Directions for Use

Welch Allyn
4341 State Street Road
Skaneateles Falls, NY
13153-0220 USA
www.welchallyn.com

EC | REP

European Regulatory Representative
Welch Allyn Limited
Navan Business Park
Navan
Co. Meath
Ireland

C E

• **US Federal law restricts this device to sale by or on the order of a physician.**

• **After a period of inactivity CardioPerfect Webstation will close automatically. The default inactivity period is 30 minutes.**

• **Consult with your system administrator on how to access the CardioPerfect Webstation application.**

Caution: Federal US law restricts sale of the device identified in this manual to, or on the order of, a licensed physician.

Welch Allyn assumes no responsibility for any injury, or for any illegal or improper use of the product, that may result from failure to use this product in accordance with the instructions, cautions, warnings, or indications for use published in this manual.

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For information about any Welch Allyn product, please call Welch Allyn Technical Support:

USA	1 800 535 6663 + 1 315 685 4560	Australia	+ 61 29 638 3000
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Germany	+ 49 747 792 7186	Japan	+ 81 33 219 0071
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Before contacting Welch Allyn it is helpful to attempt to duplicate the problem and to check all accessories to ensure that they are not the cause of the problem.

When calling, please be prepared to provide:
- Product name and model number and complete description of the problem
- The serial number of your product (if applicable)
- The complete name, address and phone number of your facility

Limited Warranty Statement

Welch Allyn, Inc. warrants that the Welch Allyn CardioPerfect Webstation computer based product you have purchased meets the labeled specifications of the Product and will be free from defects in materials and workmanship that occur within 1 year after the date of purchase. Accessories used with the Product are warranted for 90 days after the date of purchase.

The date of purchase is: 1) the date specified in our records, if you purchased the Product directly from us, 2) the date specified in the warranty registration card that we ask you to send to us, or 3) if you don't return the warranty registration card, 120 days after the date on which the Product was sold to the dealer from whom you bought the Product, as documented in our records.

This warranty does not cover damage caused by: 1) handling during shipping, 2) use or maintenance contrary to labeled instructions, 3) alteration or repair by anyone not authorized by Welch Allyn, and 4) accidents.

If a Product or accessory covered by this warranty is determined to be defective because of defective materials, components, or workmanship, and the warranty claim is made within the warranty period described above, Welch Allyn will, at its discretion, repair or replace the defective Product or accessory free of charge.

You must obtain a return authorization from Welch Allyn to return your Product before you send it to Welch Allyn's designated service center for repair.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. WELCH ALLYN'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF PRODUCTS CONTAINING A DEFECT. WELCH ALLYN IS NOT RESPONSIBLE FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM A PRODUCT DEFECT COVERED BY THE WARRANTY.

Contents

Welcome

Welcome to Welch Allyn CardioPerfect Webstation v2.0.

With the Welch Allyn CardioPerfect Webstation, you can view and interpret resting ECGs and exercise ECGs. You can also use it to print ECGs in various formats.

For further information on installation and configuration please refer to the Installation and Integration manuals.

Intended use

The CardioPerfect Webstation software is indicated for the formatting, display and printing of certain pre-recorded physiologic signals, for the purpose of assisting the clinician in the diagnosis and monitoring of various diseases and/or treatment regimens. The CardioPerfect Webstation software also provides non-diagnostic functions such as data security and search tools for patient and/or test records.

Indications

Indications for electrocardiography range from routine screening of cardiac health in the physician office environment to directed diagnostic differentiation in a hospital cardiology department.

Contraindications

There are no known contraindications for the viewing of an ECG.

> **Important:** A computer generated interpretation cannot replace sound medical reasoning by a trained professional. Therefore, a physician should always review the interpretation.

