

Research Interests

Norman H. Lee
phmnhl@gwumc.edu
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1. Cancer Genomics – Reconstructing Gene Networks (NCI funded)

- Tools: Gene expression profiling, chromatin immunoprecipitation (ChIP), loss-of-function screening using RNA interference, Bayesian statistics, site-directed mutagenesis
- Collaborators: H Lee Moffitt Cancer Center, NCI, NIDCR, Duke University, MD Anderson Cancer Center, UC Santa Cruz, Venter Institute, GWU

2. Cardiovascular Physiogenomics – Linking Genes to Disease (NHLBI funded)

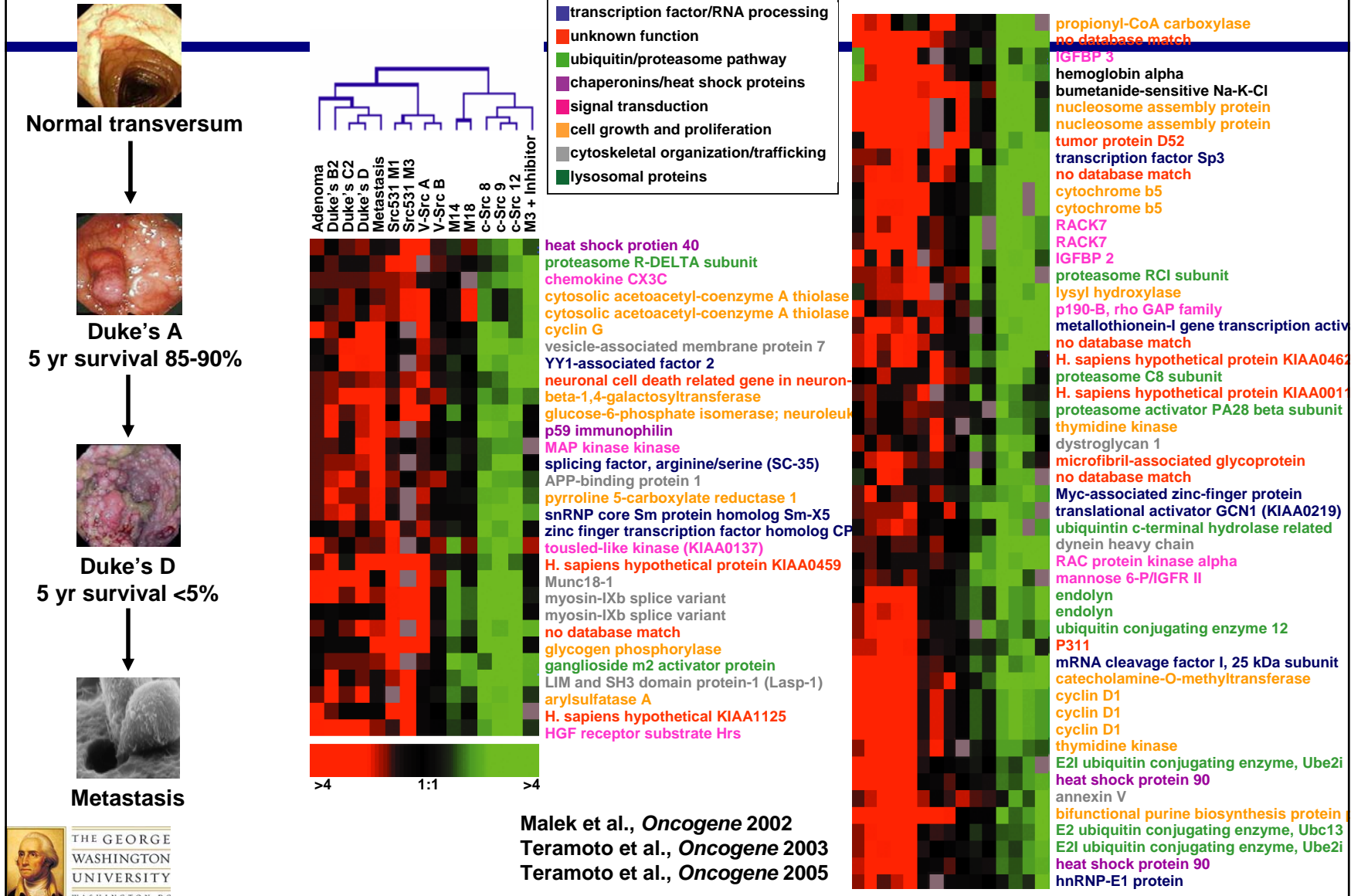
- Tools: Gene expression profiling, congenic and chromosome substituted rat strains, quantitative trait locus analysis
- Collaborators: Medical College of Wisconsin, University of Toledo

