

Cardiac-10



Technology in Practice™

# Universal ECG™



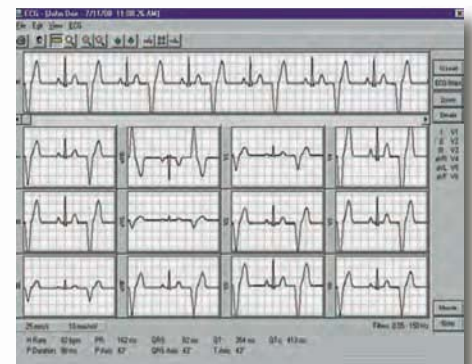
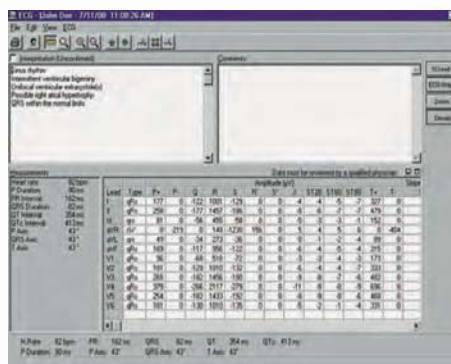
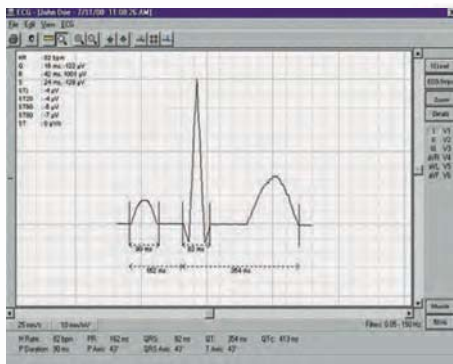
...the smallest and lightest 12-channel ECG on the market. Connect the Universal ECG to any Personal Computer (PC), Laptop, or Pocket PC to acquire, store and analyze up to 12-channels of high-resolution ECG data.

## Features:

- Automatic narrative interpretation and measurement analysis using the advanced Louvain Algorithm, which has the **best total accuracy**<sup>1</sup> when compared to leading competitors.
- Print full page reports on standard plain paper in portrait, landscape or A4.
- Review and zoom into data with electronic calipers, enter comments and modify the interpretation before confirming the results.
- Instantly create PDFs or JPEGs of the final report.
- Seamlessly integrate ECG data into your EMR via XML, HL7 and other formats.
- Also available in a 6-channel non-interpretive version.



Connect via Serial, USB, or Card Slot.



## The Universal ECG comes standard with everything you need to begin testing:

- Office Medic™ workstation software with interpretation. Manage patients and tests without an EMR. Available in English, French, German, Italian, Spanish, Portuguese and Japanese.
- Pocket Medic™ software for acquiring, analyzing, storing and reviewing 12-channel ECGs on a Pocket PC.
- Office Medic™ IDMS software for networking multiple workstations to one central database.
- MedicSync™ software for transferring or synchronizing data between multiple databases.

visit [www.QRSdiagnostic.com](http://www.QRSdiagnostic.com) for Specifications and System Requirements



Take a 12-channel electrocardiograph with you wherever you go.

Print clear reports the moment you need them on plain paper.

