C-reactive protein values to predict sepsis-induced inflammatory response in premature infants

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Describe role of Submitting/Presenting Trainee in this project (limit 150 words):
I am the fellow principal investigator on this project along with my faculty principal investigator Dr. Venkatesh Sampath. Together Dr. Sampath and I conceptualized and designed the study. I developed the study objectives and protocols, designed the data collection instruments, and collected the bulk of the data. I performed initial data analysis and interpreted the results. With the assistance of my statistician who performed the full data analysis, Dr. Sampath and I interpreted the results, and I drafted the abstract for this submission.

Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words

Background: C-reactive protein (CRP) is an inflammatory marker that has been recognized as a biomarker of the systemic inflammatory response in preterm neonates. We hypothesized that initial and peak CRP values would correlate with the degree of sepsis-induced acute lung injury (ALI) as measured by the pulmonary severity score (PSS).

Objectives/Goal: 1) Determine if confirmed (CF) sepsis events are associated with higher initial and peak CRP values than rule out (RO) sepsis events. 2) Investigate if initial and/or peak CRP correlates with severity of sepsis-induced ALI as measured by the PSS.

Methods/Design: In this retrospective case control study, we included infants < 31 weeks gestational age and < 1500 grams with late onset sepsis and RO sepsis events (blood culture negative, antibiotics continued 48-72 hours (hr)). We collected initial CRP values at the time of sepsis diagnosis and the peak CRP value recorded during the treatment period. Sepsis subtypes were defined as blood culture positive (Cx+), necrotizing enterocolitis (NEC), urinary tract infection (UTI), and culture negative (Cx-) sepsis (blood culture negative; antibiotics > 6 days). We collected the PSS, a validated score for lung injury, at different time points during the sepsis events starting at 72hr before and up to 168hr after sepsis diagnosis.

Results: We analyzed 211 CF and 123 RO sepsis events. Initial and peak CRP values were significantly higher in the CF sepsis group vs the RO sepsis group [median and interquartile range 1.8 (0.7, 4.5) vs. 0.6 (0.5-1.1), $p < 0.01$ for initial values and 3.6 (0.8, 8.7) vs. 0.8 (0.5, 1.4), $p < 0.01$ for the peak values] (Figure 1). The changes from the initial CRP to the peak CRP were also greater in the CF sepsis events than in the RO events ($F(1,335)=8.41$, p value 0.004) (Figure 2). The relationship between PSS and CRP varied over time becoming more significant after sepsis diagnosis ($F(7,1245)=2.77$, $p=0.0074$) (Figure 3). Lastly, the changes from the initial to the peak CRP levels were different across sepsis subtypes with larger changes observed in the Cx+ and NEC groups than in UTI, Cx-, and RO sepsis ($F(4,377)=2.92$, $p=0.02$, Figure 4).

Conclusions: These results indicate that CRP is significantly higher both initially and at peak values in infants with CF vs RO sepsis events. Furthermore, CRP values correlate with PSS over time suggesting that CRP is not only a marker for sepsis/systemic inflammatory response but can potentially predict the severity of sepsis-induced ALI.