1. Resting ECG

1.1. Resting ECG - Getting started

This section will guide you around the various parts of the Welch Allyn CardioPerfect Webstation Resting ECG module.
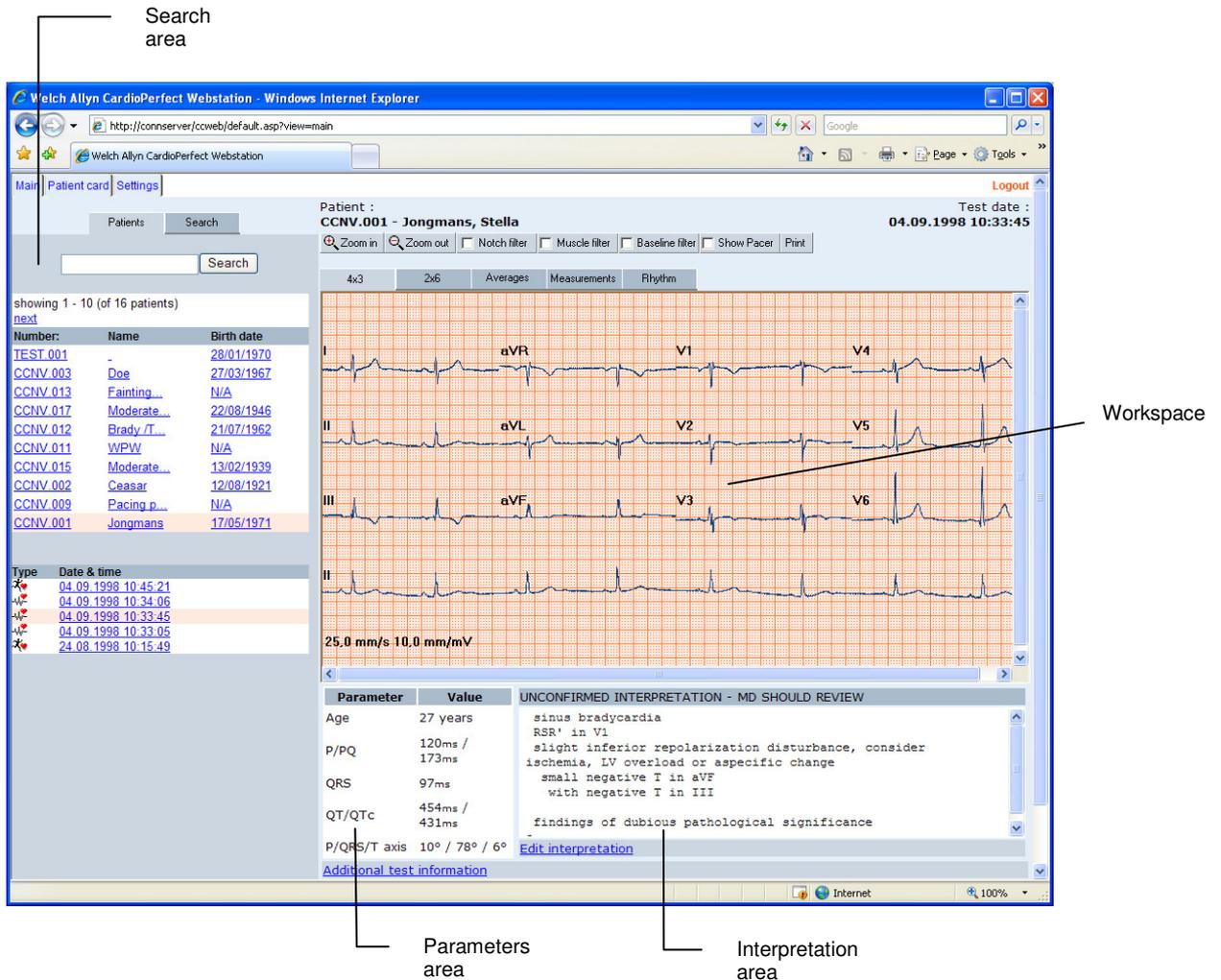
Search area

Workspace

Parameters area

Interpretation area

Search area   The search area contains search and display functionality that lets you easily retrieve patients and tests. In the search area, you can find a patient, see which tests were recorded for that patient and see the kind of tests that were recorded. You can also select search patterns, an easy way of finding information that you need frequently.

Workspace   The workspace is the core part of Welch Allyn CardioPerfect Webstation. It displays the ECG in various formats. These formats, also called views, are each displayed on a separate tab. The workspace is the place where you view, compare and measure ECGs.

Parameters area   The parameters area contains some details of the ECG, such as the age and the heart rate of the patient, and the global measurements for the ECG (P

duration, QRS duration, PQ duration, QT duration, corrected QT duration, P-axis, QRS-axis, T-axis and QTd or JTd duration).

Interpretation area   The Interpretation area contains the interpretation (either entered by the physician or generated by MEANS software). It displays the interpretation text and whether the interpretation has been confirmed.

1.2. Viewing a resting ECG

To view an ECG:

1. Select a patient from the Patient list. The tests that have been recorded for that patient are listed in the Test list.

2. From the Test list, click the ECG that you want to see. ECGs are indicated with a ⌇ sign. The test is then displayed in the workspace.
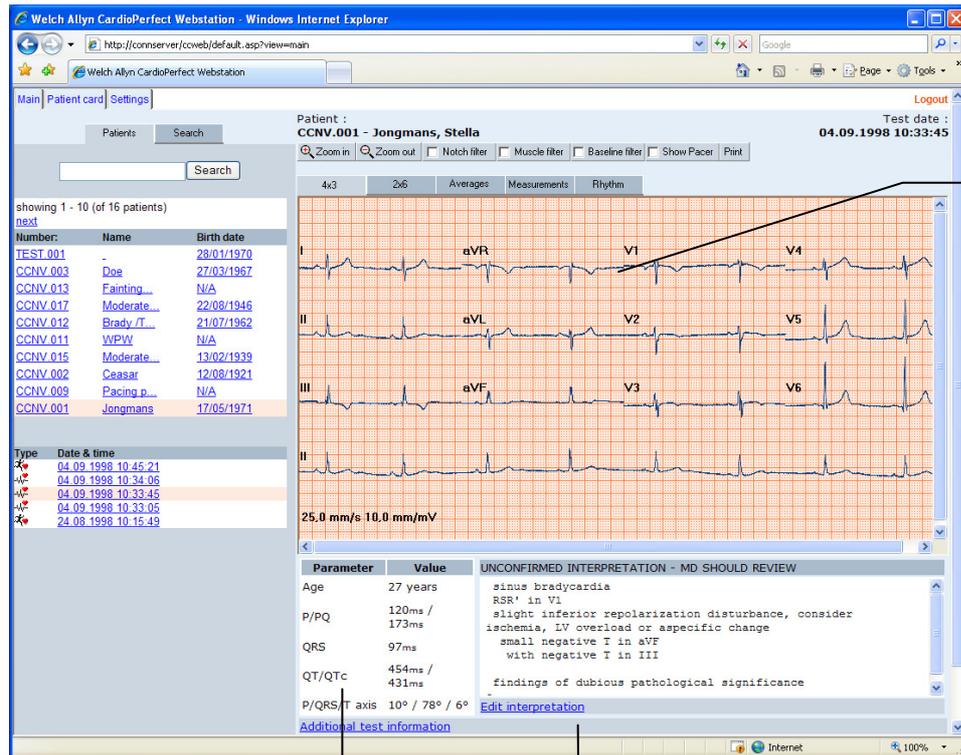
Workspace

Parameters   Interpretation

1.3.   Resting ECG Views

Welch Allyn CardioPerfect Webstation offers various views on an ECG. Each view highlights a different aspect of the ECG. Each view is presented on a different tab in the workspace and has different functionality.