3. Behavioral Genomics – Linking Genes to Behavior & Drugs of Abuse (NIDA)

- Tools: Gene expression profiling, behavior genetics in inbred mouse strains, RNAi knock-downs via lenti virus, quantitative trait locus analysis
- Collaborators: University of Maryland, Tel Aviv University, GWU

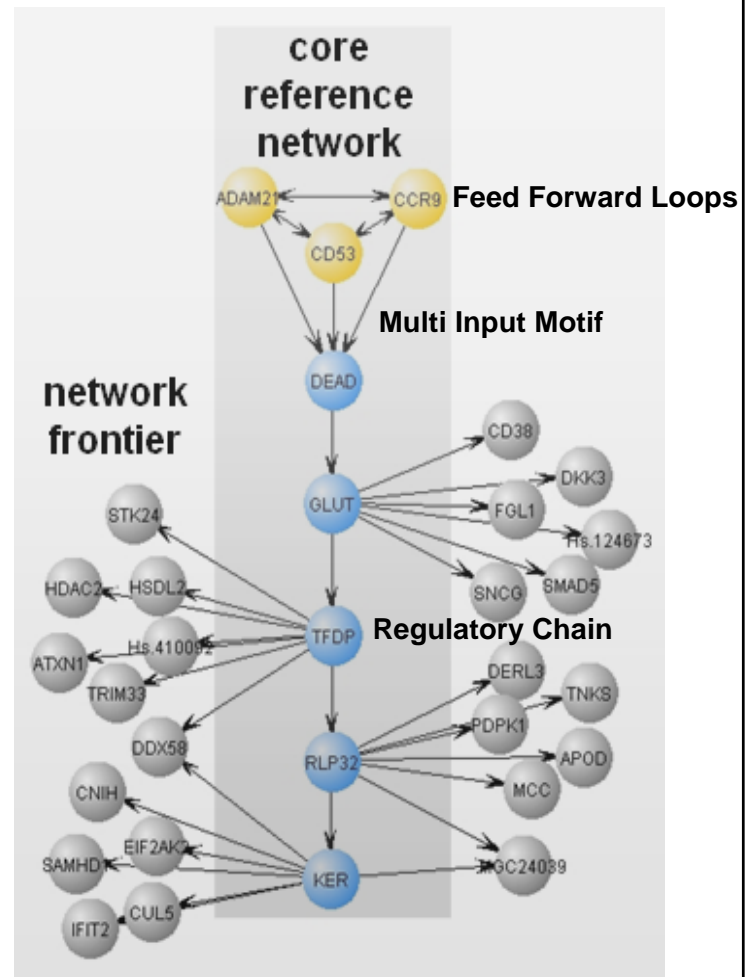
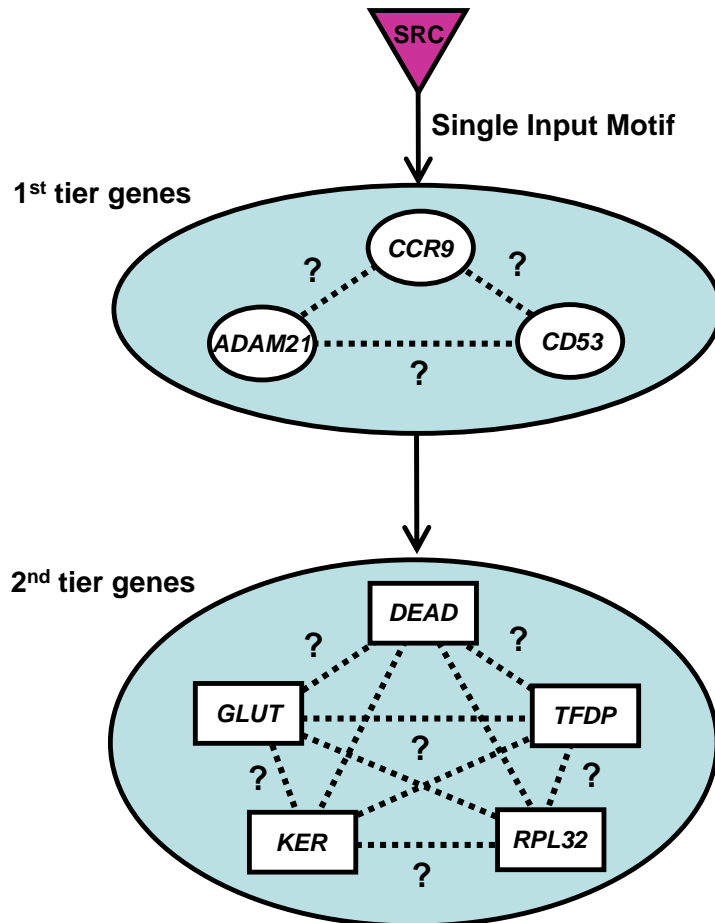


