



Innovations in Heart Rhythm Management

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Disclosures

None

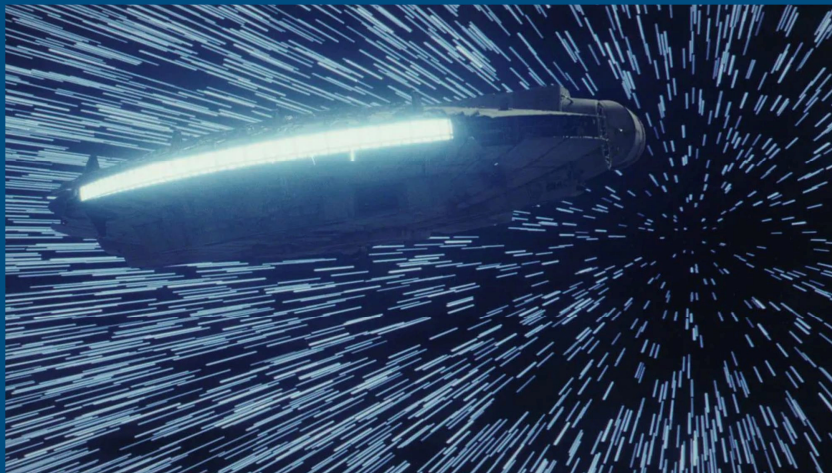
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Topics to cover

- Atrial fibrillation and new monitoring/treatment options
- Ablation mapping technology
- Left atrial appendage occlusion devices
- Current monitoring devices
- The worlds smallest pacemaker

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At a galaxy far far away...



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Luke Skywalker

65 yo male with h/o paroxysmal atrial fibrillation, rates of 100-120 bpm was referred for evaluation. He has been on Metoprolol, Flecainide and Eliquis. All at modest doses.

PMHx- HTN, DM, Injuries from light saber

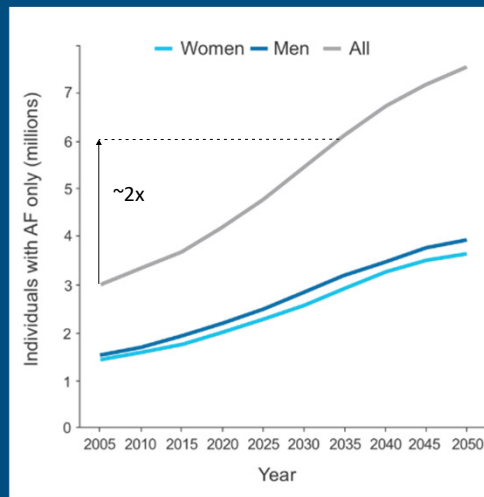
Medications - Metoprolol, Flecainide, Eliquis, Metformin

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What would you do next?

- A) Increase the dose of Flecainide from 50 mg BID to 100 mg BID or higher
- B) Change anti-arrhythmic medication
- C) Consider AF ablation
- D) Recommend watching re-runs of Seinfeld

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- US AF Prevalence is predicted to double from 2005 to 2035¹
- Age-adjusted AF incidence is predicted to grow as a result of increased risk factors- obesity, hypertension, diabetes and cardiovascular disease

¹Naccarelli GV, et al. Increasing prevalence of atrial fibrillation and flutter in the United States. *Am J Cardiol*. 2009;104(11):1534-1539. ²Miyasaka Y, et al. Secular trends in incidence of atrial fibrillation in Olmsted County, Minnesota, 1980 to 2000, and implications on the projections for future prevalence. *Circulation*. 2006;114(2):119-125.

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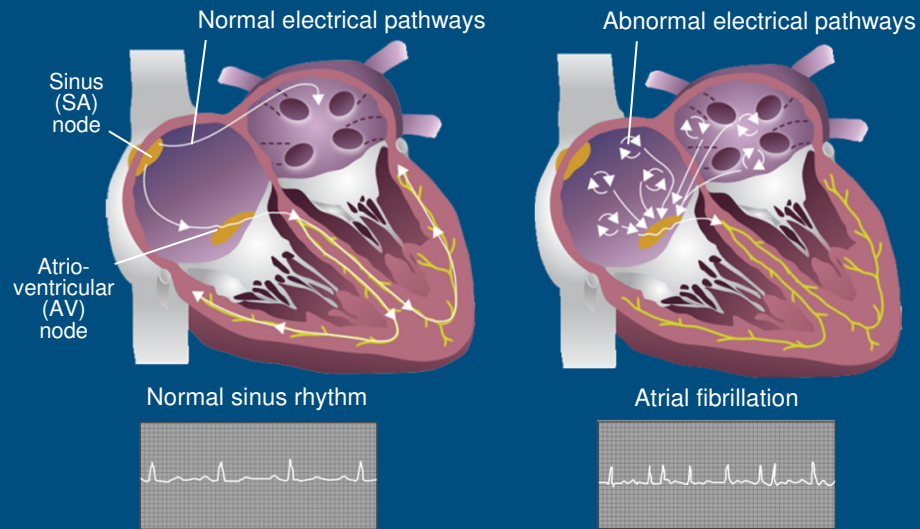
Atrial Fibrillation Health Risks and Costs

