

# MEDICAL PHYSICS SEMINAR

**Monday,  
April 11, 2016**

**1345 HSLC —4:00 P.M.**

## **NEW FORMULATIONS FOR MORPHOMETRIC AND CONNECTIVITY ANALYSIS IN PRECLINICAL ALZHEIMER'S DISEASE (AD)**

The goal of this two part talk is to provide a high level overview of recent work in the Singh group, conducted in collaboration with colleagues in the Wisconsin Alzheimer's disease research center (W-ADRC) and the Waisman Brain imaging lab.

This talk will cover (a) new algorithms for analysis of brain connectivity and (b) formulations for identifying associations between longitudinal morphometric brain changes and a set of covariates. On the technical side, the first part will deal with harmonic analysis of graphs/meshes and how such constructions improve the analysis of brain connectivity, e.g., obtained via processing diffusion weighted or functional MR images. In the second part, we will present new algorithms for solving regression problems where the responses are "manifold" values, i.e., samples from curved spaces (such as the manifold of positive semidefinite matrices). Instances of such problems are quite common in image analysis broadly, but few methods are otherwise available. If time permits, we will discuss image-based classification methods that can utilize baseline time-point image data to predict future cognitive decline (to Alzheimer's disease) in individuals who currently have some cognitive complaints but are still years away from dementia, and how such frameworks may be useful in informing the design of clinical trials.

Joint work with Nagesh Adluru, Barb Bendlin, Moo Chung, SeongJae Hwang, Vamsi Ithapu, Sterling Johnson, Hyunwoo Kim, WonHwa Kim and Ozioma Okonkwo Papers covered in this talk available from [www.biostat.wisc.edu/~vsingh/researchexhibit.html](http://www.biostat.wisc.edu/~vsingh/researchexhibit.html)

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**1345 HEALTH SCIENCES LEARNING CENTER (HSLC) 4:00– 5:00 PM**