Gene Expression Fingerprint in Human Colon Cancers



Empirical Approach to Define Cancer Invasion Network

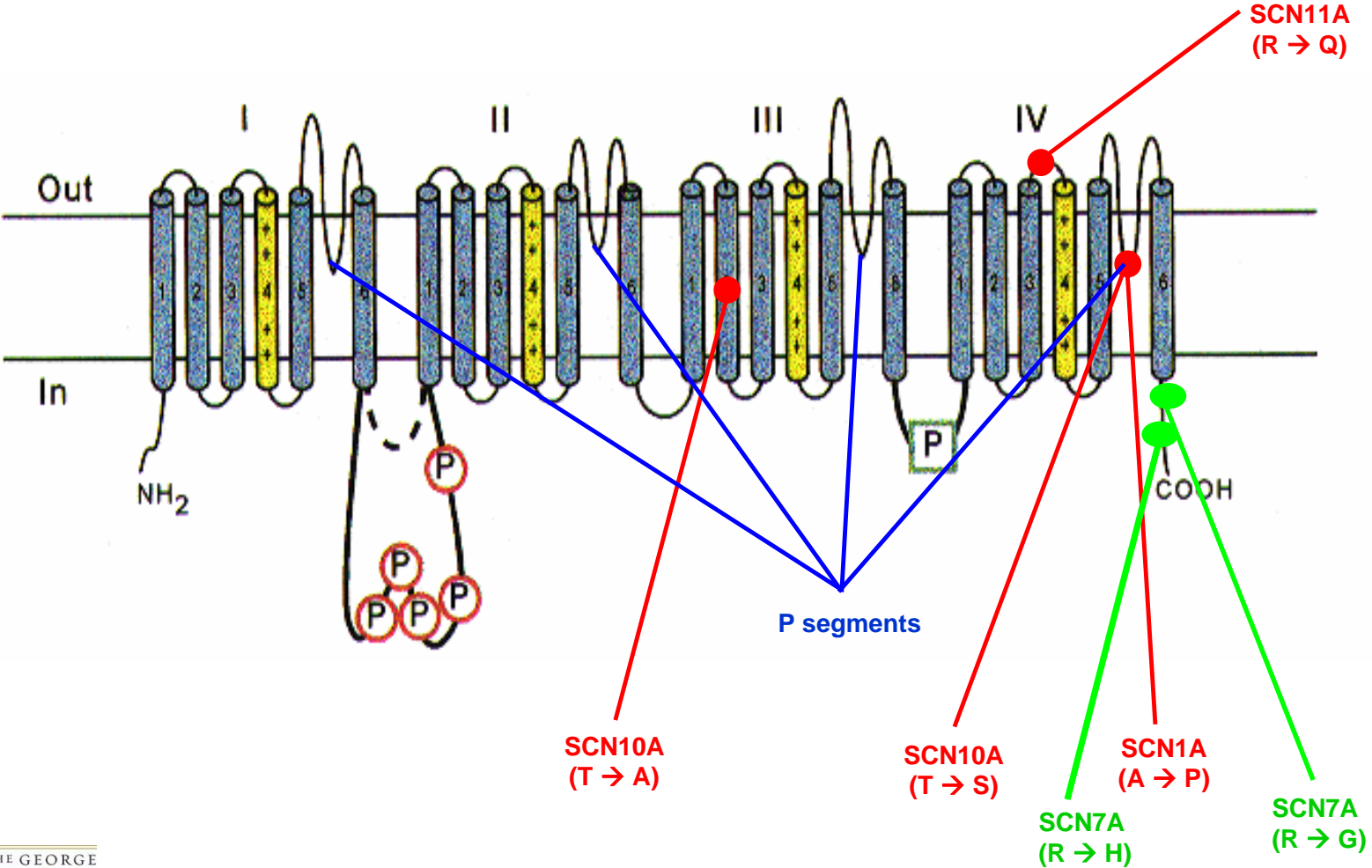
Bayesian Strategy for Cancer Invasion Network



