

# Genetics of Common, Complex Disease



## Yesterday

- Common, complex diseases were thought to be caused by interactions among behavioral, environmental, and genetic factors. These conditions have been leading causes of death in the United States for the last half century and include:
  - Heart disease
  - Cancer (e.g. lung, colon, prostate, and breast)
  - Stroke
  - Diabetes
- The underlying genetic causes of these common diseases were poorly understood.

## Today

- Complex diseases are now known to be caused by interactions among genes and environment factors including smoking, poor diet, and lack of exercise. In some cases, these environmental factors can alter DNA or the histone proteins in chromosomes. These modifications can allow the disease trait to be passed on to offspring. This non-DNA heredity is termed epigenetics.
- New technologies and scientific approaches have allowed researchers to identify an increasing number of variations in the genome that are associated with risk of developing common complex conditions.
- Large sets of information generated by genome-wide association studies and sequencing studies are entered into public databases freely available to researchers around the world. This speeds efforts to continually identify new genetic variations that contribute to the development of complex diseases.
- Hundreds of new genetic variations have been associated with risk for developing a wide variety of conditions including type 2 diabetes, heart disease, prostate cancer, Crohn's disease, Parkinson's disease, and a common cause of age-related blindness known as macular degeneration. These new discoveries are likely to lead to better ways to detect risk, select preventive strategies, and treat common complex conditions.

- The NIH's Genes and Environment Initiative (<http://gei.nih.gov/>), in addition to searching for genetic variations associated with complex diseases, aims to develop new technologies for studying the interaction of genes and environmental factors.
- The NIH's ClinSeq study (<http://www.genome.gov/20519355>) is looking at how genome sequencing can be used to detect genetic variations associated with risk for developing heart disease.

## Tomorrow

- Genetic discoveries will lay the groundwork for an era of personalized medicine for many common complex conditions. The current one-size-fits-all approach to health care will increasingly adopt strategies tailored to each person's unique genetic makeup, lifestyle, and environmental exposures.
- Health professionals will provide people with individualized information about their individual disease risk and how to prevent or reduce their risk of developing conditions such as diabetes, heart disease, and cancer.
- Individualized information will help health professionals choose the most effective treatments that are least likely to cause side effects for each individual.

### ***For additional information contact:***

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