Primary Therapy for Asymptomatic High-Risk Long QT Syndrome Patients Should NOT Be an ICD

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Nothing to Disclose
ICD Guidelines

• ACC/AHA Guidelines (Circulation 2008;117:2820-40)
  – Class IIA: ICD implantation is reasonable to reduce SCD in patients with long-QT syndrome who are experiencing syncope and/or VT while receiving beta blockers. (Level of Evidence: B)
  – Class IIB: ICD therapy may be considered for patients with long-QT syndrome and risk factors for SCD. (Level of Evidence: B)

• Medicare Coverage of ICDs
  – Documented familial or inherited conditions with a high risk of life-threatening VT, such as long QT syndrome or hypertrophic cardiomyopathy (04/01/05)
Inherited Arrhythmopathies: ICD Guidelines

- Long QT syndrome risk factors
  - Aborted SCD
  - Recurrent symptoms (syncope, VT) on β-blockade
  - Jervell & Lange-Nielsen, Very long QTc, Gender, age, Family Hx SCD

(Goldenberg and Moss, JACC 2008;51:2291)
Risk Factors Are Often Unclear

• QTc > 500 msec
  – QTc not constant
  – Varies with [K⁺], exercise, etc.

• Gender and Age
  – QTc is longer in women after puberty, boys before
  – If asymptomatic at age >50 or >60, ?benefit > risk

• Family History of Sudden Cardiac Death
  – Conflicting data on effect on risk

• High risk mutations
  – e.g. KvLQT1 pore and transmembrane domain
## All Long QT Is Not the Same

<table>
<thead>
<tr>
<th>Locus</th>
<th>Protein</th>
<th>Current</th>
<th>Chromosome</th>
</tr>
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<tbody>
<tr>
<td>LQT1</td>
<td>KvLQT1</td>
<td>↓ $I_{Ks}$</td>
<td>11p15.5</td>
</tr>
<tr>
<td>LQT2</td>
<td>HERG</td>
<td>↓ $I_{Kr}$</td>
<td>7q35-36</td>
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<tr>
<td>LQT3</td>
<td>SCN5A</td>
<td>↑ $I_{Na}$</td>
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<tr>
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<td>↓ $I_{Ks}$</td>
<td>21q21-22</td>
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<td>↓ $I_{Ks}$</td>
<td>7q21-22</td>
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</table>
There Are Other Treatments

• Avoid medications that prolong QT interval
• Avoid competitive sports
• Pharmacological
  – LQT1: β-blockers
  – LQT2: K⁺ supplementation and aldactone
  – LQT3: Mexilitine; Ranolazine
• VAD and Heart Transplant
LQT1: Beta-Blockers Are Effective

- KCNQ1/KCNE1 K⁺ channels encode $I_{Ks}$; Mutations of KCNQ1/KvLQT1 cause LQT1 form of LQTS
- β-Blockers are more effective in LQT1 than LQT2 or LQT3 (Priori et al., JAMA 2004;292:1341-44)
ICDs Have Risks

• Implantation
  – Bleeding
  – Infection
  – Tamponade

• Late complications
  – Inappropriate shocks
  – Shocks for VT that would have self-terminated
  – Infection
  – Lead failure and risks of explantation
  – Premature device failure and routine replacement
  – Limit quality of life: profession, activities, insurance
Escalating Numbers of Patients

- Genetic screening programs
  - Families of affected subjects

- Clinical screening programs
  - School athletes
  - Children

- Cost
  - ICDs for relatively low risk subjects for a lifetime
  - Cost effectiveness analyses?
Summary

• ICDs are indicated for symptomatic subjects on alternate therapies at high risk for sudden death
• ICDs are appropriate for some asymptomatic patients
• We need better ways to accurately determine the risk of sudden cardiac death vs. ICD risk in asymptomatic patients with LQTS – Clinical, genetic, etc.
• We need prospective trials to assess guidelines, and mechanisms to enforce best practices