You can view all twelve leads in two different formats (the traditional 4x3 format, and a convenient 2x6 format). But you can also view the measurements that Welch Allyn CardioPerfect calculated, or display one single average complex. If you recorded a rhythm ECG, you can examine the entire recording.

4x3 view
The 4x3 view displays a 12 lead-ECG strip of 2.5 seconds long. The leads are shown in a 4x3 configuration with a rhythm strip at the bottom of the view.
View can be simultaneous or sequential.
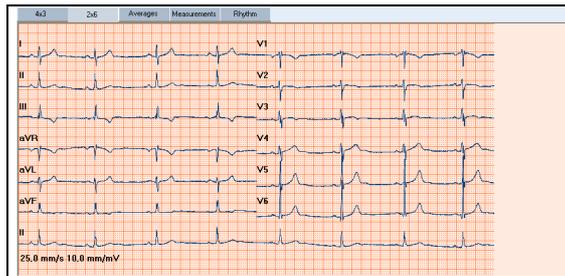
2x6 view
The 2x6 view displays a 12 lead-ECG strip of 5 seconds long. The leads are shown in a 2x6 configuration. On the left, leads I through aVF are displayed; on the right, leads V1 till V6 are displayed.
View can be simultaneous or sequential.
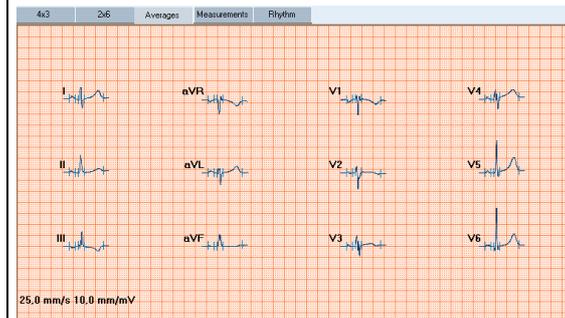
Averages view
The Averages view displays the averages of the dominant complexes for all 12 leads. You can also view a single average complex, display markers and compare complexes of other ECGs.

Measurements view
The Measurements view displays the measurements that were taken during the test. These measurements include the values for several common parameters, such as Q, R and S amplitude and ST values. The amplitudes are expressed in microvolts. The durations are expressed in milliseconds.
The measurements cannot be edited.

Type	aVL	I	-aVR	II	aVF	III	V1	V2	V3	V4	V5	V6
QRSType	qrS	qRs	Rs	R	R	rsR'S'	rSr's'	rS	Rsr's'	rs	Rs	qRs
P+	1,01	1,30	1,25	0,78	0,00	0,00	0,00	0,54	0,72	0,94	0,94	0,73
P-	0,00	0,00	0,00	0,00	0,00	-0,69	-1,49	-0,37	0,00	0,00	0,00	0,00
Q (mm)	0,53	0,41	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,81
R (mm)	2,30	5,51	6,63	7,97	5,31	0,87	1,68	3,14	5,23	4,46	14,59	17,84
S (mm)	5,33	4,24	1,30	0,00	0,00	0,67	7,24	7,59	1,71	4,29	2,74	1,34
R' (mm)	0,00	0,00	0,00	0,00	0,00	6,81	1,54	0,00	2,28	0,00	0,00	0,00
S' (mm)	0,00	0,00	0,00	0,00	0,00	6,81	1,54	0,00	2,28	0,00	0,00	0,00
ST0	-0,08	-0,04	0,26	0,23	0,18	0,16	0,08	0,24	0,35	0,91	0,96	0,22
ST20	0,20	0,27	0,20	0,13	-0,01	-0,14	0,11	0,37	0,60	1,07	0,79	0,27
ST40	0,36	0,49	0,37	0,24	-0,01	-0,25	0,01	0,51	0,78	1,20	0,91	0,43
ST60	0,41	0,61	0,50	0,39	0,08	-0,22	-0,05	0,49	0,91	1,38	1,10	0,55
ST80	0,48	0,72	0,59	0,46	0,10	-0,26	-0,18	0,45	0,99	1,57	1,23	0,70
T+	2,97	3,72	2,57	1,45	0,29	0,00	0,00	0,52	0,97	3,86	6,52	5,34
T-	0,00	0,00	0,00	0,00	-0,41	-2,27	-1,89	-0,38	-0,16	0,00	0,00	0,00
I (ms)	4	4	16	12	6	4	2	4	2	2	6	4
K (ms)	6	12	8	4	4	4	2	2	6	6	10	2
Q (ms)	20	16	0	0	0	0	0	0	0	0	0	24
R (ms)	42	38	60	40	44	58	16	22	24	24	42	38
S (ms)	40	32	52	0	0	10	30	62	10	34	26	34
R' (ms)	0	0	0	0	0	62	36	0	14	0	0	0
S' (ms)	0	0	0	0	0	0	0	0	30	0	0	0

Rhythm view
When you have recorded a rhythm ECG, you can view the entire ECG in the Rhythm view. You can use the scroll bar to move through the ECG.

The Rhythm view displays leads in different groupings, so that you can easily switch between the most common groups.

