Project 3: Pharmacogenomics

Introduction

Genetic epidemiology accommodates different viewpoints to look at "disease". Unraveling important functional determinants to or causal factors for complex diseases requires a systems biology view, combining evidences from different data sources, involving the genome, the transcriptome, and epigenome, amongst others.

In this project (Project 3), you will consider the same complex trait as selected in Project 2 and will investigate whether there has been evidence for gene-gene interactions and gene-environment interactions where the environmental factor is a particular drug.

Information about gene-gene interaction studies (methodological papers as well as applied papers) can be retrieved from the "Epistasis Blog": http://compgen.blogspot.be/2006/05/mdr-applications.html
This blog is updated on an almost daily basis by Jason Moore and is an excellent resource to stay on top of achievements in the context of gene-gene (and thus also often gene-environment) interactions.

Specific questions

- Is epistasis an example of genetic "effect modification"? Or confounding effect?

For the selected study of Project 2:

- Nowadays, editors often ask to carry out a (at least basic) interaction study. Hence, since you have selected a recent publication on a genome-wide association analysis, was an epistasis analysis carried out? Can you give more details about this analysis? If no such study was performed, does the literature in general provide any support for the existence of gene-gene interactions for this trait (see "Epistasis Blog")
- In what ways will a gene-environment interaction study be different (more complex? less complex?) than a gene-gene interaction study?
- Can you find an example of a pharmacogenomics study in relation to the selected complex trait of interest? Summarize key features of this study.
- From Project 1 to 3, we have added levels of complexity. As soon as we go into more depth of an initial biological problem, we move closer to the field of "systems biology" and "personalized medicine". Can you highlight the differences between "genomics for personalized medicine" and "public health genomics"? What is the impact of "genetic association studies", "epigenomics", "gene-environment" or "gene-gene" interactions on personalized medicine and public health?