“Mathematical Modeling of Renal Complications Induced by Cardiac Surgery”

Renal hypoxia is an important pathway in the development of acute kidney injury, a common complication of cardiac surgery performed under cardiopulmonary bypass (CPB). In this talk, I will present a mathematical model of kidney's physiology that can be used for the assessment of the conditions promoting renal hypoxia that are observed during CPB. The model represents the fundamentals of a nephrovascular unit: blood flow control, glomerular filtration, and sodium reabsorption. Renal oxygenation is given by the balance of oxygen consumption and oxygen supply, mainly determined by sodium reabsorption and blood flow, respectively. The model is used to simulate the effects of hypotension, hemodilution, and hypothermia. Simulations suggest that the rise in body temperature following the main phase of CPB increases disproportionately medullary oxygen consumption and drives the kidney into a hypoxic state which may result in renal damage.

Location: Tom Hallam Auditorium, Room 206 at NIMBioS, Claxton Education Bldg, 1122 Volunteer Blvd.

*Join us for refreshments at 3 p.m. in Room 205.

For more information about this and other NIMBioS Seminars, visit http://www.nimbios.org/seminars
Seminars are lived streamed at http://www.nimbios.org/videdos/livestream - join the conversation on Twitter using #nimbios