

FACULTY RESEARCH NEWSLETTER:

Research is a central mission of the newly formed Department of Biostatistics. To highlight our research accomplishments and to share interesting new findings among colleagues and friends, we start the *Biostatistics Research Newsletter*. An objective of this quarterly newsletter is to keep everyone informed about our research activities, as a way to promote intellectual innovation and collaboration. In the future, it will also serve as a venue to publicize important research initiatives, funding and training opportunities that are available on our campus. In this first issue, we share some truly exciting news on grant awards, publications, and media reports that occurred in the past three months. We look forward to hearing more from everyone on their research activities and achievements. Congratulations on the good work!

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GRANT NEWS:

Sujuan Gao to lead the Data Core in newly funded Indiana Alzheimer's Disease Center (IADC)

The Indiana Alzheimer's Disease Center (IADC) received a five-year renewal grant in August 2011 from the National Institute on Aging (NIA). The IADC was first established in 1991 as one of 30 Alzheimer's Disease Centers in the country. The IADC includes a Data Management and Statistics Core (Data Core). The Data Core was initially established by Dr. **Sujuan Gao** in September 2004 through a competitive supplemental application; it was successfully renewed in 2006. The latest award will provide financial support for the Data Core through 2016. The Data Core serves as the central repository for data collected by other IADC cores, and it is designed to provide analytical support to the research activities of the multidisciplinary IADC investigator team. The Data Core includes two faculty members (**Sujuan Gao** and

Hai Liu), one biostatistician (**Katie Lane**), one data manager (**Steve Brown**) and one programmer (**Mark Wei**).

Xiaochun Li receives funding from Foundation for the National Institutes of Health for method and software development

Dr. **Xiaochun Li** received funding from the Foundation for the National Institutes of Health (FNIH) for methodological research and software development, as part of the Observational Medical Outcomes Partnership (OMOP) initiative. FNIH is a nonprofit organization aimed at facilitating public-private partnerships for biomedical research. OMOP is a two year program supported by FNIH designed to develop, implement, and test the performance of analysis methods in identifying drug outcomes across multiple observational data sources. Indiana University is one OMOP partner and Regenstrief Institute is a subcontractor of the operation. **Xiaochun Li's** work involves development of analytical approaches and software for pharmaco-epidemiologic studies.

Changyu Shen co-leads NIH funded R21 project to develop new methods for the handling of missing data in observational studies

Dr. **Changyu Shen** received an R21 grant for the development of new statistical methods to handle missing data in observational studies. This project is the latest product of his collaboration with Lingling Li from Harvard's Department of Population Medicine. Drs. Li and Shen are co-principal investigators of this two year grant. The goal of this project is to develop a unified framework for the handling of missing-data and confounding adjustment in observational studies. Specifically, they will study multi-robust estimation that accounts for potential model misspecification, and develop non-parametric multiple imputation methods. Dr. **Xiaochun Li** is a co-investigator of this grant.

PUBLICATIONS AND OTHER

RESEARCH NEWS:

New method proposed for sensitivity analysis to assess biases due to unmeasured confounding

In the analysis of observational data, biases often arise due to lack of accommodation of unmeasured confounders. To assess the impact of these hidden biases, investigators often conduct sensitivity analysis. **Changyu Shen** and **Xiaochun Li**, in collaboration with Martin Were at Regenstrief Institute, and Lingling Li at Harvard University proposed a new propensity score based sensitivity function to quantify the hidden biases. They published their work in the *American Journal of Epidemiology* and the *Biometrical Journal*. Related work was also presented at the Midwest Biopharmaceutical Statistics Workshop in Muncie Indiana, at the invitation of the meeting organizer.

Li L, Shen C, Wu AC and Li X. Propensity Score-based Sensitivity Analyses for Unmeasured Confounding. *American Journal of Epidemiology*. 2011. 174(3), 345-353.

Shen C, Li X, Li L, and Were M. Sensitivity analysis for causal inference using inverse probability weighting. *Biometrical Journal*. 2011. 53(5), 822-837.

New approach developed for assessing transmission probabilities of infectious organisms

Quantifying transmission efficiency of pathogenic organisms in human populations is challenging, in part due to ethical constraints against intentionally exposing human subjects to disease pathogens. To overcome this challenge, **Wanzhu Tu** and **Barry Katz**, in collaboration with Pulak Ghosh of the Indian Institute of Management, proposed a Bayesian Markov model that allows investigators to estimate transmission probabilities from longitudinal observational behavioral and infection data. They used the method to assess the male-to-female transmission probability of *Chlamydia trachomatis*, the bacterium that causes chlamydial infections.

Their work was published in the latest issue of *Journal of the Royal Statistical Society, Series A*.

Tu W, Ghosh P, Katz BP. A stochastic model for assessing *Chlamydia trachomatis* transmission risk by using longitudinal observational data. *Journal of the Royal Statistical Society. Series A*. 2011. 174(4). 975–989.

Research found adiposity effect on blood pressure much magnified in overweight and obese children

A recent study conducted by Drs. **Wanzhu Tu** and Howard Pratt showed that the adiposity effect on blood pressure in overweight and obese children was much greater than that observed in their lean peers. The finding was made when researchers used semi parametric regression techniques to examine blood pressure data collected from a group of children. The new analytical technique showed a strong upward swing of adiposity effect in the upper spectrum of body mass index (BMI) percentiles, a finding might have been missed by traditional linear regression analysis. Using the same technique, they also showed similar upswings in heart rate and in plasma levels of leptin, an adipose-derived hormone. From these observations, the researchers hypothesized that higher levels of leptin, by activating the sympathetic nervous system, contributed to the elevation of blood pressure. The research paper was published in the latest issue of *Hypertension*, with an accompanying editorial commentary. The American Heart Association released a special report to highlight the key findings of the paper. CNN and other media outlets also reported the study. **George Eckert**, **Zhangsheng Yu**, Linda DiMeglio, and Jeusun Jung are co-authors of the publication.

Tu W, Eckert G, DiMeglio LA, Yu Z, Jung J, Pratt JH. Intensified effect of adiposity blood pressure in overweight and obese children. *Hypertension*. 2011. 58. 818-824.

CNN's report can be found at <http://www.cnn.com/2011/10/04/health/kids-overweight-blood-pressure-spike/index.html>