

NGS in diagnostics of neurological disorders

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Rapid progress of genetic diagnostic methods and application of genomic technologies has revealed the genetic basis of many neurological diseases that were traditionally characterized as idiopathic. Neurological disorders present a significant public health problem and include a number of clinical symptoms from delay in cognitive and linguistic abilities, presence of anatomic abnormalities to epileptic events and muscle weakness. Despite extensive clinical and laboratory tests, specific genetic cause remains unexplained in more than 50% of cases of these diseases. Previous diagnostic methods enabled analysis of single genetic mutations, making determination of the causal mutation time consuming, expensive, and very often not detectable. The precise differential diagnosis of neurological disorders is challenging due to their genetic heterogeneity, phenotypic similarities and overlapping symptoms. Most commonly used molecular diagnostic technique applied in the diagnosis of complex diseases is next generation sequencing (NGS). We have applied our custom designed epilepsy panel that consists of 142 genes and exome sequencing in patients with epilepsy and neuromuscular disorders which enabled the identification of causative variants in patients in whom standard diagnostic procedures failed to identify a clear genetic cause of disease. These results offer further proof that NGS approaches represent powerful tools for establishing a definitive diagnosis and can improve treatment efficacy. Genomic approach in neurological diseases opens new horizons in understanding disease mechanisms, leading to the development of new diagnostic tools and their increasing application in medicine.

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