- Negative impact on quality of life^{1,2}
- Leading cause of stroke: 5x increased risk³
- Increases risk of heart failure: 3x increased risk⁴
- Increases US healthcare system costs:
\$12 billion estimated cost to treat AF⁵

¹Singh SN, et al. Quality of life and exercise performance in patients in sinus rhythm versus persistent atrial fibrillation: a Veterans Affairs Cooperative Studies Program Substudy. *J Am Coll Cardiol*. 2006;48(4):721-730. ²Kang Y. Relation of atrial arrhythmia-related symptoms to health-related quality of life in patients with newly diagnosed atrial fibrillation: a community hospital-based cohort. *Heart Lung*. 2006;35(3):170-177. ³Wolf PA, et al. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. *Stroke*. 1991;22(8):983-988. ⁴Stewart S, et al. A population-based study of the long-term risks associated with atrial fibrillation: 20-year follow-up of the Renfrew/Paisley study. *Am J Med*. 2002;113(5):359-364. ⁵Kim MH, et al. Cost of atrial fibrillation in United States managed care organizations. *Adv Ther*. 2009;26:847-857.

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Atrial Fibrillation: Fibrillation of the Muscles of the Atria of the Heart



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AF Treatment Options



Medication to control the heart rate or rhythm



Surgery to create lines of scar tissue to block abnormal electrical circuits causing AF



Restoration of normal heart rhythm through an electrical cardioversion or medications



Pacemakers may be used in conjunction with medication or catheter ablation



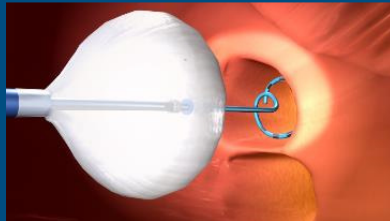
Radiofrequency or Cryoablation to help keep the heart in a normal rhythm

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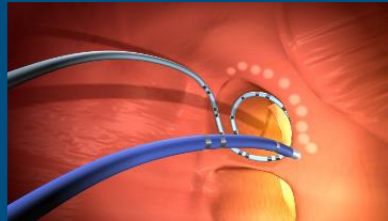
Minimally Invasive

TRANSCATHETER CATHETER ABLATION

Radiofrequency energy and Cryoballoon ablation are two standard ablation systems used today¹



Freezing tissue with a 23 or 28mm balloon



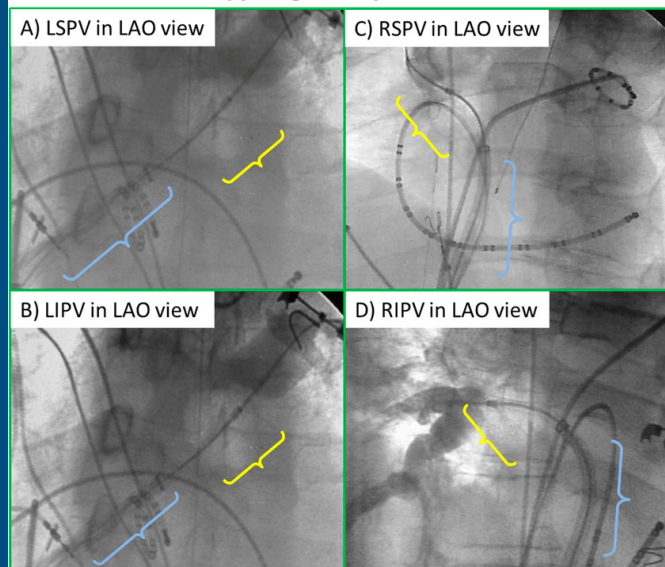
Burning tissue with point-by-point radiofrequency

January CT, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2014;134(18):1-76.

