclusion: An inverse relationship between maternal education and IL-6 and TNF-alpha serum concentration levels was identified. The family income data was consistent with the maternal education data in regards to serum IL-6 concentration; however, maternal education appears to be more strongly associated with serum cytokine levels. These data suggest that early-life socioeconomic status may have negative effects on the developing innate immune system. Further analyses should be done looking at other pertinent measures of familial stressors.