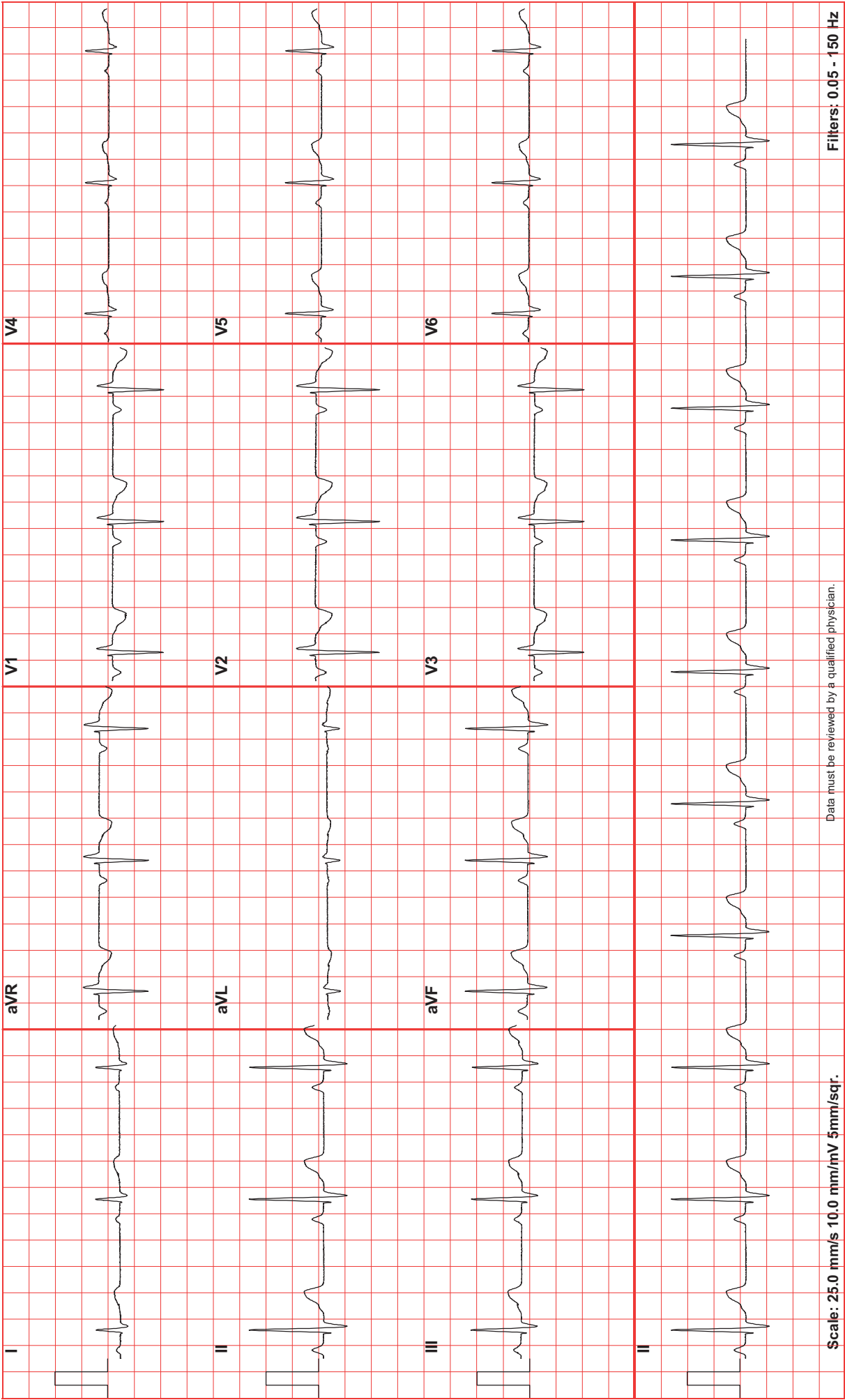


The Universal ECG is CE Marked in accordance with MDD 93/42/EEC.

QRS Diagnostic, LLC  
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Plymouth, MN, USA 55447  
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[info@QRSdiagnostic.com](mailto:info@QRSdiagnostic.com)  
[www.QRSdiagnostic.com](http://www.QRSdiagnostic.com)  
Federal law (USA) restricts this device to sale by or on the order of a physician.