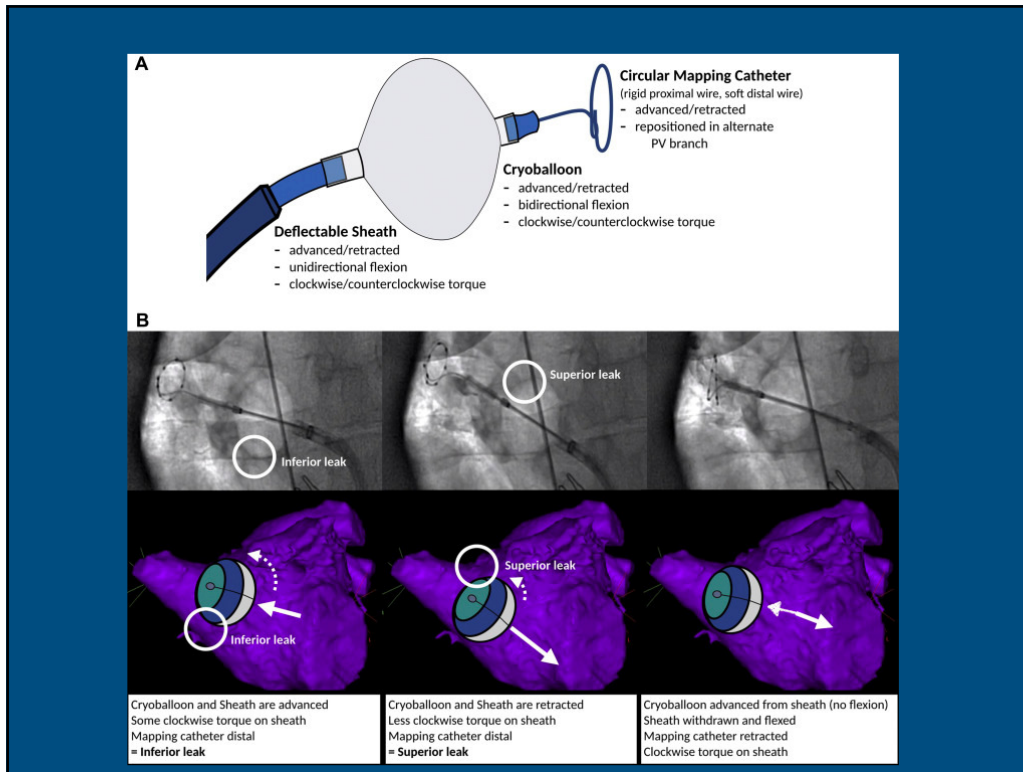
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Atrial fibrillation ablation with cryoballoon

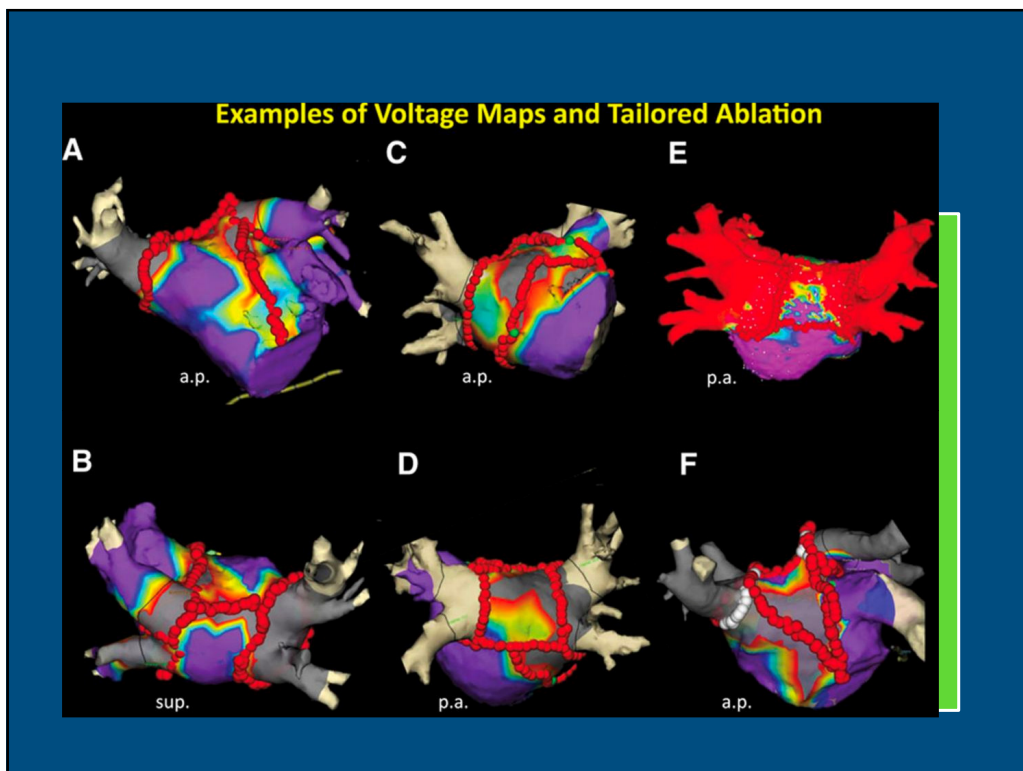
Fluoroscopy Images of Cryoballoon Ablation



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FIRE AND ICE Trial Predefined Secondary Analyses

Significant Improvements Favoring Cryoballoon

Relative to radiofrequency, Cryoballoon demonstrated:

