

How can parents protect their kids?

- See the doctor regularly for follow-up. If on a medication the dose needs to be adjusted as the child grows. Make sure you see the doctor at least once a year, more frequently during very rapid growth, and discuss the need for dose changes. ICD patients need to be seen at least twice a year to check their ICD.
- Get additional medical advice if you are not comfortable with how things are going. Ideally, every patient/family with Brugada Syndrome should be cared for by a heart rhythm specialist (cardiac electrophysiologist). Do not hesitate to obtain a second opinion if you have any questions about your or your child's treatment.
- Make sure your family has an AED (automatic external defibrillator) and/or your child's school district has AED programs in their schools. For more information visit www.StopSADS.org.
- Treat any fever quickly with acetaminophen.
- Check any prescription given to you or your child against the list of drugs to avoid. Besides the provided list of at-risk medications, the physician ordering the medication and the pharmacist dispensing it should conduct their own surveillance.

Innovative Programs

Patient/Family Support: provide information, resources and consultation to patients and their families to help them make informed medical decisions and live and thrive with SADS conditions.

Awareness: increase the general public's knowledge of the warning signs of SADS conditions through our website, speaker's bureau, social media outlets, conferences and health fairs.

Advocacy and Research: advocate for increased research for genetic arrhythmias, screening and treatment improvements. Research Registry: Compile medical history of our patients for further research.

Medical Education: provide educational programs, information and tools to assist health professionals to recognize, diagnose and treat SADS conditions. Facilitate "bench to bedside" translation of research.

SADS Awareness Campaign: year round grass roots outreach campaigns to communities and the media to increase awareness of the warning signs of SADS conditions including the annual SADS Safe Schools campaign and the National Sudden Cardiac Arrest Awareness Month.

Family Pedigree Project: help SADS families complete their family pedigree to identify others at risk.

Volunteers: utilize volunteers across the country for outreach patient support, education and advocacy campaigns to maximize our resources and save lives.



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The Sudden Arrhythmia Death Syndromes (SADS) Foundation is a leader in education, research and advocacy. Our Mission is to save the lives and support the families of children & young adults who are genetically predisposed to sudden death due to heart rhythm abnormalities.

Brugada Syndrome

A Guide for Patients and Health Care Providers

Why do I need to know about Brugada Syndrome?

What Physicians need to know.

What Patients and Parents need to know.



www.StopSADS.org

A note from the SADS Foundation.

We provide this information with the hope that informing physicians, other health care providers, and the public improve recognition, resulting in the reduction and ultimately elimination of cardiac arrest and sudden death from the Brugada Syndrome.

Incidence of Brugada Syndrome

Because this is a relatively recently identified condition, we are uncertain of the true incidence of Brugada. It is thought responsible for between 4% or more of all unexpected sudden deaths and at least 20% of all sudden deaths in patients with an apparently normal heart.

Physicians need to know:

- When to consider Brugada as a possible diagnosis.
- When to refer patients for diagnosis & treatment.
- About genetic testing for Brugada Syndrome.
- How to develop a family pedigree and screen family members for Brugada Syndrome.

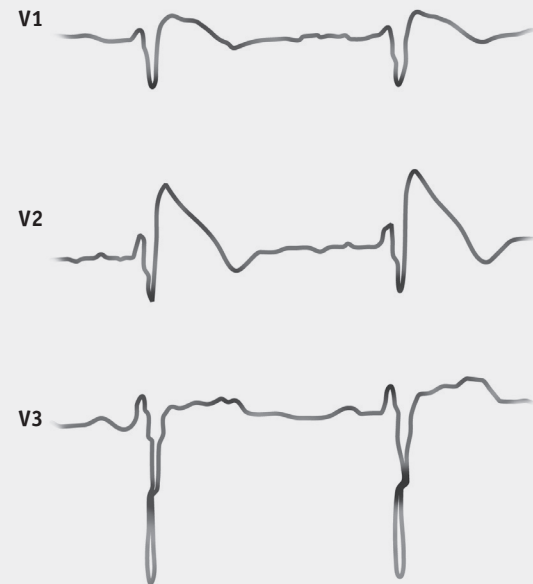
Patients and Parents need to know:

- The warning signs and symptoms of Brugada Syndrome.
- Who to see for proper testing
- How to protect their children and themselves.
- How to expand their family pedigree and contact other family members who may be at risk.



What is Brugada Syndrome?

Brugada Syndrome is an inherited disease that results in a disturbance of the heart's electrical system. Like Long QT Syndrome, Brugada Syndrome is often due to an abnormality in a cardiac ion channel. Mutations in twelve different ion channel genes have been associated with Brugada Syndrome. Mutations in the genes encoding the sodium and calcium channel in the heart are the most prevalent. In close to 60% of patients with clinical Brugada Syndrome, a genetic defect may not be identified because additional, as yet undiscovered defects, exist. Our window to this electrical activity of the heart is through an electrocardiogram (ECG). The ECG in Brugada Syndrome can be normal at times and abnormal at other times. When abnormal there is an elevation of the ST segment. Fever and certain medications can bring out these ECG changes.



What are the symptoms of Brugada Syndrome?

This is a disease that affects males more than females with an average age of onset of 40 years, although it may be diagnosed in newborns and young children and has been identified as a cause of Sudden Infant Death Syndrome (SIDS). Symptoms, like the abnormal ECG appearance, occur more commonly with a fever. The symptoms of Brugada Syndrome are syncope (fainting) and sudden death due to a fast polymorphic ventricular tachycardia (fast and unstable rhythm from the ventricle that does not allow the heart to pump adequately). If the ventricular arrhythmia stops by itself then the symptom is fainting. If it does not stop then a cardiac arrest or sudden death can occur. Other symptoms include seizures, unexplained nighttime urination or strange breathing during sleep. The arrhythmia, as well as sudden death, commonly occurs during sleep. Many patients do not have symptoms. The symptoms of Brugada Syndrome can be and are confused with the common faint.

