

Fact Sheet

Genetics of Common, Complex Disease

Yesterday

- The leading causes of death in the United States included :
 - Heart disease
 - Cancer (lung, colon, prostate and breast)
 - Stroke
 - Diabetes
- The underlying genetic causes of these common diseases were not yet understood.

Today

- Heart disease, cancer, stroke, and diabetes remain the leading causes of death in the United States.
- Once thought of as common diseases, heart disease, cancer, stroke, and diabetes, are now known to be “complex” diseases.
- Complex diseases are conditions caused by the interactions of multiple genes with each other and with the environment.
- With the sequencing of the human genome, the development of more efficient technologies, and better understanding of human genetic variation, researchers have the techniques and tools necessary to uncover the multiple genes that contribute to the risk of these common, yet complex diseases.
- The Genetic Association Information Network--a public-private partnership through the Foundation for the National Institutes of Health – funds a series of genome-wide association studies. These innovative studies scan markers across individuals’ genomes to identify genetic variations associated with common, complex diseases.
- NIH’s Genes and Environment Initiative, 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.

- Through genome-wide association studies, researchers identify genetic variations that contribute to risk of type 2 diabetes, heart disorders, prostate cancer, Crohn’s disease, Parkinson’s disease, and a common cause of age-related blindness, known as macular degeneration.
- Large sets of information generated by genome-wide association studies are entered into public databases freely available to researchers around the world. This speeds efforts to identify more genetic variations that contribute to the development of complex diseases.
- The Multiplex Initiative, which examines the interest level of healthy, young adults in receiving genetic testing for eight common, complex conditions, will provide research information to advance the concept of personalized medicine.
- The Cancer Genome Atlas project systematically catalogues mutations occurring in many common tumors.

Tomorrow

- Genome-wide association studies will lay the groundwork for the era of personalized medicine. The current one-size-fits-all approach to health care will give way to strategies tailored to each person’s unique genetic makeup, lifestyle, and environmental exposures.
- Health professionals will provide people with individualized information about how to prevent or reduce their risk of developing complex diseases, such as diabetes, heart disease, and cancer.
- Individualized information will help health professionals choose the treatments most likely to work and least likely to cause side effects for each individual.

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