Published on *My46* (https://www.my46.org) 01/20/2022

My46 Trait Profile

SCN1A-related seizure disorder

SCN1A-related seizure disorders are a group of seizure conditions that begin in infancy or childhood and can range in severity. Some of the disorders are relatively mild while others are more severe with seizures that last longer and may be difficult to control. They are caused by mutations in the SCN1A gene which makes an important part of a sodium channel protein.

Characteristics of SCN1A-related seizure disorder

A SCN1A-related seizure disorder is a group of seizure conditions caused by mutations in the SCN1A gene. This group of conditions includes simple febrile seizures (seizures that occur with high fevers), genetic epilepsy with febrile seizures plus (GEFS+), Dravet syndrome (severe myoclonic epilepsy of infancy) and intractable (uncontrolled) childhood epilepsy with generalized tonic-clonic seizures. The most common features associated with SCN1A-related seizure disorders include: febrile seizures before the age of one year or after six years, febrile seizures of unusual severity, or febrile seizures occurring before seizures not associated with a fever; a history of seizures following vaccinations, seizures that occur on one side of the body, and seizures triggered by environmental events such as high heat, temperature changes, bright lights, or loud, busy environments.

The age of onset of seizures, seizure types and severity, as well as developmental outcome are extremely variable. Intellectual and cognitive disabilities are most commonly associated with early myoclonic (sudden, brief, muscle twitches or jerks) or absence (brief period of loss of consciousness or awareness, sometimes with staring) seizures. The seizures may tend to become less severe as an individual reaches puberty, though they rarely completely go away.

Diagnosis/Testing

Individuals with SCN1A related seizure disorders have a change in the “sodium channel protein type 1, subunit alpha” or SCN1A gene. This gene makes a protein that creates an important part of a sodium channel in the brain and muscles. Sodium channels allow sodium (and sometimes other chemicals) to flow between nerve cells resulting in electrical signals being sent to the brain. Mutations in the SCN1A gene are thought to interfere with the flow of electric signals in the nerves by changing the structure or function of the sodium channel.

Management/Surveillance

Since individuals who have SCN1A mutations are at risk to have a seizure disorder, it is very important to be evaluated by and receive care from a healthcare provider (e.g., a doctor) who is familiar with these conditions and their treatment. This can be important in receiving appropriate treatment earlier and reducing chances of intellectual and cognitive impairment.

Individuals who have a SCN1A-related seizure disorder should avoid certain medications including carbamazepine, lamotrigine, and vigabatrin (which can induce or increase myoclonic seizures) and phenytoin which can induce choreoathetosis (involuntary movements of the arms or legs). It also might be important to avoid certain activities such as driving or swimming that could impact an affected individual’s safety.

Mode of inheritance

SCN1A-related seizure disorders are inherited in an autosomal dominant pattern. This means inheriting one SCN1A

mutation is enough for an individual to be affected and show signs of a seizure condition. The mutation can be inherited from an affected parent or it can occur brand new (de novo) in an affected child. Frequently, the more severe the seizure condition in an affected child, the less likely a parent also has the condition; therefore the affected child most likely has a de novo SCN1A mutation.

Risk to family members

The risk to family members depends on whether or not the individual with the SCN1A-related seizure disorder has a parent affected with the same condition. If a parent also has the disorder, the risk of having a child with an SCN1A-related seizure disorder is 50% with each pregnancy. If a parent does not have the condition, the risk of other siblings being affected is very low.

SCN1A-related seizure disorders have variable expressivity which means that sometimes, individuals in the same family who have the same SCN1A mutation may have different types of seizure conditions.

Special considerations

None

Resources

Epilepsy Foundation
http://www.epilepsyfoundation.org/
Dravet Syndrome
https://dravet.org/
Dravet Syndrome Foundation
http://www.dravetfoundation.org/
Genetics Home Reference: SCN1A
http://ghr.nlm.nih.gov/gene/SCN1A
Intractable Childhood Epilepsy Alliance
http://www.ice-epilepsy.org/

References

Harkin, LA. et al. (2007)."The spectrum of SCN1A-related infantile epileptic encephalopathies." Brain 130(Pt 3): 843-852.
Marini, C. et al. (2011)."The genetics of Dravet syndrome." Epilepsia 52(Suppl.2): 24-29.
Miller IO, Sotero de Menezes MA. (Updated 10 November 2011). SCN1A-Related Seizure Disorders. In: GeneReviews at GeneTests Medical Genetics Information Resource (database online). Copyright, University of Washington, Seattle. 1997-2013. Available at http://www.ncbi.nlm.nih.gov/books/NBK1318/. Accessed [01/26/2013] and [08/02/2013].

Created: 05/2013 **Created by:** Karin M. Dent, MS, LCGC
Updated: mm/yyyy **Edited by:** Seema Jamal, MSc, LCGC