34%
Fewer
Cardiovascular
Hospitalizations

Cryo: 139 events in 89 subjects (89/374; 23.8%)

RF: 203 events in 135 subjects (135/376; 35.9%)

33%
Fewer
Repeat Ablations

Cryo: 49 events in 44 subjects (44/374; 11.8%)

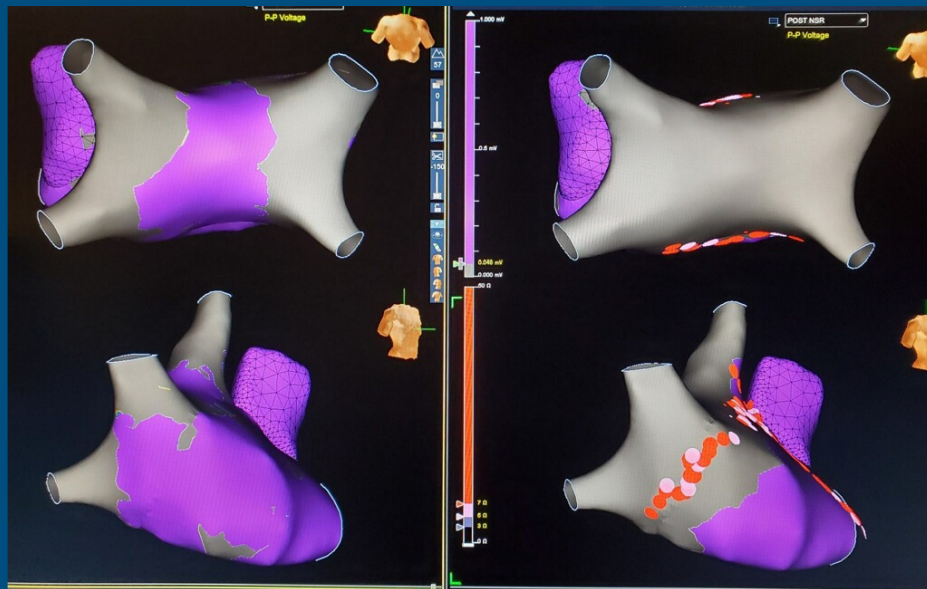
RF: 70 events in 66 subjects (66/376; 17.6%)

European Heart Journal

The authors stated, "The extent of reduction in reinterventions and rehospitalizations is not only statistically significant but also clinically relevant. Our presented data are the main events that define the patients' perception regarding the procedural success of an AF ablation procedure."

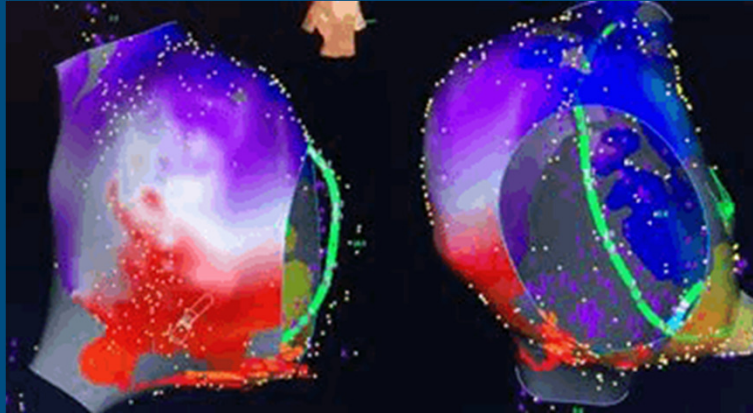
Kuck KH, et al. Cryoballoon or radiofrequency ablation for symptomatic paroxysmal atrial fibrillation: reintervention, rehospitalization, and quality-of-life outcomes in the FIRE AND ICE trial. *Eur Heart J*. 2016;37(38):2235-45.

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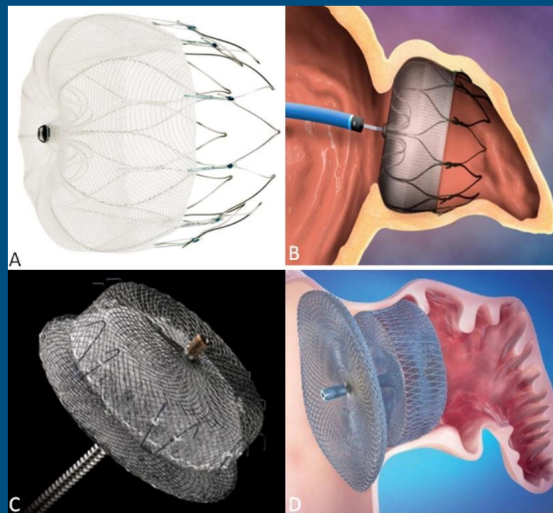
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Mapping systems