1.4. Parameters

The lower part of the workspace contains the Parameters pane. The Parameters pane contains global parameters that are determined from all leads. These parameters are:

- Patient age and heart rate
- P and PQ duration
- QRS duration
- QT, QTc and QTd duration
- P, QRS and T axis

1.5.　Working with views

There are a number of things you can do in a view. They fall into the following groups of actions:

Action	Function	Available in
Adjusting scales and magnitude of the view	Zoom in and out	4x3, 2x6, Averages, Rhythm
Improving signal quality	Apply muscle noise filter	4x3, 2x6, Rhythm
Improving signal quality	Apply AC filter	4x3, 2x6, Rhythm
Improving signal quality	Apply Baseline filter	4x3, 2x6, Rhythm
Display Pacer indicators	Show Pacer	4x3, 2x6, Rhythm

1.6.　Zoom in and out on an ECG

If you want to get a closer look at the traces, you can adjust the size of the leads by zooming in and out of the ECG.

To see leads in more detail:

- Click **Zoom in**.

To see a larger part of the ECG:

- Click **Zoom out**.

1.7.　Apply muscle noise filter

Muscle noise in an ECG signal hides low amplitude signals that may be important for the interpretation of an ECG. You can remove this noise with a muscle noise filter.

To apply a muscle noise filter:

- Click **Muscle filter**.

1.8.　Apply AC filter

ECG traces can contain noise that is due to AC mains interference. This makes the traces harder to read. You can filter out noise by applying an AC filter. When you apply a filter, you do not change the actual ECG signal. You only change the way it is displayed on the monitor. The ECG signal always keeps its original form.

To apply an AC filter while you view an ECG:

- Click **Notch filter.**

1.9.　Apply Baseline filter

ECG traces can contain some baseline wander caused by movement. You can reduce this wander of the baseline by applying a baseline filter. When you apply the baseline filter you only change the display of the traces. The actual signal remains unchanged.

To apply a Baseline filter while you view an ECG:

- Click **Baseline filter**.

1.10. Show Pacer

ECG traces can contain artificial pacemaker signal indicators.

To remove the artificial pacer indicator while you view an ECG:

- Un-click **Show Pacer**.


1.11. Display markers

Markers are convenient reference points that mark global points in an average complex or vector. You can use a marker as a starting point for your observations or measurements. You can only view markers in the Average tab.

Welch Allyn CardioPerfect Webstation inserts markers at the following points:
- Start P wave
- End P wave
- Start QRS complex
- End QRS complex
- End T wave

1.12. Interpreting a resting ECG

When you view an ECG, the interpretation is shown in the lower right corner of the workspace. If you have the optional MEANS software installed on your main CardioPerfect Workstation, this software makes an initial interpretation for you. If not, this is where you can enter your own interpretation.
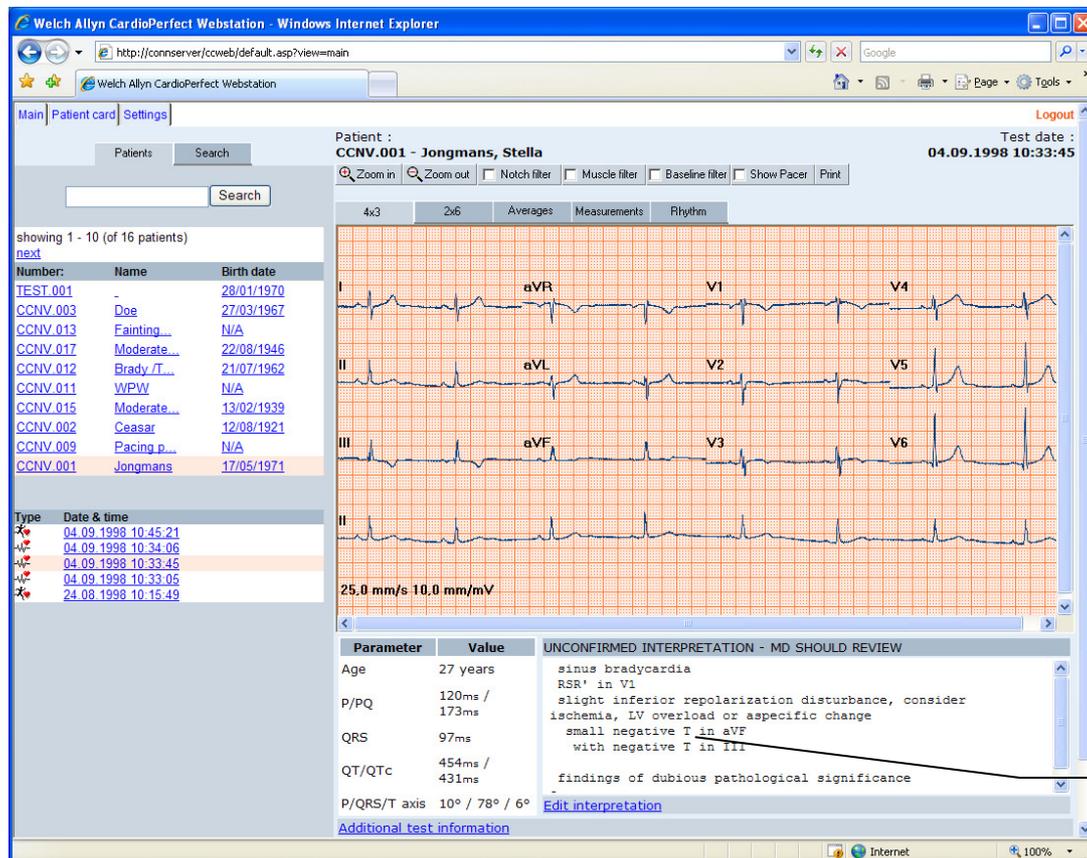
Interpretation

About MEANS and PEDMEANS interpretation software
MEANS is short for Modular ECG Analysis System. PEDMEANS is short for Pediatric Modular ECG Analysis System. They are ECG interpretation programs developed by the University of Rotterdam in the Netherlands, and can be used to interpret ECGs that were recorded with Welch Allyn CardioPerfect.

MEANS and PEDMEANS use an algorithm that consists of signal processing, measurements, rhythm and contour classification. The adult algorithm is applicable to patient ages 18 and higher. The pediatric algorithm is applicable for ages 1 day through 17 years.

MEANS and PEDMEANS interpretations consist of
- A number of statements in different categories
- Reasoning supporting the statement
- A conclusion
- An indication of the severity of the ECG

Missing information

The MEANS algorithm uses the gender and the age of a patient to make a reliable interpretation. If this information is not present in the patient card, the following assumptions are made:

- The patient is male
- The patient is 35 years old

If these values are used, this is mentioned at the top of the interpretation.

Important: A computer-generated interpretation cannot replace sound medical reasoning by a trained professional. Therefore, a physician should always review the interpretation.

1.13. Edit and confirm an interpretation

You can edit an interpretation in the Interpretation editor. In this editor, you can enter your own text. Alternatively, you can use the statement tree to select and enter common interpretation statements. Once you edit an interpretation, you must confirm it. Otherwise, your changes will not be saved.
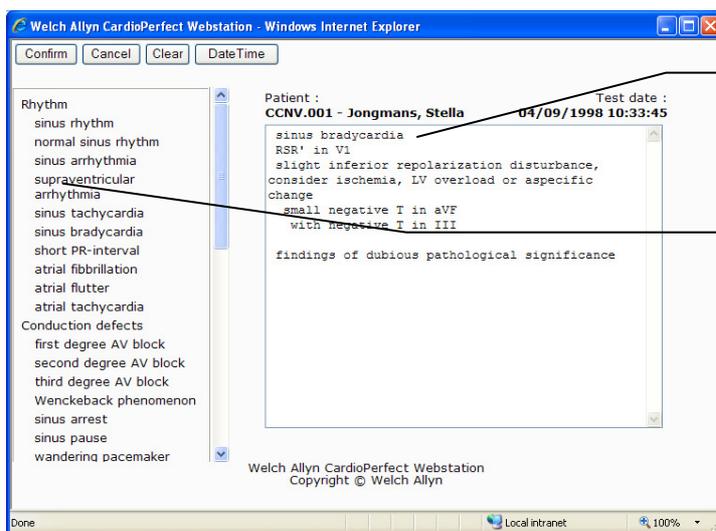
To edit and confirm an interpretation manually:

1. Click **Edit Interpretation**. The Interpretation editor is displayed.

2. In the Interpretation display, start typing at the pointer.

3. Click the **Confirm** button to save your comments and to return to the ECG.

To edit and confirm an interpretation with the statement tree:

1. Click **Edit Interpretation**. The Interpretation editor is displayed.

2. Click on the statement that you want to include in the interpretation. The statement is added.

3. To delete a statement from the interpretation, select the statement text and press BACKSPACE to delete it.

4. Click the **Confirm** button to save your comments and to return to the ECG.

Tips for editing and confirming an interpretation:

- You can automatically insert the current date and time by clicking the **Date/time** button.
- You can clear the interpretation editor by clicking the **Clear** button.
- When you return to the ECG after confirming an interpretation, the interpretation header shows the date and time of confirmation and the name of the person that confirmed it.

- The statement tree can be changed. Please consult your system administrator or local dealer for new or changed statements.

1.14. Printing a resting ECG

You can make a printout of each view in the ECG. Select the desired view by clicking on its tab. Then click on the Print button. A second browser window will open displaying the report to be printed. The report can then be printed by the browser window print functionality.

Print formats

The resting ECG Module can print the following reports:

- 2x6
- 4x3, 25 mm/s
- 4x3 5 mm/mV
- Averages
- Measurements
- Rhythm

Each report contains the view and a header that displays additional information.