3x4 Simultaneous ECG Report

Patient Details		Recording Details		Measurements		Interpretation (Unconfirmed)		Comments:
Name:	Jill Simpson	Recorded:	1/16/2009 4:03:25 PM	Heart Rate:	60 bpm	004 Normal sinus rhythm	004 Normal sinus rhythm	
ID:	123456789	Device:	CL 131568	P Duration:	76 ms	243 Ischemic ST-T changes in anterior leads	243 Ischemic ST-T changes in anterior leads	279 Poor R Progression in right precordial leads
Gender:	Female	Location:		PR Interval:	158 ms			
Date of Birth:	6/26/1970 (38 years)			QRS Duration:	92 ms			
Height:	5 ft 9 in			QT Interval:	386 ms			
Weight:	0 lbs			QTc Interval:	386 ms			
				P, QRS, T Axis:	67°, 68°, 69°			



Data must be reviewed by a qualified physician.

3x4 Sequential ECG Report

Patient Details

Name: Jill Simpson  
ID: 123456789  
Gender: Female  
Date of Birth: 6/26/1970 (38 years)  
Height: 5 ft 9 in  
Weight: 0 lbs

Recording Details

Recorded: 1/16/2009 4:03:25 PM  
Device: CL 131568  
Location:

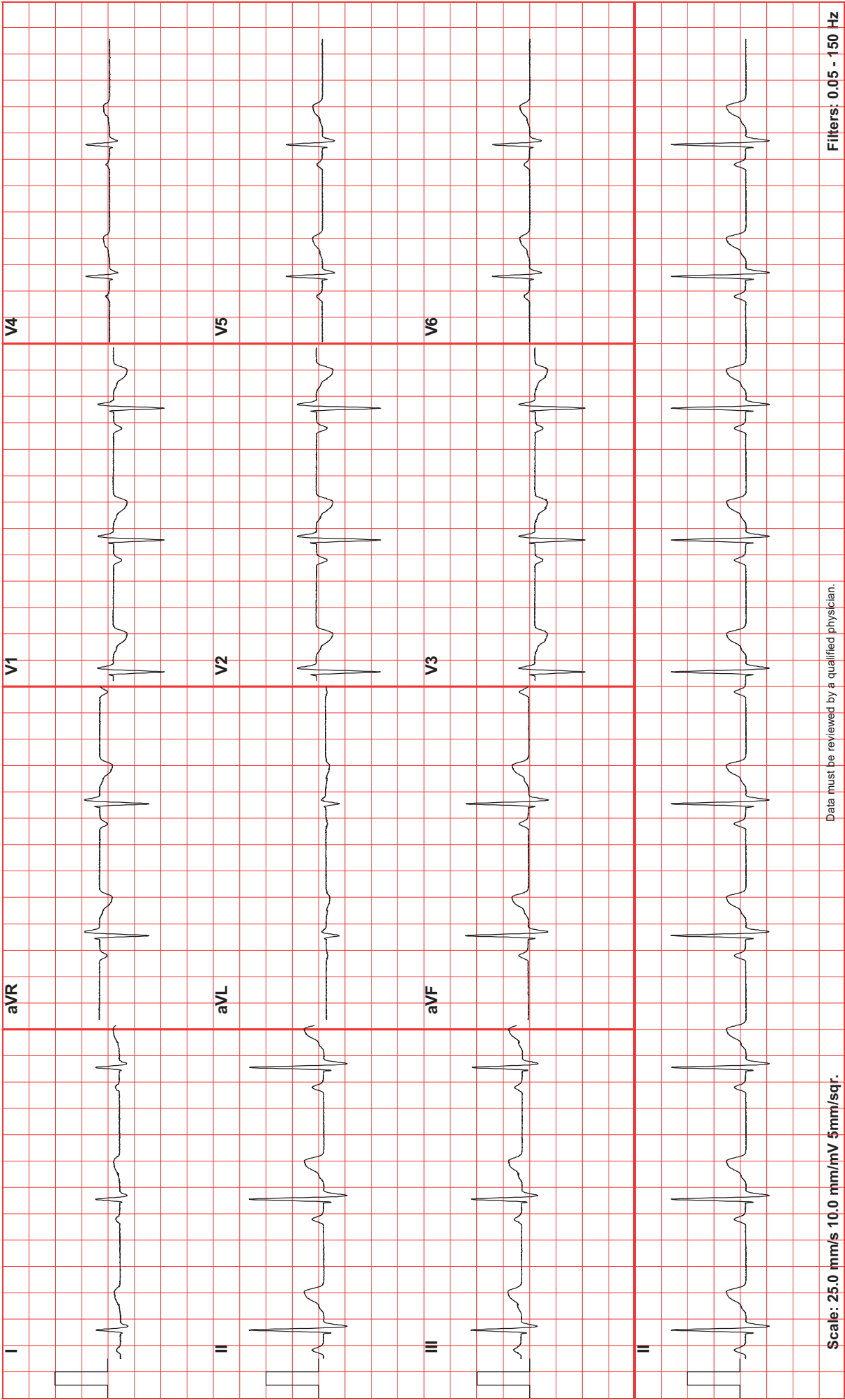
Measurements

Heart Rate: 60 bpm  
P Duration: 76 ms  
PR Interval: 158 ms  
QRS Duration: 92 ms  
QT Interval: 386 ms  
QTc Interval: 386 ms  
P, QRS, T Axis: 67°, 68°, 69°

Interpretation (Unconfirmed)

004 Normal sinus rhythm  
243 Ischemic ST-T changes in anterior leads  
279 Poor R Progression in right precordial leads

Comments:



Scale: 25.0 mm/s 10.0 mm/mV 5mm/sqr.

Data must be reviewed by a qualified physician.

Filters: 0.05 - 150 Hz

6x2 ECG Report

Patient Details

Name: Jill Simpson  
ID: 123456789  
Gender: Female  
Date of Birth: 6/26/1970 (38 years)  
Height: 5 ft 9 in  
Weight: 0 lbs

Recording Details

Recorded: 1/16/2009 4:03:25 PM  
Device: CL 131568  
Location:

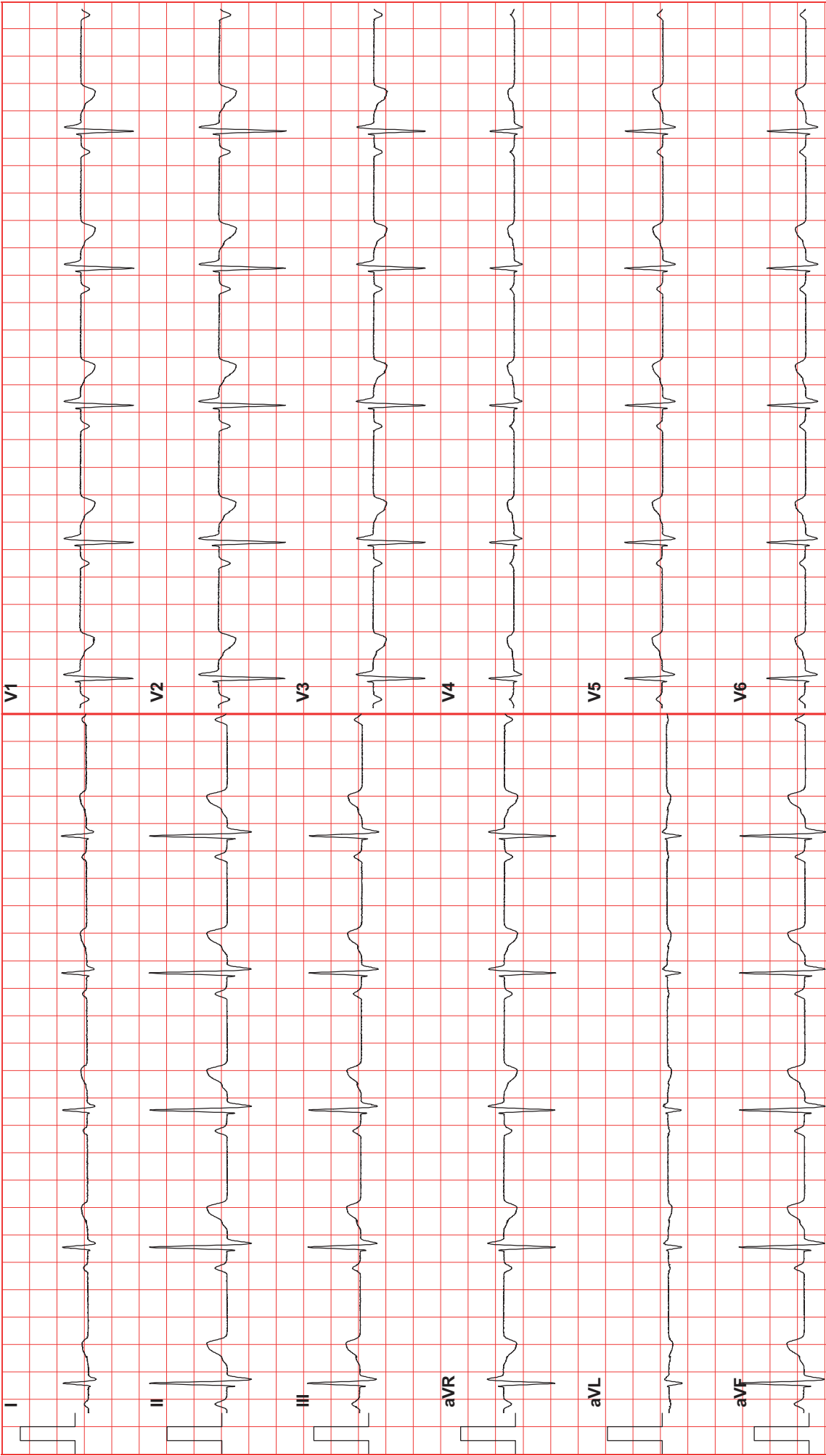
Measurements

Heart Rate: 60 bpm  
P Duration: 76 ms  
PR Interval: 158 ms  
QRS Duration: 92 ms  
QT Interval: 386 ms  
QTc Interval: 386 ms  
P, QRS, T Axis: 67°, 68°, 69°

Interpretation (Unconfirmed)

004 Normal sinus rhythm  
243 Ischemic ST-T changes in anterior leads  
279 Poor R Progression in right precordial leads

Comments:



Scale: 25.0 mm/s 10.0 mm/mV 5mm/sqr.

Data must be reviewed by a qualified physician.

Filters: 0.05 - 150 Hz



6x1 ECG Report

Patient Details

Name: Jill Simpson  
ID: 123456789  
Gender: Female  
Date of Birth: 6/26/1970 (38 years)  
Height: 5 ft 9 in  
Weight: 0 lbs

Recording Details

Recorded: 1/16/2009 4:03:25 PM  
Device: CL 131568  
Location:

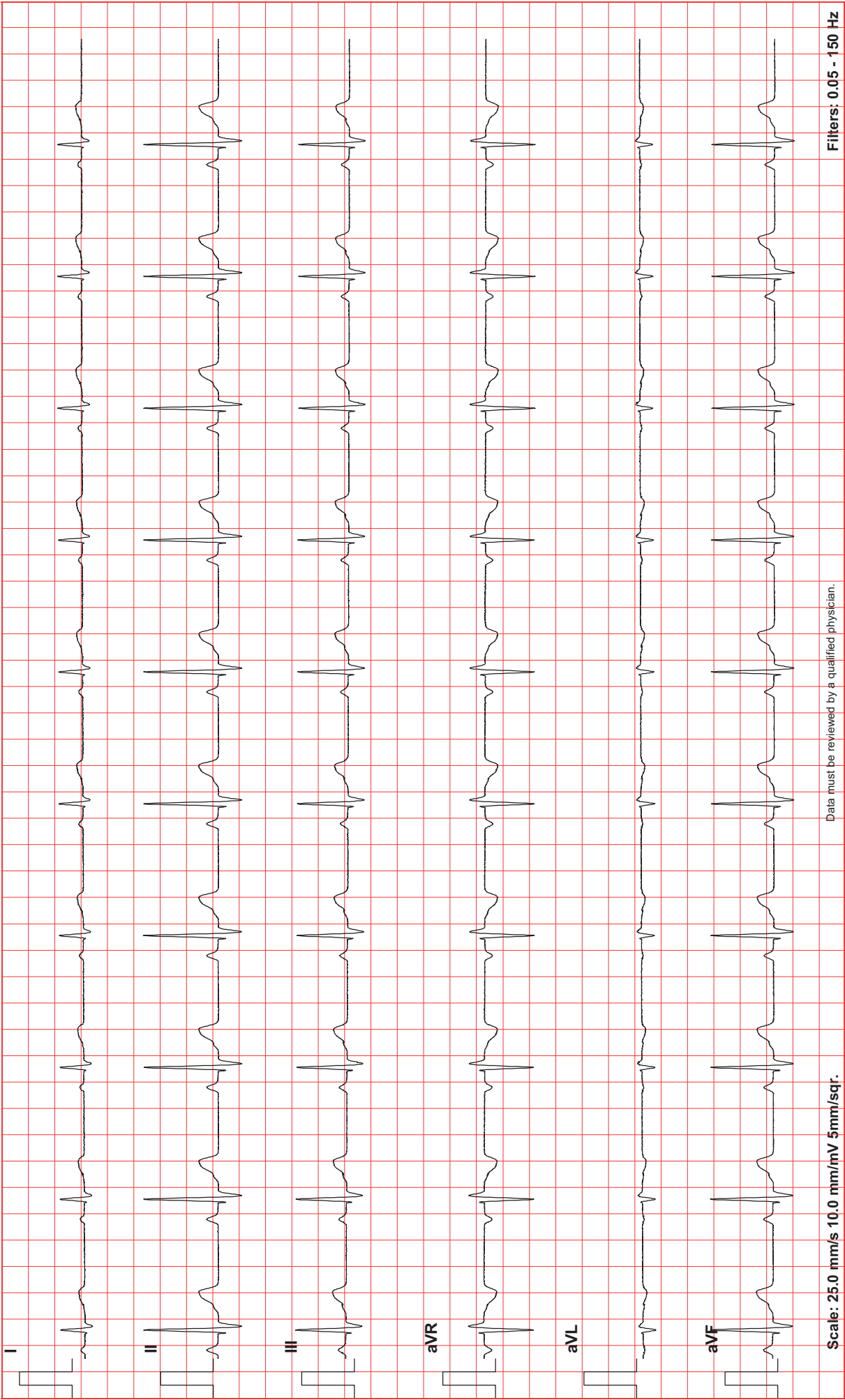
Measurements

Heart Rate: 60 bpm  
P Duration: 76 ms  
PR Interval: 158 ms  
QRS Duration: 92 ms  
QT Interval: 386 ms  
QTc Interval: 386 ms  
P, QRS, T Axis: 67°, 68°, 69°

Interpretation (Unconfirmed)

004 Normal sinus rhythm  
243 Ischemic ST-T changes in anterior leads  
279 Poor R Progression in right precordial leads

Comments:



Scale: 25.0 mm/s 10.0 mm/mV 5mm/sqr.

Data must be reviewed by a qualified physician.

Filters: 0.05 - 150 Hz

6x1 ECG Report

Patient Details

Name: Jill Simpson  
ID: 123456789  
Gender: Female  
Date of Birth: 6/26/1970 (38 years)  
Height: 5 ft 9 in  
Weight: 0 lbs

Recording Details

Recorded: 1/16/2009 4:03:25 PM  
Device: CL 131568  
Location:

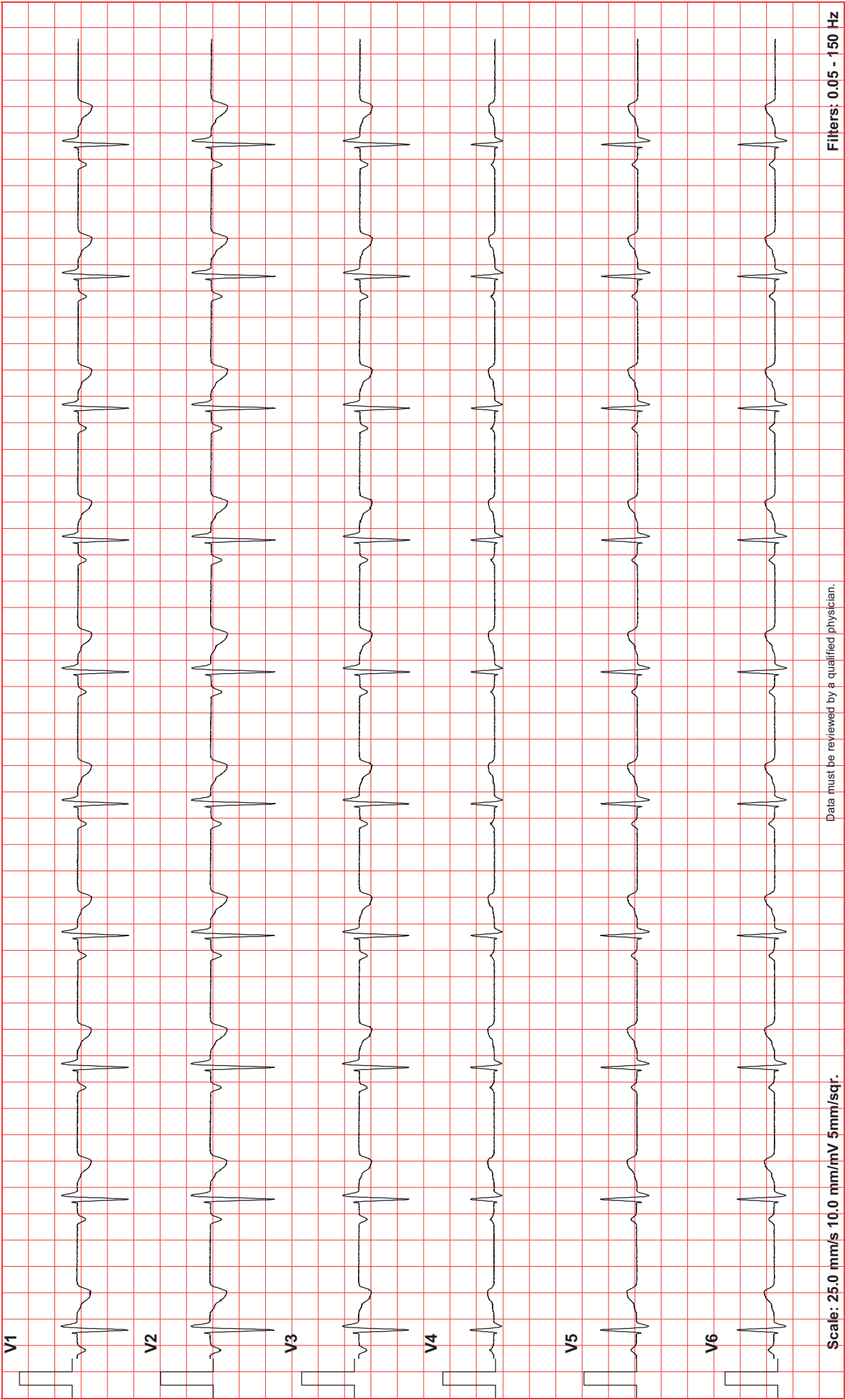
Measurements

Heart Rate: 60 bpm  
P Duration: 76 ms  
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P, QRS, T Axis: 67°, 68°, 69°

Interpretation (Unconfirmed)

004 Normal sinus rhythm  
243 Ischemic ST-T changes in anterior leads  
279 Poor R Progression in right precordial leads

Comments:



Scale: 25.0 mm/s 10.0 mm/mV 5mm/sqr.

