One of the most frequent complications of cardiac surgery with cardiopulmonary bypass (CPB) is excessive bleeding, leading to increased morbidity and mortality. The most common coagulation defect associated with CPB is thought to be impaired platelet function (1). Platelet dysfunction may result from the large blood/air interface that occurs during CPB (2). The objective of this study was to determine if removing or ameliorating areas of blood/air interface in the CPB circuit would reduce damage to platelet function associated with CPB. Following IRB approval and informed consent, sixty adults scheduled for primary coronary artery bypass graft surgery with CPB were randomized to one of four CPB circuit designs with progressively reduced blood/air interfaces as shown in figure 1. Primary outcome measures were the Plateletworks assay and platelet rich plasma aggregometry at baseline (time I), 5 minutes prior to coming off pump (time II) and 10 minutes post protamine administration (time III), and glass bead retention, platelet dense body ATP secretion and platelet count at times I, II, III, and 2 hours post separation from bypass (time IV). Secondary outcome measures were chest tube drainage at 4, 12, and 24 hours in the ICU and allogeneic blood transfusion requirements. The platelet count at time IV was decreased as a percentage of baseline in group C, showing a significant negative effect of heparin and a trend towards an interaction between the effects of heparin and suction methods. Platelet counts at the other timepoints showed no differences between groups. The glass bead assay at time II showed a statistically significant difference in the effects of heparin and the combined effects of heparin and suction methods with an increase in retention. Although expected depression on and following bypass was seen, all other primary outcome measures showed no differences between groups. There were no significant differences in any of the secondary outcome measures. Despite the two significant differences seen, the clinical meaning may be inconsequential. Glass bead retention recovered post protamine and platelet count differences, though significant at 2 hours post CPB.

References: