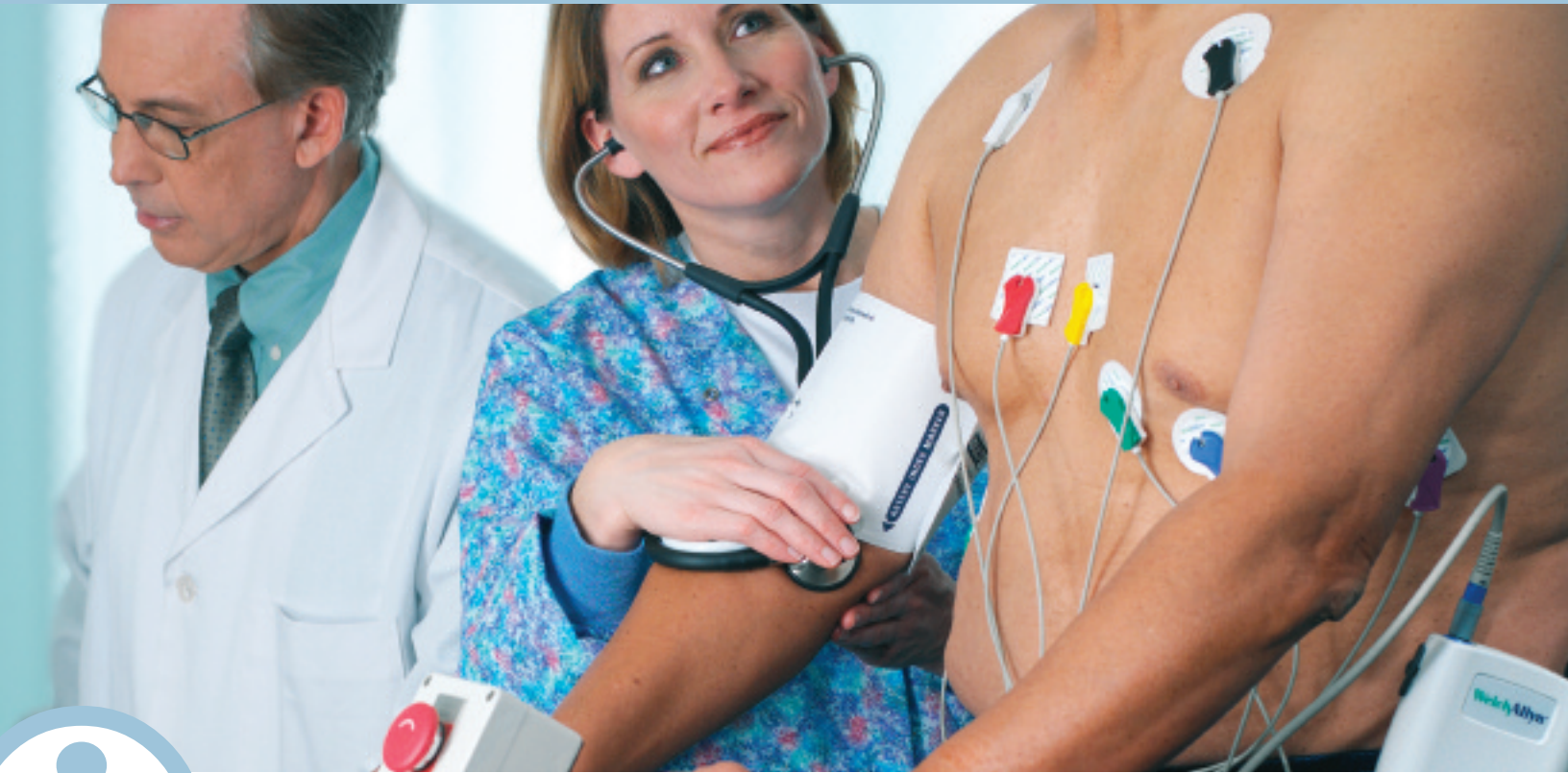


CARDIO PERFECT
EXERCISE ECG
QUICK START GUIDE



WelchAllyn®

Advancing Frontline Care™



STRESS TEST PATIENT INFORMATION

What is a stress test?

A stress test (or an exercise ECG test) is used to determine how well your heart and lungs function during physical activity. During the test, you will walk on a treadmill or ride on a bicycle while your heart rate, blood pressure, and electrocardiogram (ECG) are monitored. As the test progresses, the level of exertion is gradually increased.

Why does it work?

During exercise the body requires more oxygen. As the level of physical activity increases, the heart has to work harder to deliver more oxygen-rich blood to the exercising muscles, so the heart beats faster. By monitoring the electrical signals of the heart as it beats faster, we can often see coronary problems that cannot be seen when the body is at rest. Because it is non-invasive, the stress test provides a safe and cost-effective initial test for coronary heart disease.

How do I prepare for the test?

You should not eat or smoke for at least two hours before the test. You can drink water, but no other beverages. Please review your medications with your physician. Some medications you are not allowed to take prior to the study. Take your approved medications with water only. You should wear comfortable sneakers or walking shoes, and exercise clothing, to the test.

What happens during the test?

A nurse or technician will attach ten disposable adhesives patches, or electrodes, on your chest. Before placing the electrodes, each electrode site will be cleaned with alcohol, then lightly abraded to remove oils and to ensure that a good electrical connection is made. Wires are then

attached to each electrode. These wires conduct the electrical signals of the heart to the test system. A blood pressure cuff will also be placed on your arm, so that blood pressure can be measured during the test.

After taking one or more resting ECG's, you will move to the bicycle or treadmill and start pedaling or walking slowly. At regular intervals, the resistance of the bicycle—or the speed and elevation of the treadmill—will increase. As the intensity of the exercise increases, your heart rate will increase. The test will be stopped if you experience dizziness, fatigue, or abnormal heart beats. Normally the exercise portion of the test will end when your heart rate has reached a target level (85% of a predicted maximum heart rate, based on your age).

When the exercise portion of the test ends, you will still continue to pedal or walk slowly until your heart rate returns to normal. During this time your ECG data, along with blood pressure, will still be recorded. Then the wires and electrodes will be removed.

In some cases drugs will be used, instead of exercise, to make the heart accelerate. The stress test will still follow the same pattern, except that you will not use the bicycle or treadmill.

Are there any risks?

The exercise stress test carries a very slight risk (1 in 100,000) of causing a heart attack. All stress tests should be monitored by a health care professional. Immediately notify the attending health care professional if any of the following symptoms develop:

- unsteadiness
- dizziness
- irregular heart beat
- grayish, cold, or clammy skin
- chest pain

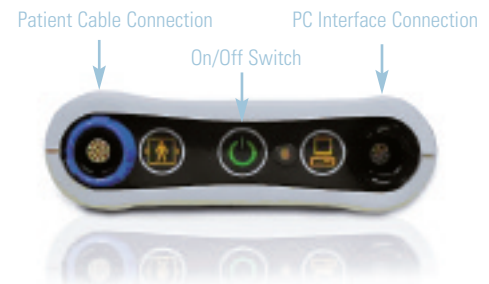
Source: Dr. Paul Fiacco, MD, CNY Family Care, E Syracuse, NY

1 Install Software and USB Drivers

- This Quick Start Guide is intended for use with CardioPerfect Workstation 1.6.0 or higher.
- For complete directions for use and warnings, please consult your user manual located on the software CD.

2 Connect your Recorder

- Connect the PC interface cable (ProLink) to a USB port on your computer.
- Connect the other end to the **black** connector on the recorder.
- Connect the patient cable to the **blue** connector on the recorder.



3 Prepare Your Patient

- Skin preparation is a key factor in minimizing noise and artifact on the stress test recording.
- While precordial leads are placed in their standard locations, arm and leg leads should be placed on bony surfaces to reduced noise.
- Place arm leads on the clavicles, and leg leads on the lower, protruding tip of the rib cage.

Skin preparation steps:

- Dry shave to remove all hair from electrode sites.
- Scrub all electrode sites with alcohol wipes.
- Stretch skin and abrade each site with an abrasive pad.
- Skin should be red, with visible abrasion marks, when the skin preparation is complete.

Source: *Prairie Cardiovascular Skin Preparation Guide*



Arm lead placement

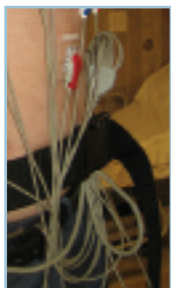
Leg lead placement



Abrade each site with abrasive pad

4 Place Electrodes and Connect Patient Leads

- Clip the patient leads to the electrodes.
- Stress electrodes should be firmly pressed and smoothed into place but be careful not to squeeze gel out.
- Position electrodes according to your local protocol. An example of the AHA guidelines is listed below.
- Dress the leads and patient cable so that they stay as quiet as possible during the test. Leads should not come in contact with legs or arms. If the recorder is belt mounted, gather excess lead lengths and tuck under the belt.



Dressing patient leads

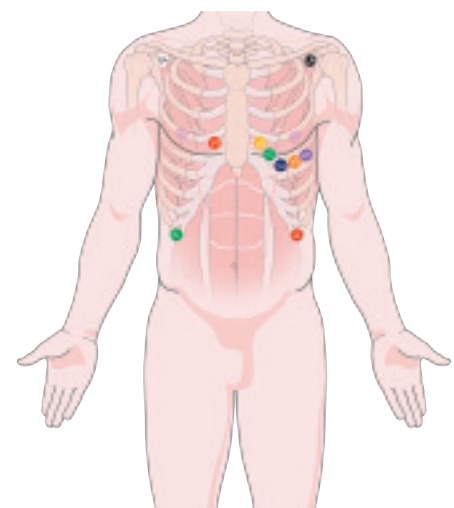
Electrode Placement

AHA Electrode Placement

RA and LA electrodes should be placed just below the right and left clavicle.

