Objective: Routine use of direct factor Xa inhibitor (direct oral anticoagulant; DOAC) therapy necessitates a modified lupus anticoagulant (LAC) testing method for this population. To remove interfering DOACs in specimens, DOAC-Stop™ treatment was used on LAC specimens to assess for antiphospholipid syndrome (APS) without altering patient’s anticoagulation treatment.

Methods: DOAC-Stop™ was evaluated with our LAC testing panel with dilute Russell viper venom time (dRVVT), and Silica Clotting Time (SCT) assays, both of which activate coagulation. DOAC-Stop™ beads were used for pretreatment by addition and rocking for 5 minutes, followed by 5000 rpm centrifugation for 5-minutes. Treated plasma supernatant was used for a screen, confirm (addition of phospholipid), 50:50 mix (addition of reagent plasma with coagulation factors), and confirm 50:50 mix phases of testing. The Total Ratio (TR; ratio between screen and confirm ratios relative to mean of normal ranges) was calculated and used per the package insert for interpretation. Implementation data was assessed for interpretation differences between groups with and without DOAC-Stop™ treatment.

Results: Patients being tested for APS by LAC assay with and without DOAC therapy were included. DOACs included apixaban or rivaroxaban. Primary interpretations included no evidence of a LAC (NELAC), evidence of LAC, and results more consistent with coagulation factor deficiency. The effectiveness of DOAC removal was established by spiking NELAC samples with apixaban and treating with DOAC-Stop™, resulting in removal of anti-factor Xa activity. An apixaban spiking study with NELAC and LAC patient specimens with LAC testing before and after DOAC-Stop™ treatment demonstrated unchanged interpretations. In a test modification study, Rivaroxaban resulted in positive dRVVT interpretations in nine of ten patients. All but one became negative after DOAC-Stop™ treatment. Two SCT interpretations became positive after treatment. Apixaban resulted in two positive dRVVT interpretation in nine patients, one of which became negative after DOAC-Stop™ treatment. SCT interpretations remained unchanged. Review of implementation data (n=78) with nine patients on DOACs having DOAC-Stop™ treatment demonstrated similar patterns of test interpretation. Interpretations included: “no evidence of a LAC” in 53% (n=41) without and 55% (n=5) with DOAC-Stop™, “Does not meet criteria” in 17% (n=13) without and 11% (n=1) with DOAC-Stop™, “Evidence of a LAC” in 21% (n=16) without and 33% (n=3) with DOAC-Stop™. The remaining eight patients without DOAC-Stop™ treatment had interpretations including factor deficiency, warfarin effect, equivocal, or concerning for interference.

Conclusion: Patients on DOACs benefit from DOAC-Stop™ to enable LAC testing for APS assessment. Data analysis demonstrates that DOAC-Stop™ effectively removes DOAC interference in the majority of tests with similar rates of major interpretation categories. LAC testing and interpretation for patients on DOAC therapy shows promise with novel approaches and reagents such as DOAC-Stop™, though interpretative challenges with false-positives and false-negatives continue.