



McGill

Department of  
Epidemiology  
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Diagnostic Radiology

## Joint Biostatistics & Radiology Seminar Winter 2018

### SPECIAL SEMINAR



### **Zhuoyu Wang, PhD**

Postdoc at the Centre de  
recherche du Centre hospitalier  
de l'Université de Montréal  
(CRCHUM)

## Modeling Conditional Dependence among Multiple Diagnostic Tests

Wednesday, February 28, 2018  
11:15 am – 12:15 pm  
Lady Meredith - Room 100

ALL ARE WELCOME

### **Abstract:**

When multiple imperfect dichotomous diagnostic tests are applied to an individual, it is possible that some or all of their results remain dependent even after conditioning on true disease status. The estimates could be biased if this conditional dependence is ignored when using the test results to infer about the prevalence of a disease or the accuracies of the diagnostic tests. However, statistical methods correcting for this bias by modelling higher-order conditional dependence terms between multiple diagnostic tests are not well addressed in the literature. In this work we extended a Bayesian fixed effects model for two diagnostic tests with pairwise correlation to cases with three or more diagnostic tests with higher-order correlations. Simulation results show that the proposed fixed effects model works well both in the case when the tests are highly correlated and in the case when the tests are truly conditionally independent, provided adequate external information is available in the form of fixed constraints or prior distributions. A data set on the diagnosis of childhood pulmonary tuberculosis is used to illustrate the proposed model.

### **Bio:**

Zhuoyu Wang has a Master and PhD degree in Biostatistics from McGill University. He also holds a Master degree in Biomedical Engineering from First Military Medical University. Zhuoyu worked in diverse fields including Bayesian statistics, diagnostic test evaluation, meta-analysis, medical imaging and medical physics. He is currently a postdoc at the Centre de recherche du Centre hospitalier de l'Université de Montréal (CRCHUM) working on causal inference methods based on machine learning.

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