Commentary
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The Historic facts of Neurogenomics

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Abstract

Genomics technologies such as next-generation sequencing (NGS) and microarrays accelerate neurogenomics research by revealing the mechanisms behind complex neurological disorders such as Alzheimer's, Parkinson's disease, amyotrophic lateral sclerosis (ALS), and psychiatric disorders. The interaction between genetic and non-genetic mutations, epigenetics, and other factors requires an analysis of the NGS level to broaden our understanding. Arrays aids in major studies of a variety of genes related to neurological disorders. Illumina provides NGS and the same tools needed to make neurogenomics research possible.

Keywords: SGLT2 inhibitors • Metformin • Insulin

Commentary

Neurogenomics is the study of how the genome of an organism affects the growth and function of its nervous system. This field aims to integrate functional genomics and neurobiology to understand the entire nervous system from a genomic point of view.

The nervous system in vertebrates is made up of two major types of cells - neuroglial cells and neurons. Hundreds of different types of neurons exist in humans, with different functions - some of which process external stimuli; others produce stimulating reactions; others plan on central structures (brain, spinal ganglia) responsible for understanding, seeing, and controlling motor functions. Neurons in these central regions tend to organize in large networks and communicate widely.

Prior to the discovery of speech patterns and DNA sequencing methods, researchers sought to understand the behavior of nerve cells (including synapse formation and neuronal development and regional segregation in the human nervous system) based on basic cell biology and biochemistry, without understanding genome impact of the neuron in its development and behavior. As our understanding of the genome grows, the role of genetic interactions in maintaining neuronal function and behavior has gained interest in the neuroscience research community. Neurogenomics allows scientists to study the nervous system of living things in the context of these subordinate and transcriptional networks. This approach is different from neurogenetics, which emphasizes the role of a single gene outside the context of network interactions when learning the nervous system.

When autism was identified as a unique biological disease in the 1980s, researchers found that people with autism showed abnormal brain growth in the cerebellum during their early years. Subsequent studies have shown that 90% of autistic children have a higher brain volume than their peers by 2 to 4 years of age, and they show an increase in white and gray content in the cerebrum. The white and gray matter in the cerebrum is associated with reading and comprehension respectively, and the formation of amyloid plaque in the white matter has been linked to Alzheimer's disease. These findings highlight the impact of structural variability on brain disorders, and promote the use of imaging technology to map the regions of the distinction between healthy and sick brains. Furthermore, while it may not always be possible to retrieve biological models from different areas of the human brain, neuroimaging techniques provide unconventional ways to understand the biological basis for neurological disorders. It is hoped that understanding the localization patterns of various psychiatric disorders may also inform network analysis studies in neurogenomics.Studies of animal models for several brain diseases have shown that the blood-brain barrier (BBB) is altered at many levels; for example, surface glycoprotein formation may affect the types of HIV-1 strains transported by the BBB. BBB has been found to be key to the onset of Alzheimer's disease. It is very difficult, however, to be able to learn this from humans because of the obvious limitations of access to the brain and to find biological examples of sequencing or morphological analysis. BBB rat models and regional disease models have been effective in considering BBB as a means of controlling disease and good brain health.

Conflict of Interest

The authors declared no potential conflicts of interest for the research, authorship, and/or publication of this article.

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