FHRP is known for its dedicated healthcare services provided to patients and families with familial arrhythmias including long QT syndrome (LQTS), short QT syndrome, Brugada syndrome, catecholaminergic polymorphic ventricular tachycardia, hereditary cardiomyopathy, and unexplained sudden cardiac death (SCD) in young people.

In this edition, we will focus on genetic testing in Long QT syndrome (LQTS). LQTS is a group of genetically inherited heart rhythm disorders. At least 13 genetic causes of LQTS have been identified, but most people with LQTS have type 1, 2, or 3. A genetic diagnosis can help determine the best treatment plan for an individual. In addition, a genetic diagnosis makes it easier to screen other family members. Genetic testing is performed from a blood test.

To learn more about our program, please log onto: http://www.metrohealth.org/heart-rhythm
Have you had a negative genetic test in the past?

The technology of genetic testing has advanced enormously over the past 10-15 years. Some families who were tested in the past, with no genetic mutation found in the family, may have a positive result if they are retested now with a full panel of genes.

You might want to consider genetic retesting:

- Families who were tested negative in a research laboratory or in a clinical laboratory whose CLIA certification is unknown
- Those who were tested negative 10 years ago, but still are suspicious of having the disease

Role of genetic testing in the diagnosis of LQTS:

- Confirms clinical diagnosis in symptomatic patients
- Identifies the specific mutation causing the disease (which genetic subtype of LQTS). This helps in making appropriate therapeutic decisions and lifestyle modifications (triggering factors and medications to be avoided).
- If a mutation is found, other family members at risk can be tested for the disease-causing mutation, which is known as mutation-specific genetic testing.

Individuals undergoing genetic testing are advised to receive pre-test and post-test genetic counseling.

To find a genetic counselor near you, please log onto www.nsgc.org

What is meant by CLIA certification?

According to the United States Federal regulatory standards, all clinical laboratories (except research) performing lab tests on humans must go through the Clinical Laboratory Improvement Amendments (CLIA) in order to ensure quality testing irrespective of where the test is performed. Therefore, it is always suggested to perform genetic testing in a laboratory that is CLIA certified.

For more information log onto: www.cms.gov/CLIA

Recommended laboratories for LQTS genetic testing: GeneDx, Familion

Are you afraid of your genetic test information being disclosed to your insurance company or to your employer?

According to the federal law known as The Genetic Information Nondiscrimination Act (GINA), neither health insurance companies nor employers shall discriminate against individuals based on their genetic information.

For more information, please log onto www.genome.gov/10002328
Who should be tested first for LQTS?

- **Single family member with evidence of LQTS**
  - Affected family member should be tested first

- **Multiple family members with evidence of LQTS**
  - Preferably the most severely affected family member should be tested first

### Types of genetic test results that can be expected

- **POSITIVE Test**
  - Mutation causing LQTS is identified and therefore confirms the clinical diagnosis.
  - All first degree relatives should be tested for the family’s specific mutation.

- **NEGATIVE Test**
  - Mutation causing LQTS is not identified
  - Negative test result does not rule out LQTS. Further clinical evaluation is necessary.
  - Family members at risk may need to be evaluated by clinical tests.

- **Variant of Unknown**
  - An abnormality in a gene is identified which might or might not cause LQTS.
  - Clinical decision making is necessary.
  - If the same abnormality is found in other family members who appear to have LQTS, this makes it more likely that the variant may be disease-causing.

If a family member is positive, that means he or she is carrying the disease-causing gene and needs further clinical evaluation.

If a family member is negative, that means he or she is not carrying the disease-causing gene.

MetroHealth
www.metrohealth.org
<table>
<thead>
<tr>
<th>Genotype</th>
<th>Gene affected</th>
<th>Some common trigger factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>LQT1</td>
<td>KCNQ1</td>
<td>Exercise, swimming, emotion</td>
</tr>
<tr>
<td>LQT2</td>
<td>KCNH2</td>
<td>Emotion, startle, sudden loud noises, post-pregnancy</td>
</tr>
<tr>
<td>LQT3</td>
<td>SCN5A</td>
<td>Sleep/pres, emotion, exercise</td>
</tr>
</tbody>
</table>

Patients with all types of LQTS should avoid low-potassium situations and avoid medications that prolong the QT interval.

Useful links and Patient resources

The SADS Foundation (Sudden arrhythmia Death Syndrome)

CARE: Cardiac Arrhythmias Research and Education Foundation- [http://www.longqt.org/](http://www.longqt.org/)

Adapted from:
1. Uptodate

Other LQTS subtypes and their corresponding gene mutations:
- LQT4 – ANK2
- QT5 – KCNE1
- QT6 – KCNE2
- QT7 – KCNJ2
- QT8 – CACNA1c
- QT9 – CAV3
- QT10 – SCN4B
- QT11 – AKAP9
- QT12 – SNTA1
- QT13 – GIRK4

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If you would like to support the Familial Heart Rhythm Program, you can write a check to:

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Towers 135A
Cleveland, OH 44109

Earmark your donation for the Familial Heart Rhythm Program.