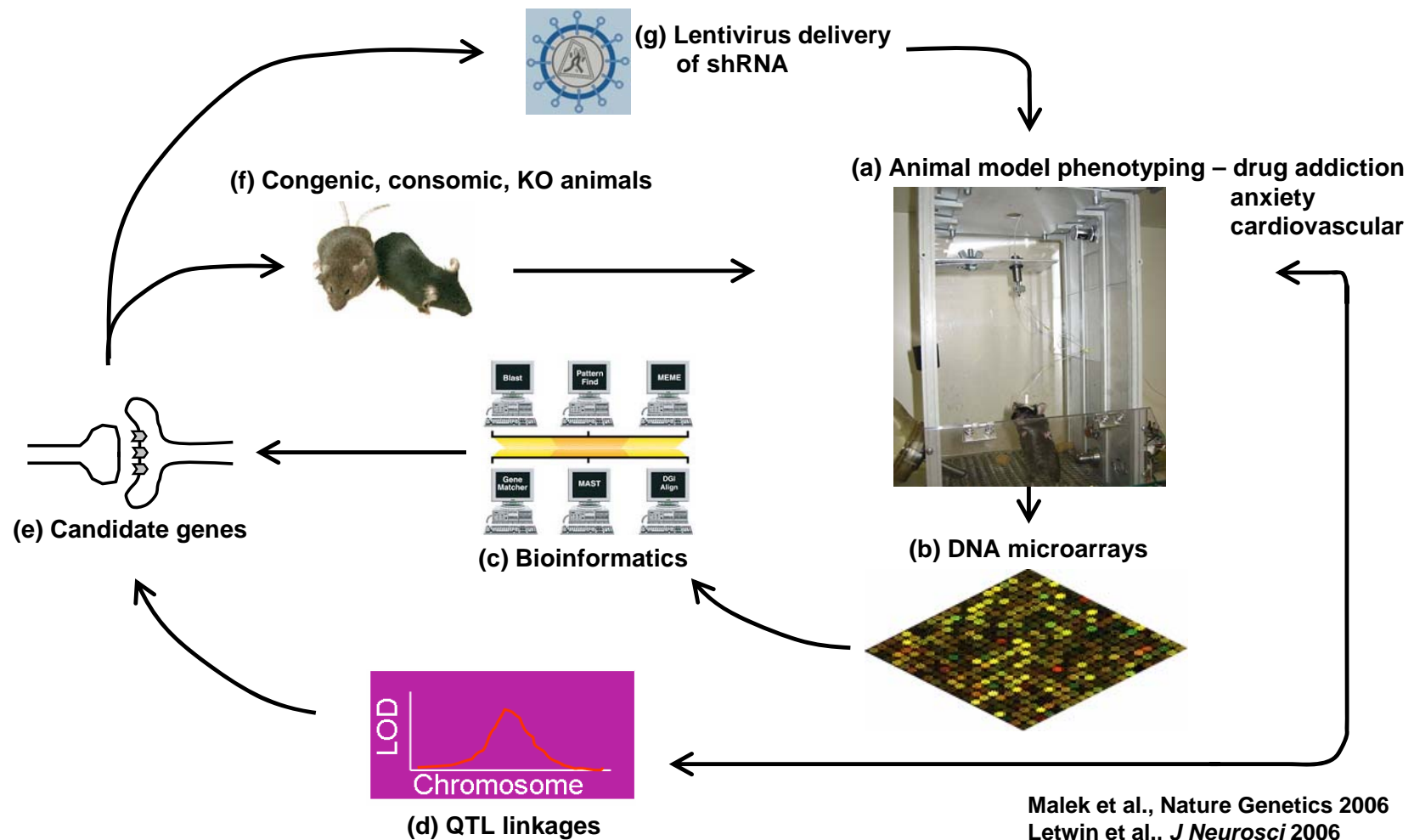
Irby et al., *Cancer Res* 2005
 Lee, *Pharmacogenomics* 2005
 Goutias and Lee, *Current Pharm Des* 2007



