



## N.Z. Cardiac Inherited Disease Registry

### Brugada Syndrome Information for Families

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#### Background

#### What is Brugada Syndrome?

Brugada Syndrome is a rare inherited heart condition that may affect the heart beat of otherwise fit and healthy people. It was initially described in 1992 by two doctor brothers, Brugada and Brugada. It is characterised by a typical appearance on the resting electrocardiogram (ECG), and is associated with an increased risk of sudden death, usually at night, as a result of a rapid chaotic heart rhythm called ventricular fibrillation. Near-miss episodes may cause sudden blackouts, which can go on to cause a seizure, especially at night.

The underlying cause is defective transmission of electrical impulses through the heart due to failure of sodium channels in the heart cell wall.

About a third of Brugada cases are found to be familial; that is they are passed down through the generations. Brugada syndrome is inherited in an autosomal dominant manner. This means for each child born to a parent carrying the at-risk gene each child has a 50% chance of inheriting the same gene.

#### How can doctors make the diagnosis of Brugada Syndrome?

Brugada syndrome is usually diagnosed in life through specialist examination of the ECG, supplemented by a taking a thorough clinical and family history. There may be a history of sudden collapse, seizure, particularly at night or with a fever, and there may be a family history of sudden death, particularly in young adult males.

Many people carry the at-risk gene for Brugada syndrome, and yet have a normal ECG most of the time. ECG signs may be unmasked by a high fever, and by some medications. Such medicines are dangerous for people with Brugada syndrome. Two of these medicines (Ajmaline and Flecainide) can be used carefully under controlled conditions by cardiologists to unmask the ECG signs in those gene carriers with a normal ECG.

#### ECG showing Brugada syndrome pattern

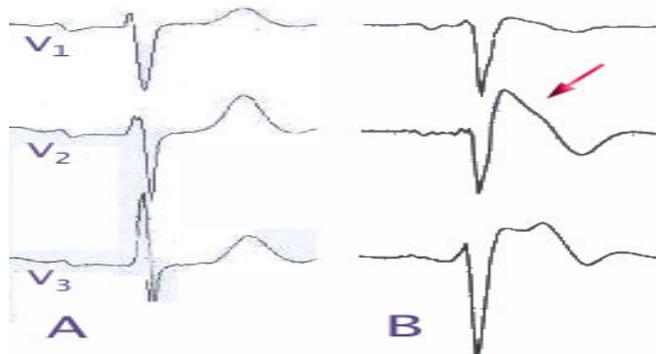


Fig 1.0: ECG (A) on the left shows a 'normal' pattern, whilst the ECG shown in (B) on the right shows elevation of the ST segment typical of Brugada syndrome. The arrow depicts the increased ST segment elevation in lead V2.

Brugada Syndrome is thus usually diagnosed from an abnormal ECG taken following a sudden collapse or seizure. Following death, diagnosis can sometimes be made from DNA from blood or tissue saved at post-mortem examination, or it may be diagnosed by ECG screening of the deceased person's first degree relatives.

## Treatment

Patients are stratified into groups from low risk to high risk depending upon their symptoms and ECG findings. All subjects with Brugada syndrome should avoid a small list of medications ([www.brugadadrugs.org](http://www.brugadadrugs.org)). It is probably wise to avoid medications on another list as well ([www.qtdrugs.org](http://www.qtdrugs.org)).

Those patients with a higher risk have the ECG features of Brugada as well as symptoms such as collapse; and this accounts for some 10% of cases. Such patients may benefit from an implanted cardioverter-defibrillator (this is a special pacemaker which monitors the heart beat and can shock the heart back into a normal rhythm). A medication undergoing evaluation is quinidine.

Those with a normal ECG and no symptoms are at low risk of sudden death. This accounts for more than half of gene carriers. No specific treatment is usually needed

If Brugada syndrome is suspected, but the ECG is normal, Ajmaline and Flecainide may be injected to see if the Brugada ECG sign can be unmasked.

### Genetic Diagnosis of Brugada Syndrome:

Changes in the DNA (which holds the basic design plans for all our body cells) are responsible for inherited heart diseases such as Brugada syndrome. These changes (or mistakes) are called gene mutations.

The major gene implicated in Brugada Syndrome is the 'SCN5A' gene which holds the design for a protein which builds sodium ion channels in the heart. These channels pump sodium across the wall of the heart cell, helping to transmit the electricity through the heart. Normal action of the sodium channels is essential for the coordinated pumping action of the heart.

These so called 'ion channels' are thus responsible for the overall pumping action of the heart; they perform a very specialised and important function. Ion channels are too small to be seen with the microscope- the heart muscle itself looks normal.

Mutations in SCN5A are thus often behind Brugada syndrome. Recently, several other genes have been linked to Brugada syndrome (CACNA1c, CACNB2b, GPD1-L, SCN1B) and we expect more to be discovered, but they are all linked to the sodium channel function.

If a mutation is found in a family with Brugada syndrome, DNA of other family members can be tested to see if the same mutation occurs in their genes also.

It is important to know that not all carriers of mutations in the at-risk gene will necessarily show features of Brugada syndrome. Most people who are gene carriers will not die suddenly, or even have any symptoms.

If you or a family member has been diagnosed with Brugada syndrome, advice and testing is available throughout New Zealand through a national network of inherited heart disease specialists called CIDG (cardiac Inherited Disease Group). Family members around New Zealand can also be offered a referral to their local Specialist centre where they will be offered screening tests and have access to Specialist advice.

### Cross-over with long QT syndrome type 3.

Mutations in the SCN5A gene may also cause Long QT syndrome type 3. The presentation is similar to Brugada syndrome, with nocturnal blackouts or seizures or sudden death at night. The ECG looks different, with a long recharging phase after each heart beat- known as the QT interval. This is mentioned here because some families have members with Brugada syndrome and others with Long QT syndrome. It is easiest understood by considering the sodium channel as a tap which must be switched on and off very quickly for each heart beat- in Brugada syndrome the tap doesn't open fully quick enough, and in long QT 3, the tap lets too much sodium through for too long.

The end result is the same- an inherited risk of sudden death. Both groups should avoid the medications on two actively updated lists: [www.brugadrugs.org](http://www.brugadrugs.org) and [www.qtdrugs.org](http://www.qtdrugs.org).

**Further information:**

[www.cidg.org](http://www.cidg.org)

[www.brugadrugs.org](http://www.brugadrugs.org)

[www.brugada.com](http://www.brugada.com)

[www.qtdrugs.org](http://www.qtdrugs.org)

**Participation in Cardiac inherited disease registry:**

If you would like more information prior to deciding whether you would like to join the Cardiac inherited disease registry, or have any other questions please feel free to contact us.

If you have any queries or concerns regarding your rights as a participant in the Cardiac Inherited disease registry you can contact an independent Health and Disability Advocate. This is a free service provided under the Health & Disability Act; through the offices of the Health and Disability Commissioner.

Telephone (NZ wide): 0800 555 050

Free Fax (NZ wide): 0800 2787 7678 (0800 2 SUPPORT)

Email: [advocacy@hdc.org.nz](mailto:advocacy@hdc.org.nz)

**The N.Z Cardiac Inherited Disease Registry has received Ethical Approval from the N.Z. Multi-centre Ethics Committee: AKX/02/00/107**