Data must be reviewed by a qualified physician.

Filters: 0.05 - 150 Hz

ECG Measurements Report

Patient Details

Name:

Jill Simpson

ID:

123456789

Gender:

Female

Date of Birth:

6/26/1970 (38 years)

Height:

5 ft 9 in

Weight:

0 lbs

Recording Details

Recorded:

1/16/2009 4:03:25 PM

Device:

CL 131568

Location:

Measurements

Heart Rate:

60 bpm

P Duration:

76 ms

PR Interval:

158 ms

QRS Duration:

92 ms

QT Interval:

386 ms

QTc Interval:

386 ms

P,QRS,T Axis:

67°, 68°, 69°

Interpretation (Unconfirmed)

004 Normal sinus rhythm

243 Ischemic ST-T changes in anterior leads

279 Poor R Progression in right precordial leads

Comments:

Lead Type	P+	P-	Q	Amplitude (µV)				S'	J	Amplitude (µV/s)				Slope (µV/s)		Duration (ms)				
				R	S	R'	S			T+	T-	ST	R	S						
I	qrs	73	0	-37	456	-141	0	0	-2	-1	1	10	114	0	-250	6	36	46	-	
II	qRs	210	0	-147	1409	-447	0	0	-13	-9	-3	22	360	0	-250	10	34	46	-	
III	qRs	138	0	-110	953	-306	0	0	-11	-8	-4	12	249	0	0	8	36	46	-	
aVR	rSr'	0	-142	0	91	-933	293	0	7	4	0	-17	0	-237	250	-	8	36	46	-
aVL	rSr'	0	-33	0	36	-248	83	0	4	3	2	-1	0	-68	-250	-	6	34	48	-
aVF	qRs	173	0	-129	1181	-377	0	0	-13	-9	-4	16	302	0	-250	10	34	46	-	-
V1	rSr'	0	-156	0	90	-967	297	0	7	4	0	-18	0	-263	-250	-	8	36	46	-
V2	rSr'	0	-198	0	113	-1205	367	0	9	7	1	-22	0	-309	0	-	10	34	46	-
V3	rSr'	0	-150	0	105	-943	310	0	9	5	-2	-14	0	-238	0	-	8	36	46	-
V4	qrs	69	0	-58	442	-151	0	0	-6	-3	-3	3	116	0	0	6	34	48	-	-
V5	qRs	99	0	-92	680	-233	0	0	-10	-7	-5	8	178	0	0	8	36	46	-	-
V6	qRs	101	0	-77	698	-223	0	0	-8	-6	-3	10	180	0	250	8	36	46	-	-



## 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.<sup>1</sup> **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	<b>Total Accuracy N=1220</b>
<i>percent correct diagnosis</i>				
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)	<sup>c</sup> 93.5	51.0	64.5	69.3
Glasgow	<sup>b</sup> 94.0	51.0	67.7	69.7
GE (Marquette)	86.3	<sup>c</sup> 61.1	<sup>c</sup> 69.7	<sup>c</sup> 69.8
Means	<sup>a</sup> 97.1	42.5	67.2	<sup>c</sup> 69.8
Hannover	86.6	<sup>a</sup> 72.1	<sup>b</sup> 79.0	<sup>b</sup> 75.8
Louvaine (Louven)	91.5	<sup>b</sup> 67.0	<sup>a</sup> 82.1	<sup>a</sup> 77.3
8 Cardiologists Combined Scores	97.1	60.4	80.3	79.2

<sup>a</sup> Highest percent correct; <sup>b</sup> Second highest percent correct; <sup>c</sup> Third highest percent correct

In 1994, clinical researchers evaluated the New Cardionics algorithm using the same methodology as in the clinical study above.<sup>2</sup> 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, Glassgow 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.

<sup>1</sup>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.

<sup>2</sup>Li, G.P., et al., "The New Cardionics ECG Program and Its Comparison with Other Programs", Japanese Heart Journal (1994); **35** (Supplement):257-258.