2. Exercise ECG

2.1. Exercise ECG - Getting started

This section will guide you around the various parts of Welch Allyn CardioPerfect Webstation Exercise ECG module.
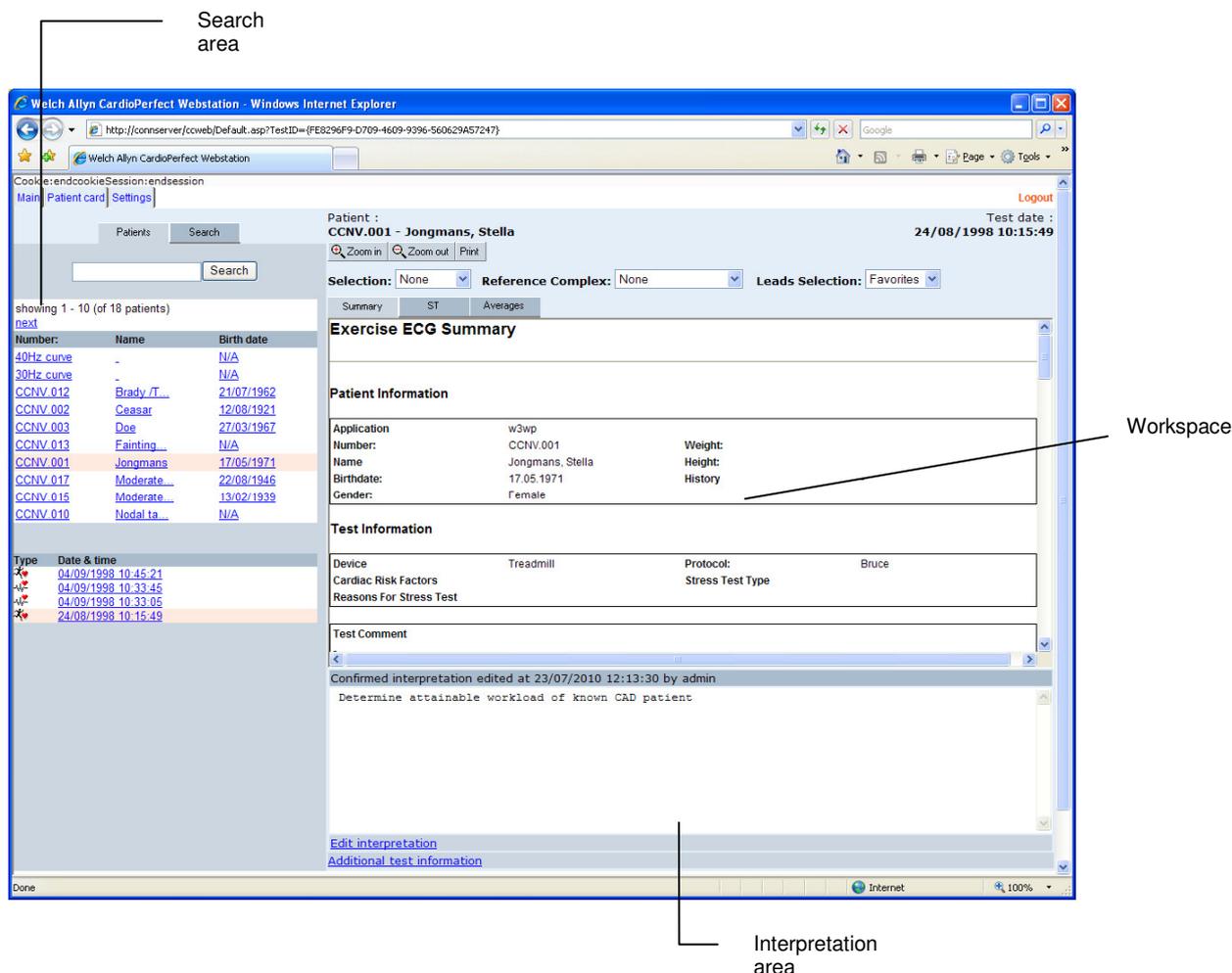
Search area

Workspace

Interpretation area

Search area The search area contains search and display functionality that lets you easily retrieve patients and tests. In the search area, you can find a patient, see which tests were recorded for that patient and see the kind of tests that were recorded. You can also select search patterns, an easy way of finding information that you need frequently.

Workspace The workspace is the core part of Welch Allyn CardioPerfect Webstation. It displays the ECG in various formats. These formats, also called views, are each displayed on a separate tab. The workspace is the place where you view, compare and measure ECGs.

Interpretation area The Interpretation area contains the interpretation. It displays the interpretation text and whether the interpretation has been confirmed.

2.2. Viewing an exercise ECG

Welch Allyn CardioPerfect Webstation offers various views on an exercise ECG. Each view highlights a different aspect of the ECG.

2.3. View an exercise ECG

To view an ECG:

1. Select a patient. The tests that have been recorded for that patient are listed in the Test list.

2. From the Test list, click the exercise ECG that you want to see. Exercise ECGs are indicated with a ⚡❤ sign. The test is then displayed in the workspace.

2.4. Zoom in and out on an exercise ECG

If you want to get a closer look at the traces, you can adjust the size of the leads by zooming in and out of the exercise ECG.

To see leads in more detail:

- Click **Zoom in**.

To see a larger part of the ECG:

- Click **Zoom out**.

You can edit an interpretation in the Interpretation editor. In this editor, you can enter your

own text. Alternatively, you can use the statement tree to select and enter common interpretation statements. Once you edit an interpretation, you must confirm it. Otherwise, your changes will not be saved.
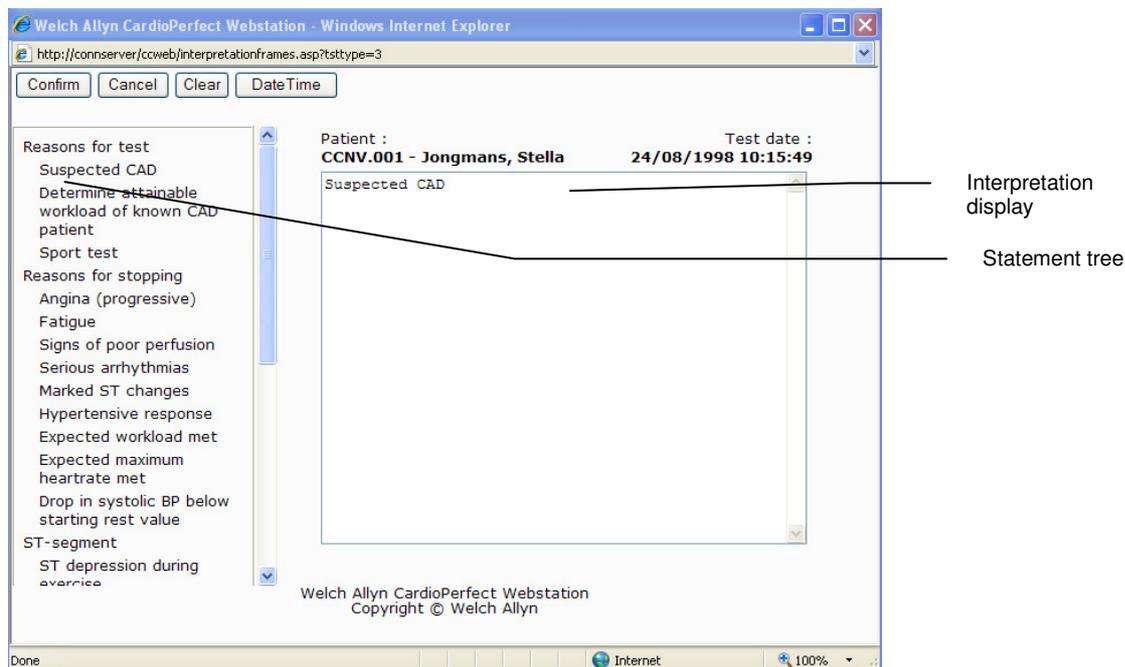
To edit and confirm an interpretation manually:

