# Cardionics/Louvaine ECG Algorithm
## Two Published Comparisons With Industry-Leading Competitive Interpretive Algorithms

The information in this Tech Note applies to:
 - Cardionics ECG Narrative Interpretation version 2.0 and higher

The narrative ECG interpretation algorithm available with **QRS Universal ECG™** and **Biolog™** diagnostic ECG devices was developed in the early 1990s by Cardionics, S.A. of Brussels, Belgium, in conjunction with the University of Louvaine Medical School.  In the late 1990s, the New Cardionics ECG Algorithm was licensed to Micromedical Industries, Australia, which was subsequently purchased by QRS Diagnostic, LLC, Minneapolis, MN USA in 2003.

In 1991, clinical researchers evaluated nine popular ECG algorithms compared to eight cardiologists relative to a standardized database of ECG tracings.[1] **The results in the table below show that the original Louvaine algorithm had the best total accuracy of all the algorithms (77.3%).**  It also was the best in correctly diagnosing Myocardial Infarction (82.1%) and the second best in diagnosing Ventricular Hypertrophy, which were both better than the respective combined scores of the eight cardiologists.

| | Control Patients N=382 | Ventricular Hypertrophy N=291 | Myocardial Infarction N=547 | Total Accuracy N=1220 |
|---|---|---|---|---|
| | *percent correct diagnosis* | | | |
| Padova | 89.8 | 61.3 | 47.1 | 62.0 |
| Nagoya-Fukuda | 89.3 | 42.6 | 63.7 | 65.6 |
| IBM Medis | 91.3 | 49.4 | 62.5 | 67.6 |
| HP (Agilent) | c 93.5 | 51.0 | 64.5 | 69.3 |
| Glasgow | b 94.0 | 51.0 | 67.7 | 69.7 |
| GE (Marquette) | 86.3 | c 61.1 | c 69.7 | c 69.8 |
| Means | a 97.1 | 42.5 | 67.2 | c 69.8 |
| Hannover | 86.6 | a 72.1 | b 79.0 | b 75.8 |
| Louvaine (Louven) | 91.5 | b 67.0 | a 82.1 | **a 77.3** |
| 8 Cardiologists Combined Scores | 97.1 | 60.4 | 80.3 | 79.2 |

a Highest percent correct; b Second highest percent correct; c Third highest percent correct

In 1994, clinical researchers evaluated the New Cardionics algorithm using the same methodology as in the clinical study above.[2] The following results were compared to the other eleven programs tested (Louvain VCG, Marquette ECG, Hewlett-Packard ECG, Medis IBM ECG, Nagoya-Fukuda ECG, Lyon VCG, Glasgow ECG, Porto VCG, Padova ECG, Means VCG, and Means ECG). The New Cardionics program had:

- The highest score of total and partial accuracy at 73%.
- The second highest rating for distinguishing between normal and abnormal patients 94.8%.
- The highest sensitivity to AMI (Anterior Myocardial Infarction) at 81.8% with only 3.6% false positives for non-AMI cases.
- The second highest sensitivity to detection of IMI (Inferior Myocardial Infarction) at 73.4%.

**Important:** A complete technical description of the algorithm and relevant coding scheme is found in the ECG Physician's Guide. This technical note is not intended to replace the ECG Physician's Guide.

[1]Willems, J.L., et al., "The Diagnostic Performance of Computer Programs for the Interpretation of Electrocardiograms", New England Journal of Medicine (1991); **325**:1767-1773.
[2]Li, G.P., et al., "The New Cardionics ECG Program and Its Comparison with Other Programs", Japanese Heart Journal (1994); **35** (Supplement):257-258.