

SCA 70
ELEVATED IL-6 LEVELS AFTER CARDIOPULMONARY BYPASS ARE ASSOCIATED WITH HYPERTHERMIA

Mitchell J, Grocott H, Phillips-Bute B, Mathew J, Newman M, Bar-Yosef S

Duke University Medical Center, Durham, NC, USA

Introduction: Hyperthermia after cardiac surgery is common, but its etiology and significance remain uncertain. A recent study demonstrated a relationship between hyperthermia and a decline in neurocognitive function after cardiac surgery. It is unclear, however, whether the hyperthermia results from the inflammatory response associated with cardiac surgery, or reflects cerebral injury with subsequent thermoregulatory changes moderated by the injured brain, (i.e. hypothalamus). Therefore, we sought to determine the relationship between cytokine production and postoperative hyperthermia in patients undergoing coronary artery bypass graft surgery (CABG).

Methods: Following IRB approval, 347 patients undergoing primary elective CABG had blood samples collected at induction of anesthesia, (baseline), and then at 0, 2.5, 4.5, 24, and 48 hours after cessation of cardiopulmonary bypass. These samples were analyzed for IL-6, IL-8, TNF-, IL-1ra, and IL-1 levels using ELISA kits. Hourly postoperative temperatures during the first 24 hours were collected from the ICU records. The association between peak postoperative temperature and cytokines was analyzed using a univariate Spearman correlation, (for peak cytokine levels), and univariate and multivariate repeated measures mixed models, (for cytokine levels over time); $P < 0.05$ was considered significant.

Results: Demographic and clinical characteristics of the population are shown in Table 1. Peak postoperative temperature was 37.7 ± 0.5 °C, (with 27% of the patients having peak temperature above 38 °C), and significantly correlated with peak IL-6 levels, (Spearman correlation coefficient = 0.158, $P = 0.013$). The relationship between peak temperature and IL-6 levels was also significant in the univariate repeated measures analysis ($P = 0.004$). Although the analysis treated temperature as a continuous variable, for descriptive purposes, we have dichotomized the peak temperature variable into hyperthermia (>38 °C), or no hyperthermia (<38 °C); Figure 1. The relationship between IL-6 and peak temperature was substantiated by multivariate analysis controlling for patient

age, bypass time, and ejection fraction ($P = 0.024$). No other cytokines showed a significant association with maximum 24 hour postoperative temperature.

Discussion: Our data demonstrates a significant relationship between IL-6 and the maximum temperature within the first 24 postoperative hours. This suggests that the inflammatory response may be responsible for the elevations in temperature commonly seen following cardiac surgery.

References:

1. *Stroke*. 2002; Feb: 537-541.

Table 1: Demographic Data

Variable	Mean	Standard Deviation
Age (yr)	62.9	10.4
Weight (kg)	85.5	17.7
Ejection Fraction (%)	54	12
Cross Clamp Time (min)	57	23
Bypass Time (min)	108	35
ICU Stay (hr)	24.2	12.1

Figure 1: IL-6 Levels Over Time, Dichotomized by Temperature Group