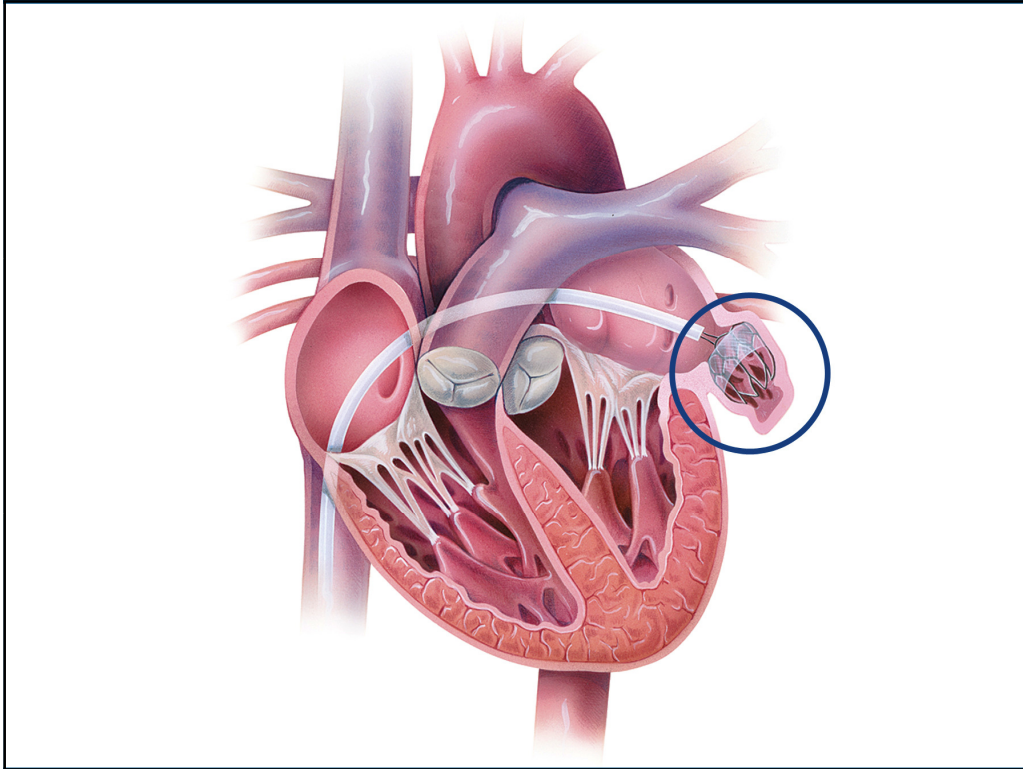


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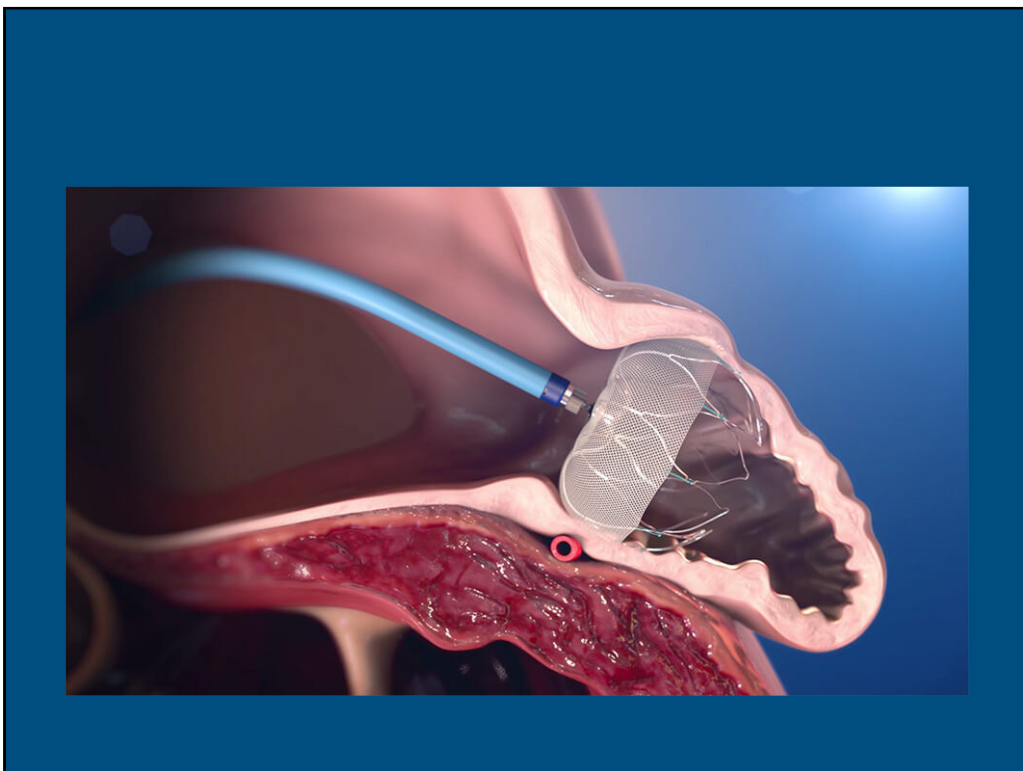
Left atrial appendage occlusion



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Master Yoda

Patient with unknown age, presented with palpitations for the last century. Given his unpredictable lifestyle, it has been a challenge to decide on a monitoring device. We discussed various options....