4. Click **Edit Interpretation**. The Interpretation editor is displayed.

5. In the Interpretation display, start typing at the pointer.

6. Click the **Confirm** button to save your comments and to return to the ECG.

To edit and confirm an interpretation with the statement tree:

5. Click **Edit Interpretation**. The Interpretation editor is displayed.

6. Click on the statement that you want to include in the interpretation. The statement is added.

7. To delete a statement from the interpretation, select the statement text and press BACKSPACE to delete it.

8. Click the **Confirm** button to save your comments and to return to the ECG.

Tips for editing and confirming an interpretation:

• You can automatically insert the current date and time by clicking the **Date/time** button.
• You can clear the interpretation editor by clicking the **Clear** button.
• When you return to the ECG after confirming an interpretation, the interpretation header shows the date and time of confirmation and the name of the person that confirmed it.
• The statement tree can be changed. Please consult your system administrator or local dealer for new or changed statements

2.5. Work with the Summary view

The summary view displays a report with the most important information, measurements and results.

The default summary view consists of:

|	
Patient information	The name, number, birth date, gender, height and weight of the patient.
Test information	Information about the reasons for the test, test type, medications and cardiac risk factors.
Test results	Information about: the test date, duration, device, the used protocol, the length, duration and number of stages of the various phases, target heart rate, maximum heart rate, maximum blood pressure and maximum workload. The name of the technician, as well as the names of the referring, ordering and attending physicians, are also shown in this section.
Test observations	Observations made during the test like: symptoms during the test, heart rate and blood pressure response to exercise, reasons for testing.
Interpretation	If the exercise ECG has been interpreted, this section contains the interpretation statements.

Trends and Graphs

ST table	An overview of the ST values as calculated in the ST table view.
Heart rate trend	The heart rate trend as calculated in the Heart rate view.
ST trend	The ST value chart of a predefined lead
Blood pressure	The blood pressure, heart rate and corresponding rate pressure product.

2.6.   Work with the Averages view

Averages view

The Averages view displays the averaged complexes at a number of given points in the exercise ECG. These points usually are the ends of each stage, and points of interest, such as the highest ST deviation. The reference complex and the lead selection values shown can be changed via the drop down boxes just above the main view.
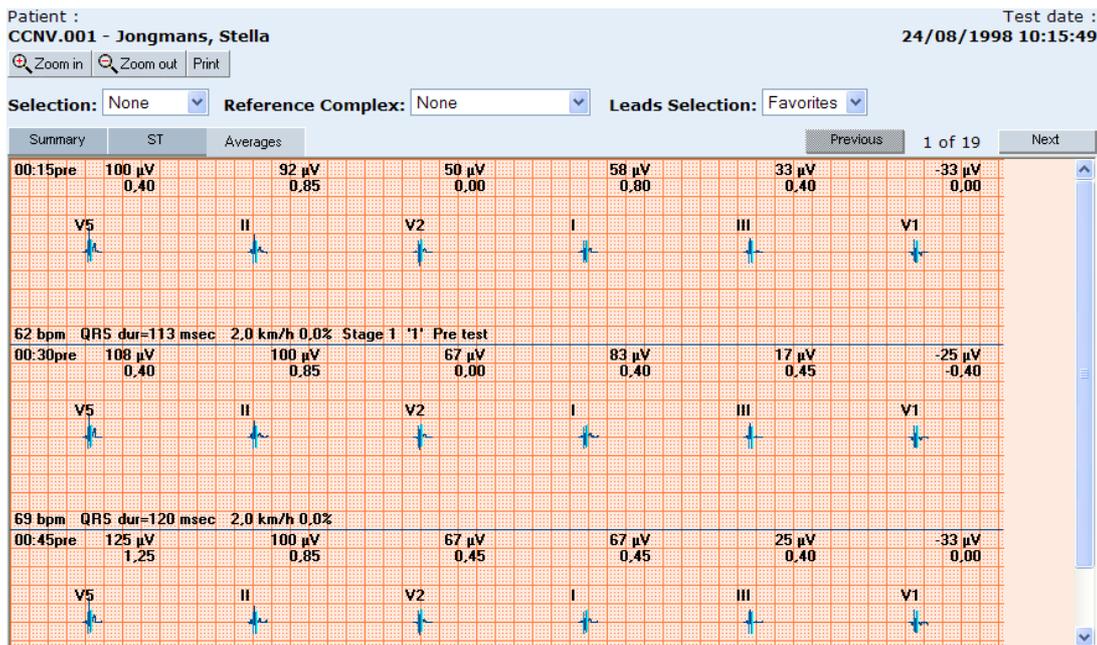
For each point, the averaged complexes are displayed, together with the patient's heart rate, the QRS duration, the workload (in case of an ergometer test) or speed and elevation (in case of a treadmill test), the phase and the blood pressure. The ST levels and slopes are displayed above the complexes.

