



## **Application of Big Data to Uncover Causes of Diseases**

by

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**Date : 17 February 2017 (Friday)**

**Time : 14:00 – 15:00**

**Venue : Seminar Room 3, G/F, The HKJC Building for Interdisciplinary  
Research, 5 Sassoon Road, Hong Kong**

### **Abstract:**

Epidemiology has played an instrumental role in identifying etiologic factors for human diseases. Historically, most epidemiologic studies were small and tended to investigate factors with a large effect size and/or that could be measured with relatively high accuracy. Although many genetic and lifestyle factors are common, and thus potentially having a significant impact on human health, they are difficult to investigate in epidemiologic studies because these factors are only weakly or moderately associated with disease risk, and further, the measurement of many lifestyle factors, such as usual dietary intakes, are subject to error and biased reporting. For instance, nutritional epidemiologic studies have often provided conflicting results regarding the association between dietary intakes and health outcomes, while candidate gene association studies have largely failed to identify genetic susceptibility loci for human diseases. Over the past 10 years, through the use of large-scale genomic data, genome-wide association studies have discovered more than 7000 genetic loci associated with human diseases and other complex traits. In addition to genomics, other omic technologies have also been used increasingly in epidemiologic studies, which will undoubtedly help to improve the understanding of the etiology of human diseases. The unprecedented availability of omic data and data from other sources, including electronic health records, has provided tremendous opportunities for epidemiologic studies. Proper use of big data will help to accelerate the pace of discovery of the causes of diseases to design cost-efficient prevention strategies.

### **Bio-sketch:**

Professor Wei Zheng is the Director of the Vanderbilt Epidemiology Center. His research, funded continually by NIH for the past 20 years, focuses on the evaluation of lifestyle factors and biomarkers for cancer risk and survival. Having authored or co-authored more than 850 scientific publications, he is known for his work on molecular, genetic, and nutritional epidemiology of cancer, particularly breast and colorectal cancers. He is one of the most highly cited researchers and has been named in “The World’s Most Influential Scientific Minds” by Thomson Reuters since 2015.



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Dr. Zheng has directed more than 20 large-scale, population-based studies, including several international consortia. In 2008 and 2009, he initiated two genetic research consortia for breast and colorectal cancers in Asians - currently including nearly 200,000 cases and controls from more than 40 studies - which have identified over 30 novel susceptibility loci/variants. He directed the first project in the Asia Cohort Consortium to harmonize data from 1.1 million subjects and quantified the association of BMI with total and cause-specific mortality. Dr. Zheng has served as a senior editor and an editorial board member for multiple epidemiology and cancer journals. He is the primary mentor for more than three dozen junior investigators.

In 2009, Dr. Zheng received an NCI MERIT award. Before joining the Vanderbilt faculty in 2000 as a full Professor, he worked at the National Cancer Institute, University of Minnesota, and University of South Carolina. Dr. Zheng received his doctoral degree in epidemiology in 1992 from Johns Hopkins University.



## **Soy Food Consumption and Breast Cancer Risk and Prognosis: Current Evidence and Recommendation**

by

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**Date : 17 February 2017 (Friday)**

**Time : 15:00 – 16:00**

**Venue : Seminar Room 3, G/F, The HKJC Building for Interdisciplinary Research, 5 Sassoon Road, Hong Kong**

### **Abstract:**

Soy food is a rich source of isoflavones, a group of phytoestrogens that have both estrogen-like and estrogen-antagonistic effects. Isoflavones have been shown to: increase the synthesis of sex-hormone-binding globulin, lowering the biological availability of sex hormones; inhibit 17 $\beta$ -hydroxysteroid dehydrogenases, which reduces estrogen synthesis; and increase clearance of steroids from the circulation. In addition, isoflavones have several non-hormone-mediated, anti-cancer properties. Over the last 3 decades, epidemiological studies conducted among Asian women, including our studies conducted among Chinese women in Shanghai, have consistently shown soy food intake to be inversely associated with breast cancer risk, whereas studies conducted among non-Asian women have largely generated null results. The importance of early-life or lifetime exposure to soy food on breast health was first suggested by our case-control study of Chinese women and confirmed subsequently by two US studies and a cohort study that we conducted among Chinese women. The soy and breast cancer association does not appear to differ by the estrogen receptor- $\alpha$  status of breast cancer; however, variations by menopausal status have been reported. The estrogen-like property of soy isoflavones, on the other hand, had been a concern for breast cancer patients. Using data from a longitudinal study conducted among Chinese women in Shanghai, we showed that soy food intake was inversely associated with the risk of cancer recurrence and mortality. Subsequently, we conducted a pooled analysis of four cohort studies, including over 9,500 breast cancer patients, and confirmed this inverse association. These findings resulted in a change in dietary recommendations, concluding that soy food intake is safe for breast cancer survivors. Subsequently, we found that high soy food intake was positively associated with menopausal symptoms and inversely associated with bone density among breast cancer survivors, lending further support to the view that soy food acts as an estrogen antagonist among breast cancer patients. Very recently, we found that long-term soy food consumption was associated with increased expression of tumor-suppressor miRNAs and genes, and decreased expression of oncogenes, especially cell-growth genes, in triple negative breast cancer tumor tissue, and was positively associated with circulating level of B-lymphocytes among healthy individuals. These



findings shed light on the biological mechanisms by which soy food consumption influences breast cancer risk and/or prognosis.

### **Bio-sketch:**

Dr. Xiao-Ou Shu is an Ingram Professor of Cancer Research and Professor in the Department of Medicine at the Vanderbilt University School of Medicine and the Associate Director of Global Health at the Vanderbilt-Ingram Cancer Center. She is an internationally respected epidemiologist, with over 30 years' experience investigating the independent and/or interactive effects of environmental exposures, lifestyle factors, and host susceptibility in the etiology and prognosis of various cancers and other chronic diseases. Over Dr. Shu's research career, she has established several invaluable epidemiology research resources, including two population-based cohort studies: the Shanghai Men's Health Study (N=61,000) and the Shanghai Breast Cancer Survival Study (N=5,000). She also played an instrumental role in launching and managing a population-based cohort study of 75,000 women, the Shanghai Women's Health Study. She is a founding member and leader of several major consortia, including the After Breast Cancer Pooling Project (ABCPP), the Asian Genetic Epidemiology Network for Obesity-Related Traits (AGEN-Obesity, N=134,500), and the Calcium and Lung Cancer Pooling Project (N=1,900,000). Dr. Shu has authored or co-authored over 750 research papers and is a "Highly Cited Researcher" recognized by Thomas Reuters in 2015 and 2016.

Among Dr. Shu's most research accomplishments is her research on the influence of soyfood consumption on a wide range of human diseases, particularly the risk and prognosis for breast cancer. Her research findings had a significant impact on the American Cancer Society and American Institute for Cancer Research's recommendation on soyfood consumption for breast cancer survivors.