Neuroscience Graduate Program

presents:

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IN A THESIS PROPOSAL

WEDNESDAY, 4 APRIL 2012

9:00AM IN ADOLPH AUDITORIUM (1-7619)

Examining Head-Movement Control and Coordination during Visual Orientation and Pursuit

Visual orientation and pursuit are essential to enable accurate visual perception. Many brain areas are involved in the generation and execution of motor commands associated with vision and are thus vulnerable to a variety of injuries and diseases of the brain. Eye movement dysfunction often occurs with stroke, traumatic brain injury, and diseases of motor control. Smooth pursuit eye movements are characteristically abnormal in schizophrenia and may be present in some forms of autism. This has been one of several motivating factors for investigators to gain a clear understanding of the neurobiology of eye movements.

However, neurophysiological investigation has revealed an essential link between eye and head movements, and the need for accurate coordination. Higher-level commands to reorient the line of sight may be executed through many combinations of eye and head movements. The determining factors for which movements are ultimately performed are currently under investigation. An understanding of the neurophysiologic basis for coordinated eye-head movements may ultimately lead to new evaluation and diagnostic criteria for deficits in visuomotor orientation.

The major goal of my proposed research is to increase our understanding of the underlying mechanisms of coordinated eye-head movement control. We will address this issue through behavioral, adaptive and neurophysiological examination in three aims.

Aim I will test the hypothesis that initial eye position is an important determining factor in head movements associated with pursuit.

Aim II will examine the effects that adaptation-driven changes in head motor commands have on coordination and concurrent eye movements.

Aim III will test the hypothesis that reticulospinal neurons in the nucleus reticularis gigantocellularis are active during head movements associated with both pursuit and gaze shifts. Additionally, we will characterize the firing pattern of these neurons and determine their relationship to head velocity and acceleration.

Results of these experiments will increase our understanding of motor coordination in the visual system, direct future behavioral and electrophysiological investigation and will inform models of normal brain function.