When should the diagnosis be suspected?

- In any young person with **unexplained syncope (fainting), unexplained cardiac arrest, or sudden death.**
- When there is a **family history** of unexplained syncope, unexplained seizures, or sudden death in young people.
- When the autopsy is normal following the sudden and unexplained death of a young person.

How is the diagnosis made?

- Abnormal resting ECG
 - Multiple ECGs may be needed
 - ECGs at times of fever
- Drug provocation study (i.v. procainamide)
- Genetic testing
 - Only positive in 30-40% of patients

How is Brugada Syndrome inherited, and who in a known or suspected family should be tested?

Brugada Syndrome is usually inherited by autosomal dominant transmission. This means that it generally should affect boys and girls equally, and that each child of an affected parent has a 50% chance of inheriting the genetic abnormality. In a really large family, close to 50% of the children would inherit the genetic abnormality. In average size families, it can range from all to none as each child has an independent 50/50 chance of inheriting the particular disease gene. Once a family member is identified with Brugada Syndrome, it is important that other family members be tested for the syndrome. It is especially important to know which parent and grandparent has the abnormality, since brothers and sisters, aunts, uncles, nephews, nieces, and cousins on the affected side are potentially at risk.

Screening ECGs in family members of a patient with Brugada Syndrome is important but because the ECG can be different at different times, it is more difficult and additional ECGs, during fever or drug provocation testing may be needed. In some cases, an ECG taken with leads V1 and V2 raised two intercostal spaces is helpful in diagnosing the syndrome. In some cases, a definitive diagnosis requires the use of provocative agents such as the sodium channel blocker procainamide to unmask the Brugada syndrome ECG.

What about genetic testing?

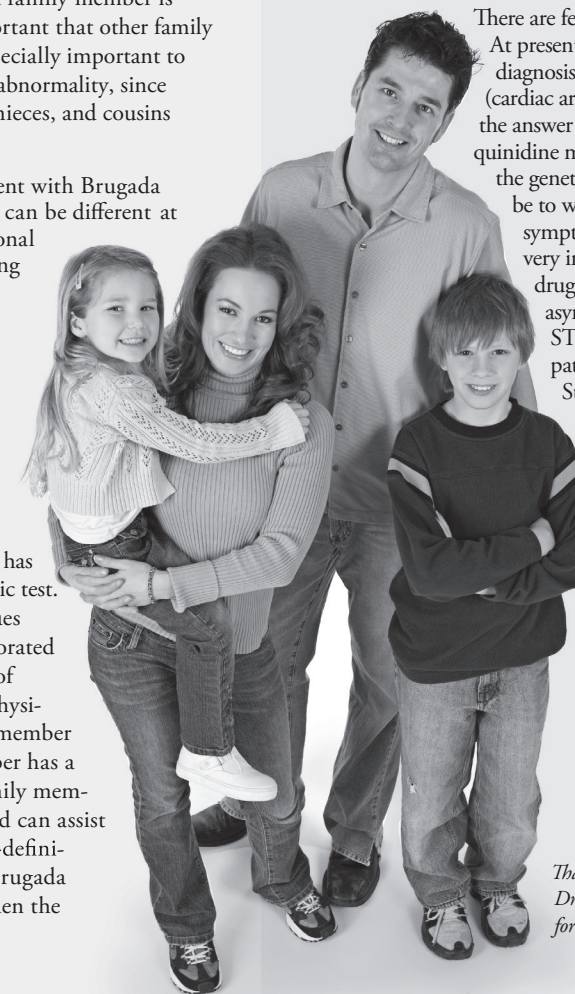
Since 2004, Brugada Syndrome genetic testing has been a commercially available, clinical diagnostic test. As research about Brugada Syndrome continues more mutations will be identified and incorporated into the test and will increase the usefulness of genetic testing in Brugada Syndrome. Your physician may order the initial test on one family member (so-called index case). Once/if a family member has a gene mutation identified, testing of other family members for that specific mutation is available, and can assist in clarifying those family members with non-definitive ECG findings. If a genetic diagnosis of Brugada Syndrome is established for the index case, then the

genetic test is definitive and will rule in or rule out the diagnosis of Brugada Syndrome in family members and relatives. Genetic testing is available through three commercial facilities and a number of research laboratories. For the contact information and the most up to date list, contact the SADS Foundation or www.StopSADS.org. Genetic screening conducted in research laboratories is generally more extensive in that it is designed to uncover new genes associated with Brugada Syndrome. Once a novel genetic variation is identified in a new gene or a gene known to be associated with Brugada Syndrome, it is important to determine whether the variation is truly disease-causing through further clinical and basic research.

What is the treatment and who should be treated?

There are few options for treatment for Brugada Syndrome. At present, the ICD is used for patients with a definitive diagnosis (Brugada pattern on ECG) and symptoms (cardiac arrest, syncope or palpitations). An ICD is not the answer for every patient. Several studies suggest that quinidine may have therapeutic value. For patients with the genetic diagnosis but no symptoms, the answer may be to watch them closely and have them report any symptoms. Close monitoring during times of fever is very important. Research is ongoing concerning other drug therapy for Brugada Syndrome. In the case of asymptomatic patients who manifest a coved type ST segment elevation, physicians may discuss with patients the option of being treated with quinidine. Such patients should be registered by physicians at www.brugadasyndrome.info.

Patients should avoid drugs that block the sodium channels in the heart and may precipitate life-threatening arrhythmias. For a complete list of drugs to avoid, visit www.StopSADS.org or www.brugadadrugs.org.



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