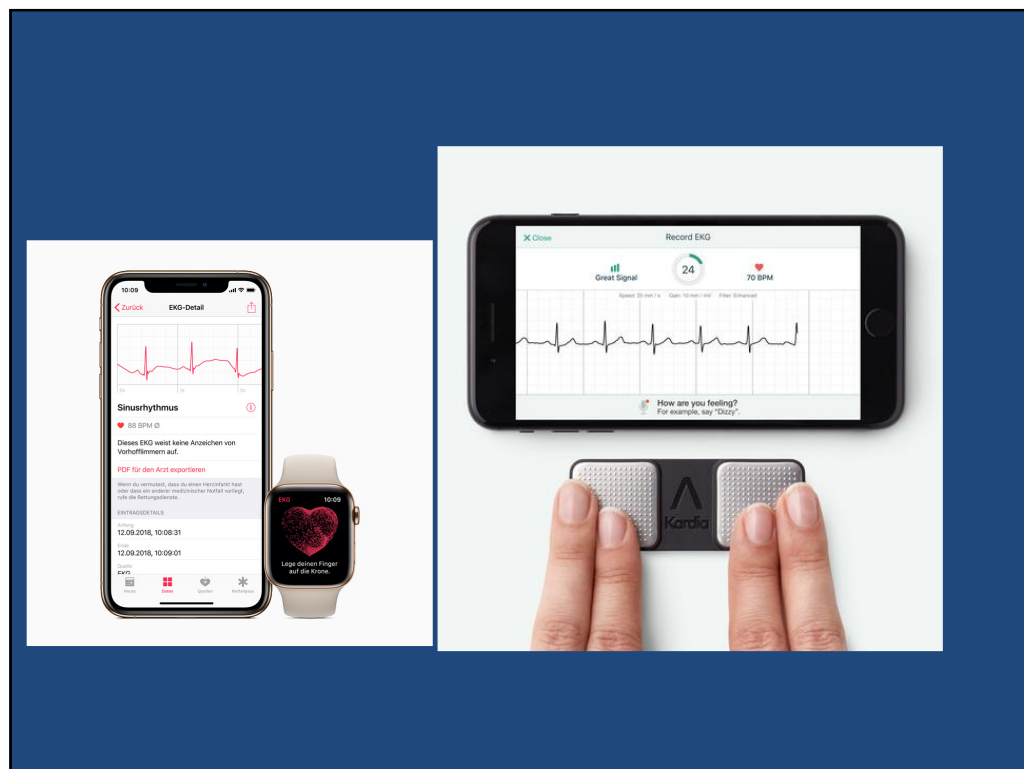
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Diagnostic Strategies

Advances in Monitoring and Detection of Arrhythmias

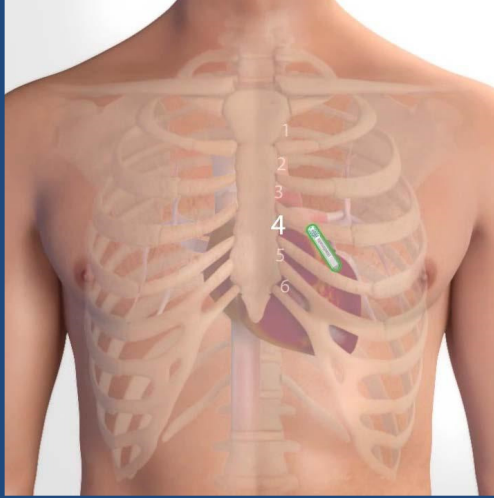
- Mobile applications and monitors are revolutionizing the way we interact with patients who have or are at risk for arrhythmias
- These include wireless patch monitors, smartwatches, apps and implantable loop recorders

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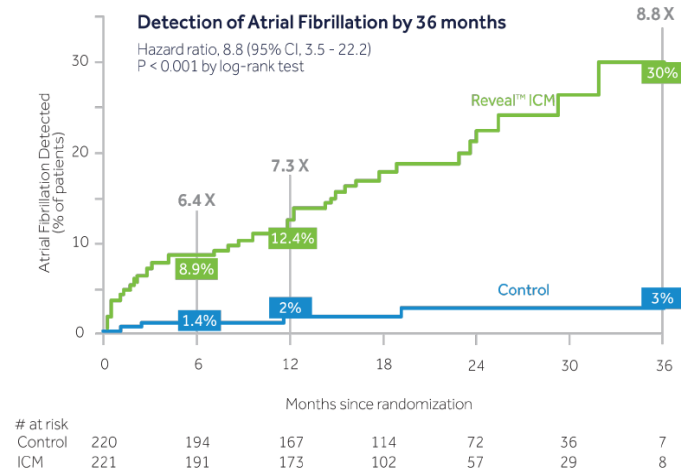
Implantable loop recorder



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CRYSTAL AF: monitoring with ICM superior to SOC

for the DETECTION of AF

Source: Sanna T, et al. *N Engl J Med*. 2014;370:2478-2486.