Cancer Genomics: Mutations in Sodium Channels

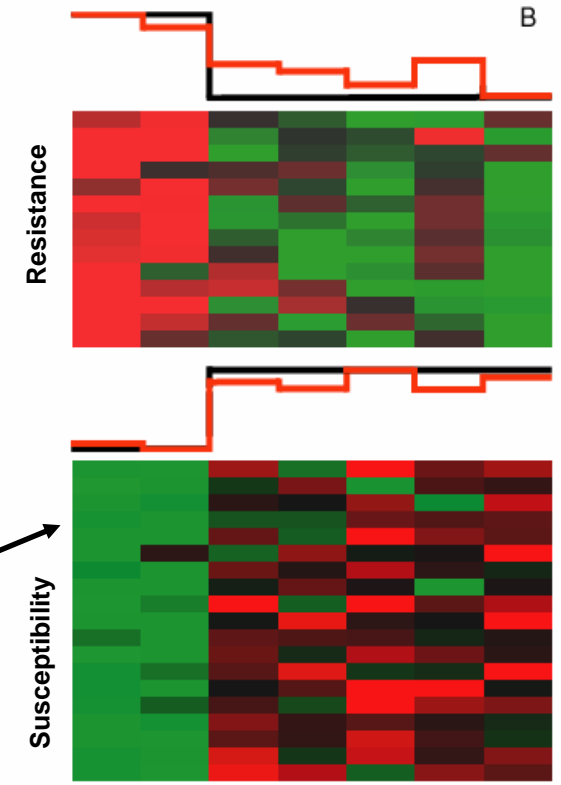
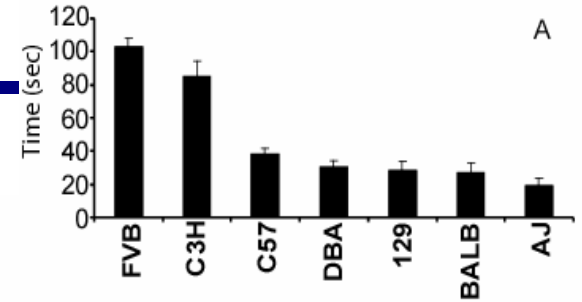
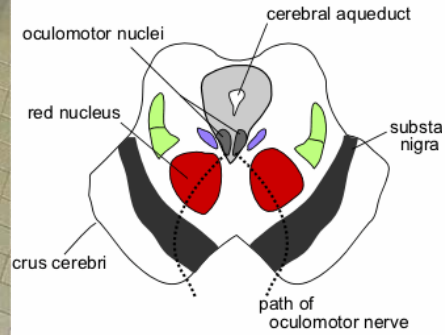
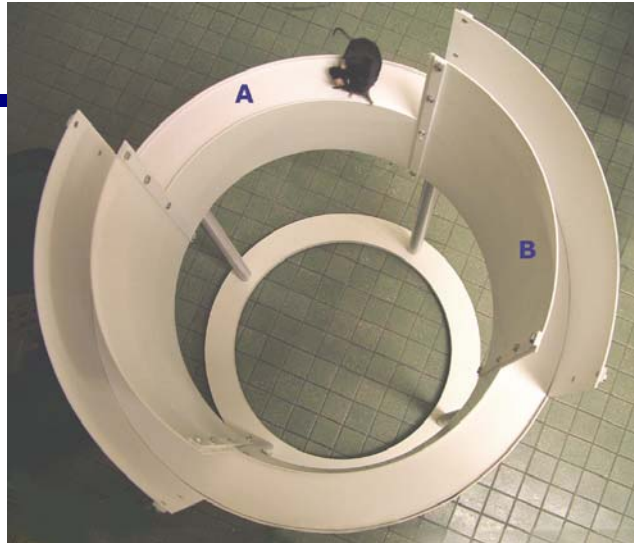


