What is genetic association studies (GWAS)?

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Version: Poster
**DNA STRUCTURE**

- DNA contains the genetic instructions for the development and function of living things.
- It is a polymer that contains two strands coiled together to form a double helix.
- The strands are made of nucleotides, each of which consists of sugar and phosphate group linked to one of four bases: thymine (T), adenine (A), guanine (G) and cytosine (C).

**Gene & Genome**

- A gene is a basic unit of heredity.
- Entire genetic material of an organism is called genome. It helps to search for genes linked to different types of physical traits.
- Researchers are always seek for highly associated GENES for a particular physical traits or disease.

**WHAT IS… Genetic Association Studies (GWAS)**

- Researchers are always seeking for highly associated GENES for a particular physical traits or disease.
- Depending on the highly associated known GENES, it is highly possible to explore new associated GENES (Concept of conditioning on major GENES).

**GWAS Statistical Model**

- Genes are analysed, compared statistically, and plot Manhattan Plot which gained its name from ‘Manhattan Skyline’.
- GWAS information may be used to predict someone’s risk of developing a certain condition based on his or her GENE structure.

**Response Variable: Skin Color**

- Many Physical Traits (say, skin color, facial features) are not determined by single Genes, but a combination of many GENES.
- IN GENOME-WIDE ASSOCIATION STUDIES OR GWAS, RESEARCHERS INTERROGATE SNPS THAT COMMONLY ARISE IN THE POPULATION... AND ASK WHETHER THEY ASSOCIATE WITH DISEASE.

**GWAS information may be used to predict someone’s risk of developing a certain condition based on his or her GENE structure.**

**GWAS Statistical Model**

- The points which lies above the blue diagonal line and the horizontal red lines indicates newly detected GENES.

- Highly associated Genes can be shown in Manhattan plot.

- But WHAT HAPPENS ONES WE FIND THOSE ASSOCIATED GENES.

- BUT HOW DO RESEARCHERS KNOW WHICH GENE CONTRIBUTE TO A TRAITE MOST???

**New GENES**

- New GENES

**Already Explored GENES**

- Already Explored GENES

**Other Covariates such as Age, Sex etc**

**GWAS Statistical Model**

- Detection of New Gene Associations

**Newly Explored GENES**

- Newly Explored GENES