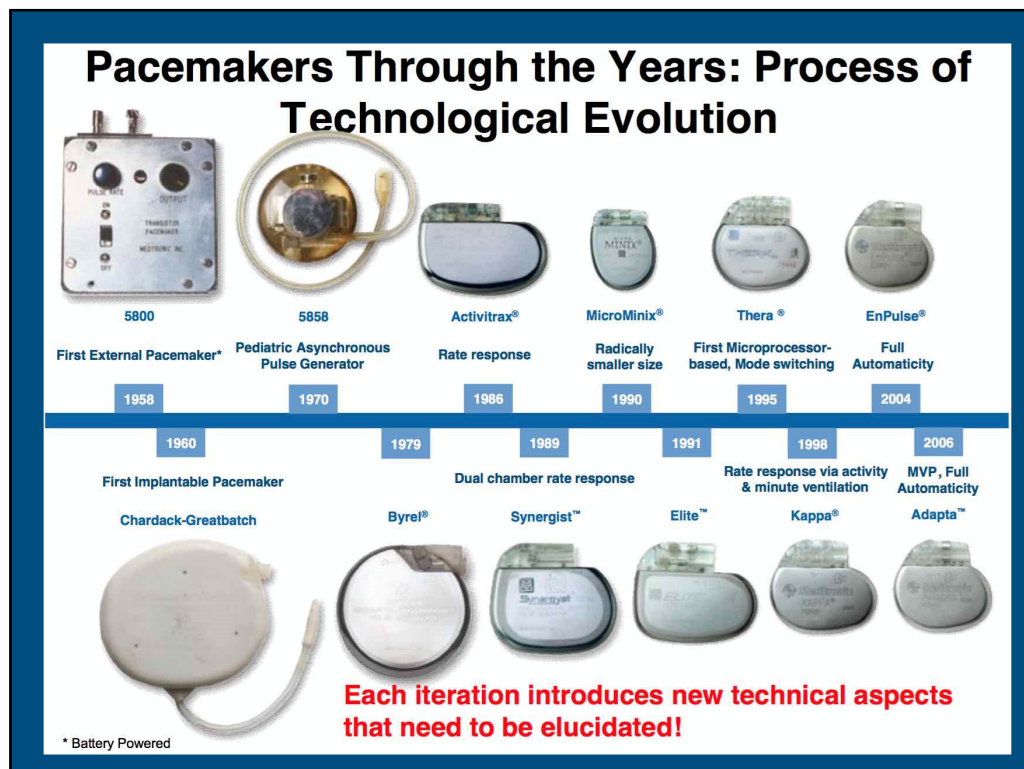
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Master Yoda

We were able to detect paroxysmal atrial fibrillation and intermittent bradycardia with heart rates in the 20-30s.

It was time to decide on a pacemaker. He did not have much time as he was getting ready for the final Jedi fight between him and Darth Vader. Whatever needed to be done had to be done before that.

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Leadless pacemaker

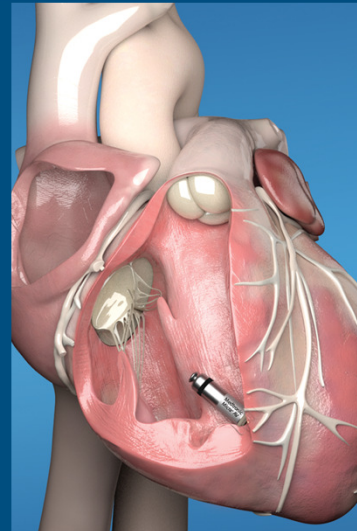
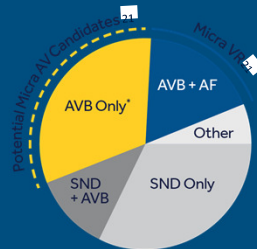


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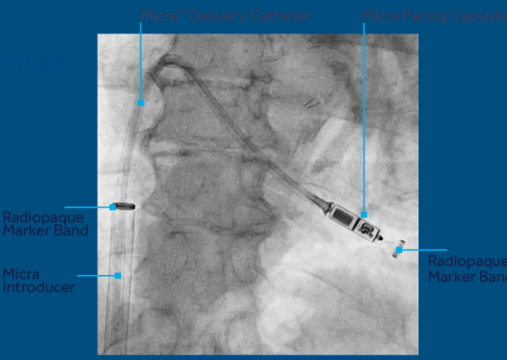
MICRA™ AV TRANSCATHETER PACING SYSTEM

