**FACTORS ASSOCIATED WITH ERRORS IN THE HEPARIN DOSE RESPONSE TEST: RECOMMENDATIONS TO IMPROVE INDIVIDUALIZED HEPARIN MANAGEMENT IN CARDIOPULMONARY BYPASS**

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ABSTRACT

Background: A critical aspect of cardiopulmonary bypass (CPB) is to achieve full anticoagulation to prevent thrombosis and consumptive coagulation without using excessive amount of heparin. This can be achieved with heparin dose response (HDR) test *in vitro* to calculate an individualized heparin bolus to reach a target activated clotting time (ACT) and heparin concentration. However, we often observe that the measured ACT with the calculated heparin bolus gives significant errors, both positive (measured ACT is higher than expected) and negative (measured ACT is lower), from expected ACT.

Methods: We performed a retrospective study of 250 patients who underwent cardiac surgery to attain an error distribution of the measured from expected ACT with calculated heparin bolus. In addition, it is aimed to identify possible patterns of baseline ACT, calculated heparin concentration (CHC) and HDR slope that are associated with the significant positive and negative errors.

Results: We found that individualized heparin bolus by HDR test is consistently underestimated while it gave a significant number of positive and negative errors. Further analysis indicates that significant negative errors correlate with high baseline ACT and slope and low CHC while significant positive errors with low baseline ACT and slope and high CHC.

Conclusion: The measured ACT can be substantially different from expected ACT. The accuracy of the HDR test appears to be dependent upon baseline ACT, slope, and CHC. Based on our analysis, we provide several recommendations and a flow chart to improve the quality of individualized heparin management on CPB.