To select which six leads you want to view:
1. Click the **I-aVF** button to display the averages of leads I to aVF.
2. Click the **V1-V6** button to display the averages of leads V1 to V6.
3. Click the **I-III,V1-V6** button to display the averages of leads I to V6.
4. Click the **Favorites** button to display the lead preference that was set in the exercise ECG settings.

Display markers

Markers indicate where in the QRS complex the measurement reference points have been set. These reference points are automatically calculated. Markers can only be displayed in the Averages tab.
Welch Allyn CardioPerfect Webstation Exercise ECG shows markers at the following points:
- Q   QRS onset
- J   QRS end
- J+x   ST measurement point

Display ST slopes

Welch Allyn CardioPerfect Webstation Exercise ECG not only measures ST levels, but can also calculate the value of ST slopes. The ST slope value gives additional qualitative

information about your ST level measurements.

The ST slope is calculated as follows: (ST at J+60 - ST at J+40) / 20 msec.

2.7. Display the ST table view

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The ST table view shows points in the recording together with the stage, workload or speed/elevation, blood pressure, heart rate, rate pressure product, the PQ and the QRS duration, and the ST values for various leads.

2.8. Interpreting an exercise ECG

Once you have viewed the information in the exercise ECG, you can edit and confirm the interpretation.

2.9. Edit, save and confirm interpretation

Any user with edit rights can edit an unconfirmed interpretation in the Interpretation editor. In this editor, you can enter your own text. Alternatively, you can use the statement tree to select and enter common interpretation statements. Once you edit an interpretation, you can save it. The test will then be labeled as *'Unconfirmed Interpretation - MD should review'*.

To enter text in the Interpretation editor:
1. Click **on Edit Interpretation**. The Interpretation editor is displayed.

2.
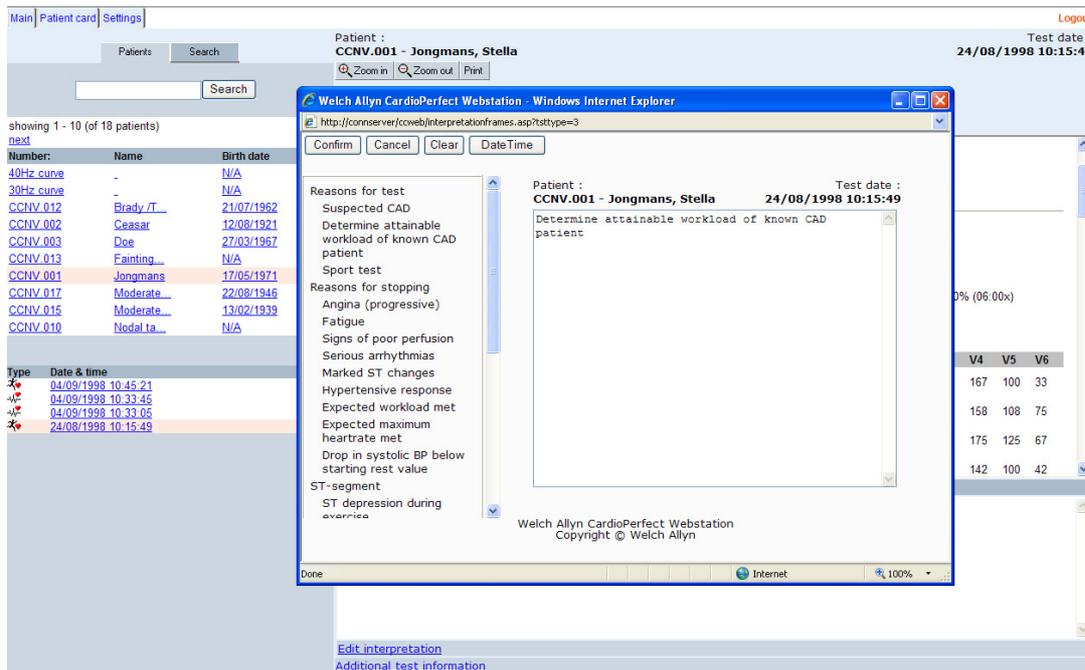
To enter a statement from the statement tree:
1. From the statement tree, click on one of the categories to display all possible statements for that category.
2. From a category, click on the statement that you want to include in the interpretation. The statement is added.
3. To delete a statement from the interpretation, select the statement text and press BACKSPACE to delete it.
4. Click the **Save** (or **Confirm**, if available) button to save or confirm your comments and to return to the ECG.

Tips for editing and confirming an interpretation:
- You can automatically insert the current date and time by clicking the **Date/time** button.
- You can clear the interpretation editor by clicking the **Clear** button.

2.10. Printing exercise ECGs

You can make a printout of each view in the ECG. Select the desired view by clicking on its tab. Then click on the Print button. A second browser window will open displaying the report to be printed. The report can then be printed by the browser window print functionality.

Print formats

The exercise ECG Module can print the following reports:

- Summary
- ST
- Averages

Each report contains the view and a header that displays additional information.