

University of Maryland Baltimore Graduate School

Announcement of Doctoral Dissertation Defense*

Candidate: Peter D. Murray

Date, Time, and Place: January 25, 2008, 1:00 pm, Davidge Hall

Dissertation Title: Mechanisms of CREB-dependent Gene Transcription in Astrocytes

Dissertation Abstract:** The transcription factor, cAMP/Ca²⁺-response element binding protein (CREB), is found in every cell in the brain. In neurons, CREB mediates the expression of many, and possibly most, Ca²⁺-induced genes. Ca²⁺-induced, CREB-dependent gene transcription in neurons has been shown to be required for cell survival, synaptic plasticity, and learning and memory. In contrast, CREB-dependent gene transcription in astrocytes was found to be stimulated by cAMP, but not by Ca²⁺. Although both cAMP and Ca²⁺ were found to activate CREB by phosphorylation of serine 133, only cAMP induced transcription in astrocytes. Several additional mechanisms known to be required for CREB-dependent gene transcription in neurons that might be lacking in astrocytes were investigated. mRNA expression of Ca²⁺/calmodulin-dependent protein kinase IV (CaMKIV), which is required for Ca²⁺-induced CREB-dependent gene transcription in neurons, was found to be at least ten-fold lower in astrocytes, while CaMKIV protein expression was undetectable. These results suggest that Ca²⁺ is incapable of activating CREB-dependent transcription in astrocytes due to insufficient CaMKIV expression, providing a mechanism to insulate CREB-regulated genes from the slow Ca²⁺ waves that mediate intercellular signaling within astrocyte syncytia. Nevertheless, CREB-dependent gene transcription in astrocytes can still be activated by cAMP.

Dissertation Committee Chair (name and title): Bruce K. Krueger, Professor, Departments of Physiology and Psychiatry School of Medicine

Dissertation Committee Members (names and titles):
Frank Margolis, Graduate Program Director, Program in Neuroscience, Professor
Scott Thompson, Professor, Departments of Physiology and Psychiatry School of Medicine
Margaret McCarthy, Associate Dean for Graduate Studies, Professor
Robert Bloch, Director, Training Program in Membrane Biology, Professor
Gary Fiskum, Vice-Chair, Research, Departments of Anesthesiology, Biochemistry & Molecular Biology, and Pharmacology & Experimental Therapeutics, Professor

The Open Presentation is open to the university community and invitees of the candidate. Any member of the Graduate Faculty may observe the Final Examination. Only committee members may vote. For more information, see **Procedures for Examination of the Doctoral Dissertation.*

***You must type your abstract on this form in the space provided.*

Updated: February 24, 2006