

# Bioengineering Seminar

**Werner M. Graf, MD, PhD**

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*Howard University College of Medicine, DC*

## **The Structure and Function of Movement Perception and Behavior**

The vestibular system, our sense of balance, most of the time operates without us being consciously aware of it, although pertinent information is ubiquitously available throughout the nervous system. Over the past decades, we have researched the involvement of the vestibular system in reflex control of eye movements and posture, multisensory processing and movement perception. Movement perception and spatial orientation involve the posterior parietal cortex, and we have recorded in areas of the intraparietal sulcus (areas VIP, AIP) controlling such behavior. We have shown that neurons there receive multi-sensory and movement-related inputs, and process such information to provide signals about active-passive or object movement disambiguation. Analysis parameters contain information about angular and linear movements in three-dimensional space using visual, tactile, vestibular or even auditory cues.

We have also researched the pathways underlying behavior and movement perception using a transneuronal tracing technology. We have discovered new processing pathways that relate sensory information to the posterior parietal cortex about movement, eye position and vision.

The combined data of our research provides insights about the contextual structure-function relationship of movement perception, multisensory disambiguation processing, spatial orientation and the composition of the neural representation of internal and external reference frames. The discovery of massive vestibular input to the posterior parietal cortex also suggests a powerful role of the sense of balance in the syndrome of spatial hemineglect and the eventual alleviation thereof.

Thursday, March 7, 2012

3:00PM-4:00PM, Room 3507

Nguyen Engineering Building

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## **BIOGRAPHY**

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**Werner Graf, MD, PhD**, serves as Professor and Chairman at the Department of Physiology and Biophysics at Howard University College of Medicine in Washington, D.C. Dr. Graf received his medical degree in 1975 and his Ph.D. in neurophysiology in 1977 from the Albert-Ludwigs-Universität in Freiburg, Germany. He worked as a post-doctoral fellow at New York University Medical Center and from 1981 to 1991 as an Assistant and Associate Professor in the Neurophysiology lab at Rockefeller University, New York. During his time as Research Director at the CNRS, Collège de France in Paris he was awarded the Prix Antoine Lacassagne (Lacassagne Prize of the Collège de France).

Dr. Graf's research focuses on the neuronal basis of self-motion perception and spatial orientation using trained non-human primates as models for human behavior and pathophysiology, especially with respect to normal aging and the associated challenges of every-day life, i.e., vehicle driving and the prevention of falls in the elderly. His group is currently developing vestibular rehabilitation paradigms, and *in vitro* studies about the neuronal and molecular mechanisms of certain neurodegenerative diseases affecting postural control and locomotion.



*For any questions  
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