Exercise Rx for PM and ICD Patients

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SCD affects 500,000 persons in the United States each year accounting for more deaths than stroke, lung cancer, and breast cancer combined

Worldwide, SCD comprises 50 percent of overall cardiac mortality

Sudden Cardiac Death

Common risk factors are reduced left ventricular ejection fraction, acute or prior myocardial infarction, prior ventricular arrhythmias, and congestive heart failure.

Most sudden deaths in the United States occur in persons without known heart disease or in those with a high coronary risk profile.

Turakhia MP, Schiller NB, Whooley MA. Prognostic significance of increased left ventricular mass index to mortality and sudden death in patients with stable coronary heart disease (from the Heart and Soul Study). *Am J Cardiol.* 2008;102(9):1131–1135.
Michel Mirowski, M.D. (1924-1990)

Invented the Automatic Implantable Cardioverter Defibrillator (ICD) in the 1960’s after his mentor (Professor Harry Heller) died of a heart arrhythmia.

Facing opposition from the medical community, Mirowski led a team that designed and tested the first ICD, which was also the first alternative to drugs and surgery. The first human implant occurred in 1980 at Johns Hopkins. The device was originally the size of a deck of cards and weighed nine ounces.

Source:
Michel Mirowski and the Automatic Implantable Defibrillator, John A. Kastor MD, April 15, 1989 and May 1, 1989
Vice President Dick Cheney:

On June 30, 2001, Cheney was implanted with an ICD.
Beginnings…

Microwave ovens do NOT affect pacemakers or Defibrillators

Exercise is excellent for everyone, especially those at risk for deconditioning
Beginnings…

Exercise will not harm implanted devices

Individual patients will require individualized exercise prescriptions

A knowledge of their individual medications is critical
Beginnings…

Precise goals should be determined

Initial monitoring may be necessary

Understanding the device may be the first step
What to Do…

Forget there is a device

What is the recommendation you would give if there were no device?

Are there measurements from the device you could use for benefit
Pacing System Components
Chronotropic Incompetence: 
Chronotropic Incompetence is a Significant Problem

- 58% incidence in pacemaker patients

- 30% of patients with Sick Sinus Syndrome (SSS) had sinus function deterioration over 2.5 to 4 year follow-up

- Can be precipitated or exacerbated by medications common in paced population (e.g., atrial antiarrhythmics, beta-blockers for CAD, CHF)

Lau, CP, Rate Adaptive Cardiac Pacing; Futura Publishing 1993. p. 15.
Heart Rate Response in the Healthy Heart

Benditt, David G., Rate Adaptive Pacing; Blackwell Publishing 1993. p.57, fig 4.10
The Ideal Rate Response System

Rate support at rest, during ADL’s, and at higher exertion

Response is physiologic: quick acceleration, stable proportionality, smooth deceleration

Rate support across a broad range of patient lifestyles and clinical conditions
Number of Daily Heart Rate Excursions

Daily Heart Rate Distribution by Age

Mean Heart Rate Distribution by Gender

Mean Heart Rate Distribution by Fitness Level

Patterns of Chronotropic Incompetence

(a) Normal
(b) C1
(c) Normal
(d) C1

Rest Exercise Recovery

Lau, CP., Rate Adaptive Cardiac Pacing, 1993
Implications for Pacing Practice

Heart rate response during daily activities is generally submaximal, but with frequent rate excursions of short duration.

Older patients require the same submaximal rate support as younger patients.

Women need at least the same rate support as men.
Implications for Pacing Exercise

Less-active, less-fit subjects require more aggressive submaximal rate support

Patients need adequate rate support at rest, during ADL’s, and for higher exertion
Diagnostics

Real-Time Electrograms

Shows annotated markers that identify certain intrinsic activity and device-related events
Diagnostics

Histograms

Data displayed in graphic, tabular or summary format

Ideal for monitoring disease progression and identifying potential arrhythmia concerns
Counters

Brady and Tachy Counters Provide Therapy and Episode Summaries for Device Lifetime
Histograms

Magnify for Closer Inspection of High-Rate Activity
Conclusions

The presence of a Pacemaker or ICD should not prevent aggressive exercise prescriptions

Understanding of the device function may be critical to provide accurate guidance
Conclusions

The device may offer guidance to monitor the success of the exercise therapies.

There is still much to learn as we see these patients exercise results.
Questions