Comparative network analysis of insulin resistance in caucasian and african americans

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African Americans (AA) have more pronounced insulin resistance and higher insulin secretion than European Americans (Caucasians or CA) matched on age, gender, and body mass index (BMI). However, molecular mechanisms underlying distinguished insulin resistance in AA remains unknown. In this study, we performed integrative network analysis the gene expression data from the subcutaneous adipose tissue of 99 CA and 37 AA metabolically characterized non-diabetic subjects with a range of insulin sensitivity (SI) and BMI values. We systematically identified the common and ethnicity-specific co-expressed gene modules and drivers. Many adipose co-expression modules were enriched for genes differentially expressed between the two ethnicities or with differential connectivity (MDC) among members of the network module. For example, SI is positive correlated with transcript modules enriched for mitochondrial metabolism in both groups. Several SI associated co-expressed modules are enriched for genes differentially expressed between groups, or had different modular connectivity among members of the network module. SI-associated transcriptional networks that were deranged predominantly in one ethnic group may explain the physiological features of glucose homeostasis among AA subjects. This study paves a way for systematically understanding the molecular mechanisms of insulin resistance in both CAs and AAs. Further studies will be required to identify how genetic and epigenetic factors determine the structure of co-expression networks in adipose tissue that modulate glucose-homeostasis and related physiological traits.

Biography

Bin Zhang is an Associate Professor of the Department of Genetics and Genomic Sciences, Icahn School of Medicine at Mount Sinai, New York, USA. He holds a PhD and a Master’s degree in Computer Science from the State University of New York at Buffalo, a Master’s degree in electronic Engineering from Tsinghua University, China, and a Bachelor’s degree in Electrical Engineering from Tongji University, China. His expertise lies in systems biology. He has published 86 peer-reviewed papers including 9 papers in Nature, Science, Cell, Nature Genetics, and PNAS. As of April 2015, his publications have been cited 7131 times.

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