Left Ventricular Endocardial Pacing: A Direct Comparison Of The Second Generation Of
The Novel Wireless CRT System (WiSE-CRT) With The Original System

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Introduction: The WiSE-CRT system is a leadless endocardial pacing system for cardiac
Resynchronization therapy. It uses ultrasound technology to transfer energy from a subcutaneously pulse
generator (transmitter) to a receiver-electrode implanted on the Left Ventricle (LV) endocardial wall. This
converts acoustic energy to an electrical pulse. The original hardware has been revised and
Generation 2 system (Gen2) now contains the Model 4100 transmitter. (see table 1). Early data for
generation 2 of the system suggested greater efficiency and reduced battery energy requirement to
achieve LV capture. A small number of patients have had the generation 1 transmitter explanted and
replaced with generation 2 system. We compare and describe energy requirement for LV capture for the
2 systems in these patients

Methods: Patients studied were those who underwent removal of the original system and replacement
with Gen 2 at the same intercostal location. Electrode-transmitter distance and pacing parameters were
measured post Gen 2 implant and compared with the parameters of the original system immediately prior
to explanation.

Result: 16 patients underwent removal of the original system /replacement with Gen 2 at the same
intercostal location. Parameters are shown in table 1. There is no conventional direct voltage threshold -
Energy requirement for electrical capture is calculated via function of amplitude/ pulse width/ aperture
of sound beam, power required per transmit level of the transmitter and efficiency of conversion of
battery energy to transmitter energy. Energy required for capture with gen 2 was less for all cases. Mean
(SD) was 1.97 (0.98) mJ original vs. 0.62 (0.36) mJ for Gen 2 (p= 0.000048). When corrected for the
improved conversion efficiency of Gen 2 transmitter (0.75 v 0.55) this difference remains significant
1.08 mJ v 0.48mJ, p =0.00037). This demonstrates that the reduced energy requirement for capture is not
due to improved energy conversion within the transmitter alone. there was no difference in distance from
transmitter to electrode or in superior / inferior angle of beam. However medial-lateral beam angle was
reduced by mean 12.9 degrees (p=0.0003). This reduced angulation of the ultrasound beam results in far
greater efficiency of energy delivery to the endocardial LV electrode

Conclusion: Generation 2 of the Wise-CRT system requires far less energy to achieve capture than
original system when compared head to head. This increased efficiency exceeds that due solely to
improved efficiency of conversion of battery energy to transmitter energy and is likely to reflect other
improvements within the 4100 model, including the angulation of the transmitter head that results in a
reduction medial-lateral beam angle