

**INTERNATIONAL SOCIETY FOR COMPUTERIZED ELECTROCARDIOLOGY
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**Diagnostic Performance of a Computerized Algorithm for
Augmenting the ECG with Acoustical Data**

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Introduction: Various types of cardiac disease can have characteristic electrical and hemodynamic manifestations. For example, acute myocardial ischemia is typically associated both with displacement of the ST segments of the ECG and with alterations of the mechanical properties of the left ventricle. The latter changes may produce pathological heart sounds, i.e. an S3 and/or an S4. Since ECG and acoustical parameters are orthogonal, their concordance in a given patient would constitute strong corroborative evidence of the presence or the absence, respectively, of the disease of interest. To facilitate the acquisition of these types of diagnostic information, we have developed a highly efficient system to record and interpret simultaneous 12-lead ECG and cardiac acoustical data. Methods: An expert phonocardiographer visually reviewed the acoustical recordings of each patient to determine whether an S3 or an S4 was present. Results: The following data show the ability of our computerized acoustical algorithm to detect an S3 or an S4 in patients in a variety of clinical settings. The performance of the algorithm is compared to a consensus of 2 experienced cardiologists concerning the audibility of the recorded S3 or the S4 in the each of the same patients.

Modality	Sound	Sensitivity	Specificity	Relative Odds
Cardiologists	S3	3/8 (38%)	39/40 (98%)	30:1
Algorithm	S3	6/8 (75%)	37/40 (93%)	40:1
Cardiologists	S4	10/20 (50%)	27/28 (96%)	24:1
Algorithm	S4	16/20 (80%)	26/28 (93%)	53:1

We conclude that it is possible to efficiently record 12-lead ECG and acoustical data simultaneously and that the acoustical algorithm's overall ability to detect