- **Content for possible pamphlet**/download on new Alliance website and 8a.net.
- Needs updating and some peer review – perhaps by a few clinicians in the network
- Key is to present some additional value added over currently available info on our or other websites.

Understanding SCN8A

The SCN8A gene was first discovered in humans by Dr. Michael Hammer, Ph.D., a geneticist who identified the gene in his own daughter, Shay Emma Hammer, soon after her death in 2011. SCN8A causes rare a form of severe epilepsy associated with developmental delay, and many other neurological symptoms. It undoubtably affects thousands of individuals worldwide; however, because of its recent discovery, we only know of hundreds of cases so far.

What is SCN8A epilepsy?

SCN8A epilepsy and related disorders is an early-onset, intractable epilepsy characterized by multiple seizure types and developmental delay. Most SCN8A mutations are *de novo* (or non-inherited) although about 10% of cases are inherited. Many individuals experience other early onset epilepsy syndromes such as Infantile Spasms. The phenotype (or characteristics) of the disorder is extremely broad – including some children who experience limited effects to others who are profoundly affected with impaired functioning of most systems. The most common clinical features reported by Dr. Hammer based on family reported data since 2015 include:

Seizures

Age of onset is typically either early - from the first day of life (or in utero) to 18- 22 months, although several cases of later onset have been identified. Initial seizure type varies at onset with most patients developing additional seizure types, including focal clonic seizures evolving to a bilateral convulsive seizure, afebrile tonic clonic seizures, tonic seizures, epileptic spasms, febrile seizures, and myoclonic seizures. (See overview of different seizure types at https://www.epilepsy.com/learn/types-seizures.)

Both convulsive and non-convulsive status epilepticus appear to be common. Seizure frequencies range from hundreds per day to one per month or less.

Most SCN8A patients have refractory (uncontrolled) seizures and require polytherapy (multiple anti-seizure medications). Early evidence suggests that sodium channel blockers are the best first line of attack in controlling seizures; however, few patients are known to be controlled on a single medication.

EEG and MRI

While often normal, EEG at onset may show focal or multifocal activity. Patients often develop an abnormal EEG showing moderate to severe background slowing and focal or multifocal sharp waves or spikes, most often in the temporal regions.

Most patients exhibit normal MRI brain scans at onset. Some patients have been shown to develop cerebral or cerebellar atrophy in follow-up studies.

Development

The developmental pattern varies from normal development prior to seizure onset with subsequent slowing or regression after seizure onset, to one of abnormal development from birth. Many patients experience a drastic slowing or arrest in development after a known trigger (e.g., change in seizure type, vaccination) or for no apparent reason.

Approximately half of patients learn to sit and walk unassisted. Ataxia is common in these patients. The remaining patients are non-ambulatory. Patients can experience sudden loss of mobility.

Language is frequently affected. The majority of patients speak few words or none.

Intellectual Disability

Patients typically develop intellectual disability ranging from mild to severe, with about half of patients having severe intellectual disability. Autistic features are noted in some cases.

Movement Abnormalities

Variable types of movement disorders have been described in some patients, including hypotonia, dystonia, choreoathetosis, ataxia, spasticity, and increased startle.

Startle and Sleep Problems

Many children are hyper-alert as infants (i.e., more awake and aware of their surroundings than typical newborns) and are easily startled. For example, one child was noted to have jittery movements shortly after birth, and a pathologically exaggerated startle response to tactile and acoustic stimuli. The hyper-alert sleep appears to make it more difficult to settle into a deep, healthy sleep. These symptoms have been anecdotally reported in several other SCN8A cases.

Associated medical problems

Additional findings reported in some patients include, physical weakness, autonomic nervous system dysfunction, hearing problems, dysmorphic features, sleep dysfunction, g-tube dependence, gastroesophageal reflux, cyanosis, bone fractures, laryngomalacia, scoliosis, microcephaly, difficulty with temperature regulation, tachypnea, arrhythmia, cortical visual impairment, pneumonia, hyperplasia of gums, constipation, chronic UTI.

Sudden unexpected death in epilepsy (SUDEP)

SCN8A patients are reportedly at higher risk for SUDEP. It has been reported in approximately 10% of published cases.

Common Issues for SCN8A patients – by Dr. Michael Hammer (adapted from 8a.net)

Things that we know that are important to discuss during your appointments and hospitalizations:

1. Medications tend to be metabolized much faster with SCN8A children than normally developing children. It is crucial that the AED's are pushed at an aggressive level to ensure they can do their job. Be sure they are aware that sodium channel blockers tend to be the most successful medications for treatment (see Medications).

2. Medication and CBC levels should be checked often with blood work, especially if the child is presenting or seizing more often than their baseline. Medication levels are usually higher than "textbook" and while that is okay for most SCN8A patients, it is important to make sure all bodily levels are not at critical levels.

3. EEG's are important in providing information in regards to seizure types, where they are located, if medications potentially have affected the brain and if seizure types change.

4. Have a written plan of action approved by your doctor in case of hospitalizations, including medications to be used and/or avoided during emergencies. Keep this on hand at all times.

5. Rescue Medications – Everyone should have some form of rescue meds to help in case of emergencies that can be managed at home.

6. Have a discussion about SUDEP. It is crucial to have an open conversation to acknowledge risks and precautions (See SUDEP).

7. ALL children should be on a pulse ox to monitor heartrate while sleeping. We are aware that SCN8A presents itself not only in brain tissue, but heart tissue as well (See Monitors).

8. A 24-hour heart monitoring/holster monitor should be performed once a year, as we know SCN8A presents itself in brain and heart tissue. It is important to keep an accurate history of the heart so that if there are any detected changes, they can be treated appropriately.

9. After giving your physician the clinician guide and SCN8A.net site, ask them if they are honestly comfortable and willing to help with appropriate care. If not, ask if they have a reference for someone that can provide the dedication and care necessary for successful treatment.

10. Trust your parent intuition. If something does not feel right, respectfully speak up, ask questions, and keep asking until you are satisfied and comfortable with the answer and understand the reasoning behind certain decisions. You do not have to settle for an answer you're not happy with. No one knows your child better than you. When in doubt, you can always consult patient advocacy to help with communication.