

## **Rotational elastographic measurements in trauma patients with low vs high concentration tissue factor initiators**

### ***ABSTRACT:***

Early diagnosis of coagulation abnormalities through viscoelastic measurements in trauma patients could guide intervention strategies. However, the optimal time points for measurement, reagents used, and interpretation of the results have not been standardized across trauma centers. We sought to compare viscoelastic measurements initiated by low concentration tissue factor compared to high concentration tissue factor in trauma patients. We performed a prospective observational study of rotational elastographic measurements using two different extrinsic pathway activators in trauma patients across time starting in the pre-hospital setting or emergency department. An elevated prothrombin time was used to identify patients with coagulopathy, defined by International Normalized Ratio (INR) >1.3. Using rotational thromboelastometry (ROTEM®) and Thromboelastography (TEG®), we compared two extrinsic pathway activators: recombinant tissue factor relipidated with synthetic phospholipids (rTf-sp) and ex-tem®. Longitudinal blood draws into citrate were obtained at the scene, in the emergency department, and in the intensive care unit. Using both activators four simultaneous ROTEM® assays as well as two TEG® assays were conducted to measure clot time (CT), maximum clot firmness (MCF), rate of clot development (alpha angle), and maximum lysis (ML). We enrolled 25 trauma subjects; obtaining longitudinal measurements in 14. The average Injury Severity Score (ISS) was 20.0 + 9.6 and two patients developed coagulopathy. MCF and alpha angle values correlated well between each activator (MCF, R=0.830; alpha angle, R=0.639), however, CT measures exhibited low correlation (R=0.208). Both reagents revealed a dramatic coagulopathy, more specifically hyperfibrinolysis, prior to INR elevation. This finding highlights the potential diagnostic capacity of both activators at identifying coagulopathic abnormalities. In one instance, hyperfibrinolysis was detected by ROTEM® at an earlier time point relative to aberrant INR values. This suggests that elastographic measurements can capture early coagulopathic abnormalities in trauma patients.