What’s New in ICDs / Pacemakers?

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Disclosures

Honoraria, Speakers Bureau Medtronic, Research Grants
Honoraria, Speakers Boston Scientific, Research Grants
Honoraria, Speakers St. Jude Medical, Research Grants
Pacemaker Technology in 2018

- **Leadless** VVI pacemakers
- Remote, wireless, blue tooth monitoring
- All new devices are now MRI compatible
- Arrhythmia logbooks, including AF burden
- Advanced algorithms to reduce unnecessary RV pacing
- His bundle pacing
Leadless Pacemaker
Indications for Leadless Pacing

- Chronic atrial fibrillation with slow VR
- Infrequent need for pacing/back up pacing only
- No venous access for transvenous leads
Remote, Wireless Monitoring

Biotronik Home Monitoring™

Medtronic CareLink™

Boston Scientific Latitude™

St. Jude Merlin.net™
Bluesync™-enabled Devices

Are designed to transfer heart device data via Bluetooth® Low Energy (BLE) to the CareLink™ network from anywhere — even outside the home.

- Enhanced security with data encryption and pacemaker protection
- Use of Bluetooth low energy is designed to minimize battery drain of the pacemaker
- Automatic notifications inform patients of transmission status
- Upgradeable throughout lifetime of device

*Medtronic Azure XT DR MRI SureScan Device Manual. M964338A001B. 2016-10-22*
Piccini et al., Heart Rhythm, Vol 13, No 12, December 2016

CIED Implant
- CIED implant between 4/1/2008 and 3/31/2013 N=279,407
- <1 year enrollment in MS prior to/after implant N=124,341

MS Enrollment
- N=155,066
- First clinic FU > 120 days post implant or no clinic FU RM N=12,440 (26%)
- No RM N=47,921 (45%)

Follow-up Adherence
- N=94,705
- Patients <21 years old or missing data RM N=1,832 (5%)
- No RM N=307 (<1%)

Age
- Study Cohort N=92,566

Remote Monitoring
- Clinic Visits & Remote Monitor N=34,259
- Clinic Visits Only N=58,307

RM

No RM

(% indicates the proportion excluded from each group)
ICD  
N = 27,816

HR: **0.74**
95% CI: 0.71-0.77
p-value: < 0.001

Mean LOS, days
RM: 5.6 (10.3)
No RM: 10.0 (19.2)
p<0.001

Days After Implant

CRT-D  
N = 9,125

HR: **0.72**
95% CI: 0.67-0.77
p-value: < 0.001

Mean LOS, days
RM: 6.7 (12.3)
No RM: 11.2 (19.2)
p<0.001

Days After Implant
2017 HRS expert consensus statement on magnetic resonance imaging and radiation exposure in patients with cardiovascular implantable electronic devices

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<th>CDR</th>
<th>LOE</th>
<th>Recommendations</th>
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<td>I</td>
<td>A</td>
<td>MR conditional devices should be considered MR conditional only when the product labeling is adhered to, which includes programming the appropriate “MR mode” and scanning with the prerequisites specified for the device.</td>
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<tr>
<td>I</td>
<td>B-R</td>
<td>MR imaging in a patient with an MR conditional system should always be performed in the context of a rigorously applied standardized institutional workflow, following the appropriate conditions of use.</td>
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<tr>
<td>I</td>
<td>B-R</td>
<td>It is recommended for patients with an MR conditional system that personnel with the skill to perform advanced cardiac life support, including expertise in the performance of CPR, arrhythmia recognition, defibrillation, and transcutaneous pacing, be in attendance with the patient for the duration of time the patient’s device is reprogrammed, until assessed and declared stable to return to unmonitored status.</td>
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<tr>
<td>I</td>
<td>A</td>
<td>It is recommended for patients with an MR conditional system that ECG and pulse oximetry monitoring be continued until baseline, or until other clinically appropriate CIED settings are restored.</td>
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<td>I</td>
<td>C-EO</td>
<td>All resuscitative efforts and emergency treatments that involve the use of a defibrillator/monitor, device programming system, or any other MRI-unsafe equipment should be performed after moving the patient outside of Zone 4.</td>
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<tr>
<td>I</td>
<td>C-EO</td>
<td>It is recommended for patients with an MR conditional system that personnel with the skill to program the CIED be available as defined by the institutional protocol.</td>
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<td>IIa</td>
<td>C-EO</td>
<td>It is reasonable to perform an MR scan on a patient with an MR conditional system implanted more recently than the exempt period for conditionality of the system, based on assessment of risk and benefit for that patient.</td>
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His Bundle Pacing

- Most physiological form of ventricular pacing
- Conduction occurs through native His-Purkinje system
- No pacing induced dyssynchrony
- May have a clinical advantage over traditional RV pacing or even biventricular pacing
His Bundle Pacing

Madhaven et al., JACC Vol. 69, No. 2, 2017; 211-35
His Bundle Pacing

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5673318/
- In patients with AV block and/or LBBB, it is important to be prepared for complete AV block and asystole.
- Failure to implant (10-20% of patients, infra-His block)
- High thresholds (10-15% of patients)
- Lead revisions (~3%)
- Ventricular undersensing
- Far-field atrial oversensing
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<th>Recruiting</th>
<th>Imaging Study of Lead Implant for <strong>His Bundle</strong> Pacing</th>
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<td><strong>His Bundle</strong> Pacing in Bradycardia and Heart Failure</td>
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<td><strong>His Bundle</strong> Pacing Versus Coronary Sinus Pacing for Cardiac Resynchronization Therapy</td>
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<td>Comparison of <strong>His Bundle</strong> Pacing and Bii-ventricular Pacing in Heart Failure with Atrial Fibrillation</td>
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<td>The <strong>His</strong> Optimized Pacing Evaluated for Heart Failure Trial (HOPE-HF)</td>
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ICD Technology in 2018

- Smaller size, longer lasting batteries
- Remote, wireless monitoring
- All new devices are now MRI compatible
- Arrhythmia logbooks, including AF burden
- Advanced algorithms to reduce unnecessary RV pacing
S-ICD

80 Joules
5 shocks/episode

Sensing electrode
S-ICD

Freedom from S-ICD Complication (1 Year) 98.0%
Freedom from Inappropriate Shock for AF/SVT (1 Year) 98.5%
No Change to TV-ICD 98.9%
Shock Efficacy 97.4%

Boersma et al., JACC Vol. 70, No. 7, 2017
• MADIT S-ICD study
• Designed to test the hypothesis that post-myocardial infarction diabetes patients with relatively preserved ejection fraction of 36%-50% will have a survival benefit from a subcutaneous implantable cardioverter defibrillator
Smaller size, longer lasting batteries
Wireless, remote monitoring
Arrhythmia logbooks, including AF burden
Monitoring of HF parameters
New LV/RV optimization algorithms
Quadripolar LV leads
Multipoint pacing
MultiPoint™ Pacing

- Pacing from **two** LV sites ("Multipoint LV stimulation") and **one** RV
  - Capture a larger area

- Engage areas around scar tissue
  - Improve pattern of depolarization/repolarization
  - Improve hemodynamics
  - Improve resynchronization

**Not Approved in the US**
MultiPoint™ Pacing

- MPP study
- This trial seeks to evaluate whether MPP via a single quadripolar LV lead improves hemodynamic and clinical responses to CRT, both in clinical responders and non-responders
Conclusions

• Exciting time for pacing technology, for healthcare providers and for our patients!
Thank You