



NIMBioS

National Institute for Mathematical
and Biological Synthesis



NIMBioS Interdisciplinary Seminar

3:30 p.m.*, Tuesday, December 2, 2014

Dr. Ioannis Sgouralis
NIMBioS Postdoctoral Fellow

“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.*

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