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UVM – Student Research Conference  
Abstract

### **Systems Biology of Coagulation and Trauma-Induced Coagulopathy**

Hemorrhage is a major cause of death in civilian and military victims of trauma, in part because traumatic injury disrupts the body's normal coagulation mechanism, causing bleeding and clotting disorders known as trauma-induced coagulopathies (TICs). This study is part of a multi-center effort to develop a "natural history" of coagulation using a systems biology approach that will incorporate data from laboratory, animal, and computational models of coagulation. At UVM, blood samples and clinical data will be collected from adult trauma patients upon their arrival to the Fletcher Allen Emergency Department and every 3 hours thereafter for the first 24 hours, then once per day for up to 4 day. A variety of assays will longitudinally assess clotting times, clotting factor concentrations, and the reaction of blood samples to common therapies for traumatic injury including IV fluids, blood products, and anticoagulant drugs. This data will then be used to construct individual coagulation profiles that may have predictive power in determining who is at risk for developing TICs. Because the disease mechanisms for TICs are so complex, a systems biology approach will provide a comprehensive model of coagulation that can be used to predict the coagulopathic behavior of trauma patients and to proactively alter therapy to improve patient outcome.