The world's smallest pacemaker, now with AV synchrony

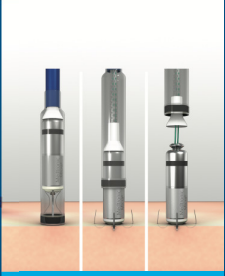
- Micra AV's accelerometer detects mechanical atrial activity and uses this information to deliver AV synchronous ventricular pacing.
- New, integrated circuitry capable of sustaining new AV synchrony functionality.
- Estimated average battery longevity of 8-13 years, dependent on the patient's degree of AV block.



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Delivery catheter provides visual feedback when adequate tip pressure has been achieved, and retracts during deployment.⁶

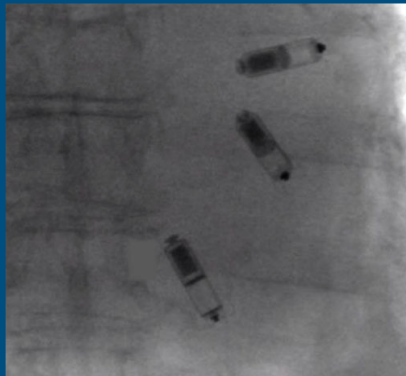


Linear, one-step deployment facilitates consistent capsule placement; no torque required.²²

Micra™ AV and Micra™ VR Transcatheter Pacing Systems

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MULTIPLE MICRA™ DEVICES CAN BE IMPLANTED IN THE RV



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Advantages

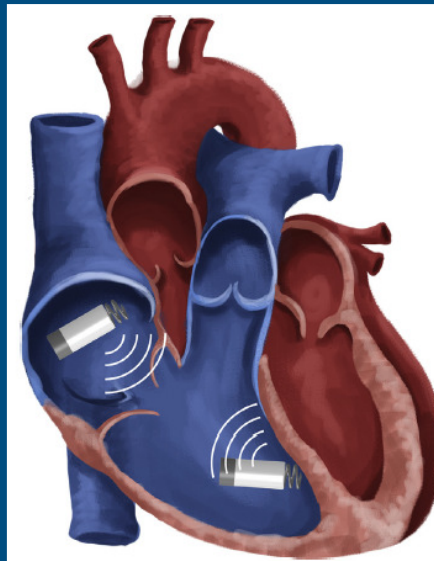
- There are no Endovascular leads
- Low Risk of Infection and more easily treated
- Lower risk of dislodgement
- No limitations regarding cell phones or movement of the upper extremities
- The WEAKEST link, the leads have been removed from the system

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Disadvantages

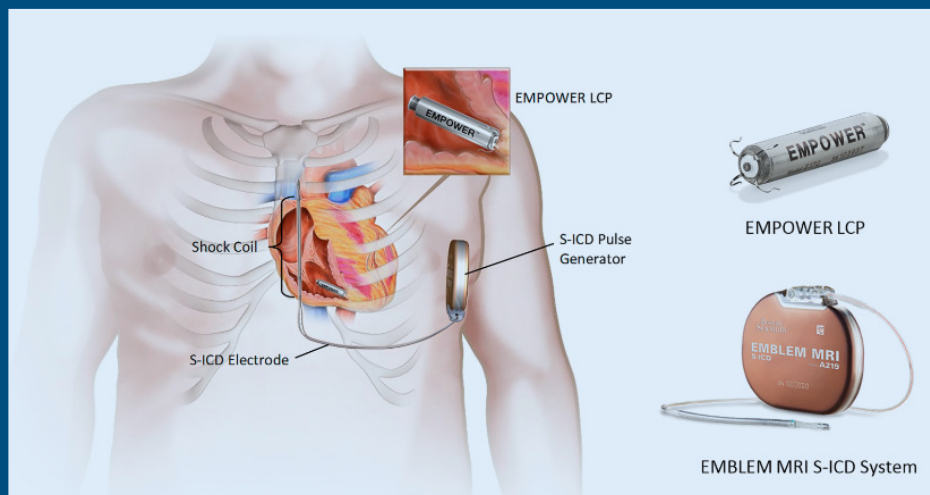
- Difficult to extract
- Battery life estimated to be 10-13 yrs.
- Planning needed for younger patients.

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Leadless pacemakers are implanted in the right atrium and the right ventricle. To synchronize, the devices communicate wirelessly with each other.

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Yoda Wins !!



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*Thank you and may the Force be with
you...*

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Please feel free to contact me for any
questions at mmehta@lhs.org