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Department of Medicine  
Channing Division of Network Medicine

## Channing Network Science Journal Club

April 17, 2015, 11am @ 5th floor conference room

Speaker: Damien Croteau-Chonka, Ph.D. in Genetics and Molecular Biology  
Postdoctoral Research Fellow, Channing Division of Network Medicine  
Brigham and Women's Hospital and Harvard Medical School.

Paper to present: System Model Network for Adipose Tissue Signatures Related to Weight Changes in Response to Calorie Restriction and Subsequent Weight Maintenance

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<http://www.ploscompbiol.org/article/info%3Adoi%2F10.1371%2Fjournal.pcbi...>

Abstract: Nutrigenomics investigates relationships between nutrients and all genome-encoded molecular entities. This holistic approach requires systems biology to scrutinize the effects of diet on tissue biology. To decipher the adipose tissue (AT) response to diet induced weight changes we focused on key molecular (lipids and transcripts) AT species during a longitudinal dietary intervention. To obtain a systems model, a network approach was used to combine all sets of variables (bio-clinical, fatty acids and mRNA levels) and get an overview of their interactions. AT fatty acids and mRNA levels were quantified in 135 obese women at baseline, after an 8-week low calorie diet (LCD) and after 6 months of ad libitum weight maintenance diet (WMD). After LCD, individuals were stratified a posteriori according to weight change during WMD. A 3 steps approach was used to infer a global model involving the 3 sets of variables. It consisted in inferring intra-omic networks with sparse partial correlations and inter-omic networks with regularized canonical correlation analysis and finally combining the obtained omic-specific network in a single global model. The resulting networks were analyzed using node clustering, systematic important node extraction and cluster comparisons. Overall, AT showed both constant and phase-specific biological signatures in response to dietary intervention. AT from women regaining weight displayed growth factors, angiogenesis and proliferation signaling signatures, suggesting unfavorable tissue hyperplasia. By contrast, after LCD a strong positive relationship between AT myristoleic acid (a fatty acid with low AT level) content and de novo lipogenesis mRNAs was found. This relationship was also observed, after WMD, in the group of women that continued to lose weight. This original system biology approach provides novel insight in the AT response to weight control by highlighting the central role of myristoleic acid that may account for the beneficial effects of weight loss.

*Damien Croteau-Chonka received his Ph.D. in Genetics and Molecular Biology with a certificate in Bioinformatics and Computational Biology in 2012 from the University of North Carolina at Chapel Hill. He is currently a Postdoctoral Research Fellow in the Channing Division of Network Medicine at Brigham and Women's Hospital and Harvard Medical School. His research interests include understanding the shared genomic epidemiology of common, complex health phenotypes, especially those related to respiratory and inflammatory traits and diseases, such as obesity and asthma.*

Hosted by Yang-Yu Liu