Experimental and Computational Approaches to Associate Genes with Phenotypes



Malek et al., *Nature Genetics* 2006
Letwin et al., *J Neurosci* 2006
Reiner et al., *Bioinformatics* 2007
Lee, *Exp Physiol* 2007

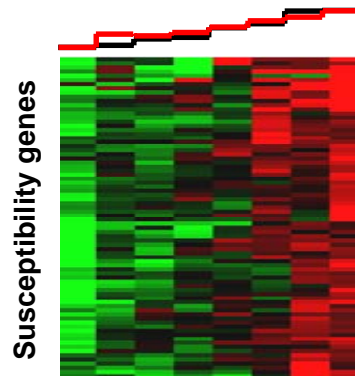
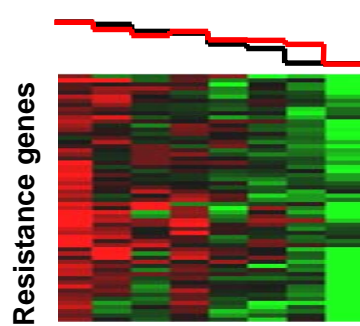
Searching for Genes Involved in Anxiety



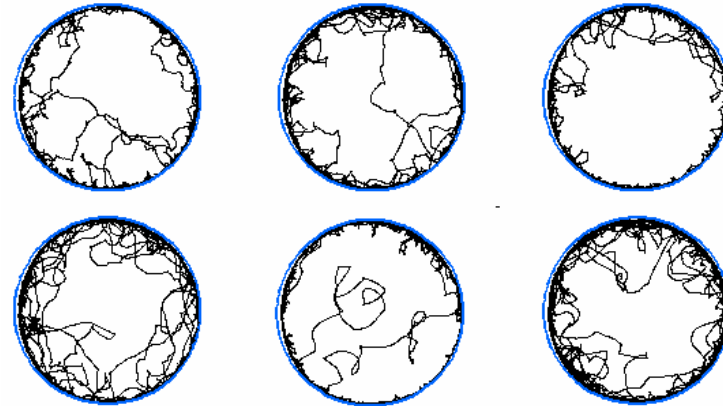
- Time in open quadrants of an elevated zero-maze is a commonly used measure of anxiety state
- Computational analysis identified 14 positively and 21 negatively correlated genes in the periaqueductal gray
- A number of these genes map to anxiety-associated QTLs (Rims3, Cdk2, AW554615, AI853937)
- Egr-1 (Axtrb4 QTL) ↑ fear conditioning; the anxiolytic drug Diazepam blocks this effect



RNAi Mediated Gene Knockdown & Anxiety



Anxiogenic gene knockdown:



Scrambled control:

