

PLEASE ANNOUNCE TO ALL ENGINEERING CLASSES

Department of Electrical and Computer Engineering

Colloquium Announcement

Tuesday, October 25, 2011, 2:00 p.m., Engineering Haggerty 120
("Meet the Speaker" Reception at 1:30pm, Room 204 of Olin Engineering,
Refreshments will be served)

Mathematical Modeling of Redox Enzyme Kinetics in Pulmonary Endothelial
Cells

By

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Abstract

The endothelial cells that line blood vessels in lungs provide a large chemical reactor surface which can act upon compounds carried in the blood; with perhaps the most well-recognized role being the activation, or inactivation, of vasoactive peptides via endothelial converting enzymes. The pulmonary endothelium also displays the ability to modify redox status and disposition of blood-borne components on a single pass through the pulmonary circulation. This latter property has been studied extensively by collaborators at the Zablocki VA Medical Center Research Service, where various redox-sensitive dyes with different physical and chemical properties have been employed as probes of pulmonary endothelial redox enzymes and constituents. This talk will focus upon one particular redox-sensitive dye, 2,3,5,6-tetramethyl-1,4-benzoquinone (duroquinone, DQ), which in pulmonary endothelial cells serves as a probe of NAD(P)H:quinone oxidoreductase 1 (NQO1) and mitochondrial electron transport complex III.

Bio

Dr. Krenz has taught mathematics, statistics and, at times, computer science at Marquette University since January, 1985. He received his Doctorate in Applied Mathematics from Iowa State University in 1984 under the direction of Dr. Richard K. Miller (where he also collaborated and published with Dr. Anthony Michel), and BS degrees in Mathematics and Computer Science in 1978 from Moorhead State University.

In 1996, he received the Father John P. Raynor, S. J. Faculty Award for Teaching Excellence, in 2001, Marquette's Ignatian Pedagogy Award and in 2004, the Helen Way Klingler College of Arts and Sciences honored him with its Faculty Award for Excellence in Academic

Advising. These awards would not have been possible without the wonderful students and colleagues he has had the honor of working with during his almost 27 years at Marquette.

In collaboration with practicing physician/scientists, physiologists, cell biologists and biomedical engineers, Dr. Krenz studies various nonrespiratory functions of the lung; that is, what the lung does besides gas exchange. In particular, he applies engineering principles/mathematics to model cellular metabolism and hemodynamic properties of the lung. These investigations have involved several approaches, such as incorporating available vessel morphometric data within the framework of "simple" deterministic homogeneous vascular networks, as well as nondeterministic heterogeneous vascular networks. In addition to the hemodynamic studies, he investigates the uptake and interaction of drugs with the endothelial cells of the lung capillary bed. This research is funded by the National Institutes of Health and the Department of Veteran's Affairs.

Dr. Krenz served over a decade on NIH grant review panels, has published in IEEE Transactions on Circuits and Systems, SIAM Journal of Control and Optimization, Journal of Mathematical Analysis and Applications, ACM Transactions on Mathematical Software, Indian Journal of Pure and Applied Mathematics, Journal of Integral Equations and Applications, Annals of Biomedical Engineering, Free Radicals in Medicine and Biology, American Journal of Physiology and Journal of Applied Physiology.