# The Centre for Blood Research Seminar Series

## Wednesday, February 28, 2018

## LSC 3 | 12:00 - 1:00PM

## Dr. Paul Santerre

***Professor***
***Institute of Biomaterials and Biomedical Engineering***
***and Faculty of Dentistry, University of Toronto***

***"Biomaterial design for blood contact applications, inspired by protein-material interactions and enabled by block co-polymeric polyurethanes."***

Although there has been more than 50 years of historical use for synthetic polymers in the cardiovascular field, many of the same limitations still persist: haemolysis, thrombosis,thromboembolic complications, anticoagulation-related haemorrhage, immune responses, infection, and tissue overgrowth. To address these needs, substantial attention has been given to the chemistry of the polymeric surfaces. Scientists for the most part have appreciated that the bioreactivity to existing polymer systems, which are for the most part homopolymers, is a problem and that a great deal of understanding is needed in order to overcome the complex biomolecular systems at work. The study of biological interactions with implant materials accelerated, and gradually merged the worlds of protein biochemistry in the 80's and cellular function in the 90's to the field of biomaterials. By the end of the 80's it was appreciated that diversity of chemistry was going to be important if we would ever overcome the bioreactivity issues of existing homopolymers. The Santerre lab in 1990 was quick to follow this line of research and applied practical thinking to the problem by using polymeric additives (i.e. Endexo) that could modify surfaces during the extrusion of medical devices, thus reducing manufacturing steps, and providing a rapid and simple strategy for generating chemical diversity at surfaces, and thereby minimizing the denaturation of blood proteins at the surfaces of blood contacting devices. Commercialization of the Endexo technology started in 2001 and first products entered into the clinic in 2010 and have now been used in over a million patients with blood contact devices. The development history of Endexo and its clinical impact will be reviewed. In 2005, the Santerre group conceived of a new co-polymeric platform for the development of degradable tissue engineering scaffolds. The use of degradable polymers in vascular tissue regeneration has sparked the need to characterize polymer blood biocompatibility during degradation. Work in this presentation will show data which evaluates the differences in hemocompatibility (platelet response, complement activation, and coagulation cascade initiation) between as-made and hydrolyzed poly(lactic-co-glycolic) acid (PLGA) and a novel degradable co-polymeric polar hydrophobic ionic polyurethane (D-PHI) platform. Platelet activation will be discussed within the context of leukocyte activity which plays a major role in mediating platelet activation.

**Live Online Seminar Viewing:**
**http://tinyurl.com/cbrseminaronline**

Canadian Blood Services
*it's in you to give*