GEN3051
Week 1
Lecture 1: Human Genes & Human Genetic Disorders
Lecture 2: Linkage Analysis & LOD Scores

Lecture 1: Human Genes & Human Genetic Disorders

1. Types and prevalence of genetic disorders in humans.
2. Gene structure and expression.

Human Genetic Disorders

Human disorders can affect any aspect of physical or mental properties.

- Can be classified according to time of action:
  - spontaneous miscarriage
  - congenital (present at birth)
  - childhood
  - late onset (symptoms appear in teenage hood + adulthood)
- All result from combined action of genes + environment. Can also be classified by relative contribution of the genetic component:
  1. Single gene
  2. Chromosomal
  3. Multifactorial

Single Gene Disorders

- Any human gene can occur in mutant form.
- Latest estimate from Human Genome Project is that there are ~21,500 genes.
- Mutation of many are very deleterious, strong selection pressure against them ∴ very rare.
- For others mutations have milder consequences, but also occur sporadically.
- Catalogue of single gene disorders originated by Victor McKusick, called 'Online Mendelian Inheritance in Man' (OMIM) http://www.ncbi.nlm.nih.gov/sites/entrez?db=omim - Continuously updated catalogue of human genes and genetic disorders. Phenotypic companion to HGP.
- Contains 22,219 data entries (as of 28 Feb, 2014)
  - 20,891 autosomal
  - 1,204 X-linked
  - 59 Y-linked
  - 65 mitochondrial
- Of these entries, many are associated with a known phenotype, others are only known from DNA sequence.
- 4043 description of phenotype and known mutation
- Each gene has a unique six digit number
  - 100000, 200000 - autosomal (pre May 1994)
  - 300000 - X-linked
  - 400000 - Y-linked
  - 500000 - mitochondrial
  - 600000 - autosomal (post May 1994)
- There are many single gene disorders but most are very rare (< 1 in 10,000).