

INTERNATIONAL SOCIETY FOR COMPUTERIZED ELECTROCARDIOLOGY
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**Using Heart Sounds to Improve Automated ECG Differentiation
Between Ventricular Pacing and Conduction Defects**

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Background – The computerized identification of ventricular paced rhythms is often difficult, especially when the pacemaker artifacts are of very low amplitude. Furthermore, QRS morphology varies widely depending on the location of the ventricular pacing lead and can emulate the morphology of intraventricular conduction defects. We hypothesized that combining heart sound and ECG data to quantitate electromechanical (EM) delay (QRS onset to onset of first heart sound) can facilitate the detection of ventricular pacemakers.

Methods - Data were acquired on 116 subjects using the Audicor system that records and analyzes simultaneous ECG and heart sound data. By visual overread, 21 subjects had ventricular pacemakers, 6 had left bundle branch block, 11 right bundle branch block, and 28 nonspecific intraventricular conduction delay. Using electronic calipers, we measured the EM delay.

Results – Of the ventricular paced subjects 17/21 (81%) had an EM delay \geq 100 ms, and all 95 remaining subjects had an EM delay $<$ 100 ms. Using the product of EM delay and QRS duration, 20/21 (95%) ventricular paced subjects had values \geq 17500 ms², and all 95 remaining subjects had values $<$ 17500 ms².

Conclusion – We conclude that using the product of EM delay and QRS duration is a highly sensitive and specific parameter for the computerized detection of ventricular pacemakers.