RL and LL electrodes should be placed on the lower edge of the rib cage, or at the level of the umbilicus at the mid-clavicular line.

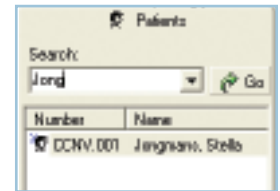
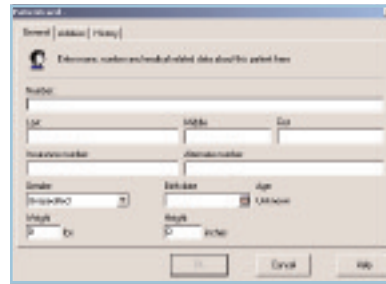
- V1** Fourth intercostal space at the right border of the sternum
- V2** Fourth intercostal space at the left border of the sternum
- V3** Midway between locations V2 and V4
- V4** At the mid-clavicular line in the fifth intercostal space
- V5** At the anterior axillary line on the same horizontal level as V4
- V6** At the mid-axillary line on the same horizontal level as V4 and V5



AAMI	V1 1	V2 1	V3 1	V4 1	V5 1	V6 1	RA 0	LA 1	RL 1	LL 1
IEC	C1 1	C2 1	C3 1	C4 1	C5 1	C6 1	RA 1	LA 1	R 1	L 1

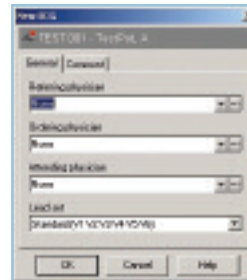
5 Select Patient

- Open the CardioPerfect Workstation Software by double clicking on the CardioPerfect icon.
- To enter a new patient:
 1. Click the Patient button.
 2. Fill in Patient Card.
- To select a patient from the database:
 1. In the Search box, type the patient name or number (can be a partial entry).
 2. Click the Go button.
 3. Click on the patient for whom you want to record the test.



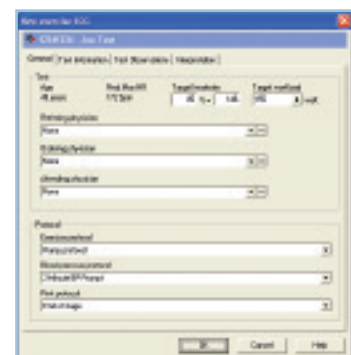
6 Record a Resting ECG (optional)

- Most exercise protocols will record a Resting ECG inside the stress test. You can, however, record Resting ECG's independent of the Exercise ECG test, if you wish.
- Click on the ECG icon.
- If the new ECG dialog appears, select Physician Names and click OK.
- Click the Record button to start a 12-lead resting ECG.
- Review ECG data and print report
 - > You can choose from multiple ECG report templates.
 - > If automatic printing is checked in the ECG Print settings, the report will print immediately.
 - > If you did not select Automatic printing in the Settings, click on the down arrow next to the Print icon and choose "Print Selected Formats" to initiate printing.
 - > If you just want to print one type of report, click on the Print icon, and select the desired report page.



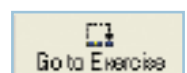
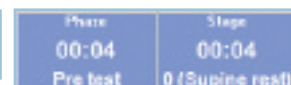
7 Initiate the Stress Test

- Click on the Exercise ECG button—the New exercise ECG window will appear.
- On the Protocol tab, set target heart rate & physician data. Change protocol selections if required.
- On the Test Information or Test Observation tabs, enter data describing reasons for test, etc. This data can be entered at any time during or after the test.



8 Start the Stress ECG Test

- To begin the test, click the start button.
- Take baseline resting ECGs—most stress test protocols will be setup to take one or more resting ECG snapshots prior to starting the exercise portion of the test. Follow the protocol prompts.
- Place patient on treadmill.
- Start the exercise portion of the test by clicking the Go to Exercise button. You will be asked to confirm this action.

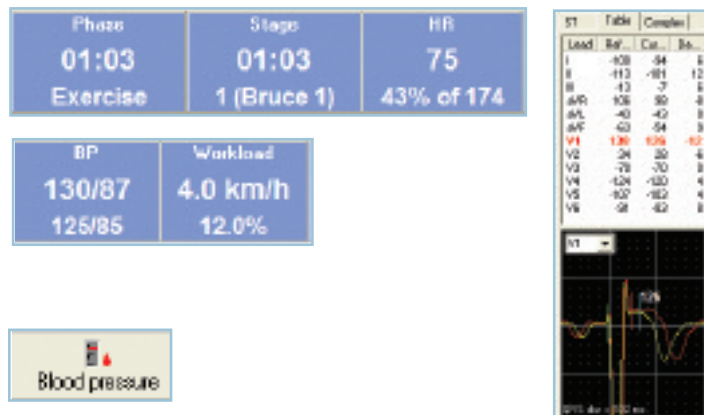


9 Monitor and Coach Your Patient

The real time monitor window gives you many ways to track patient and test status. They include:

- Phase, stage and heartrate
- Blood pressure and workload
- ST changes

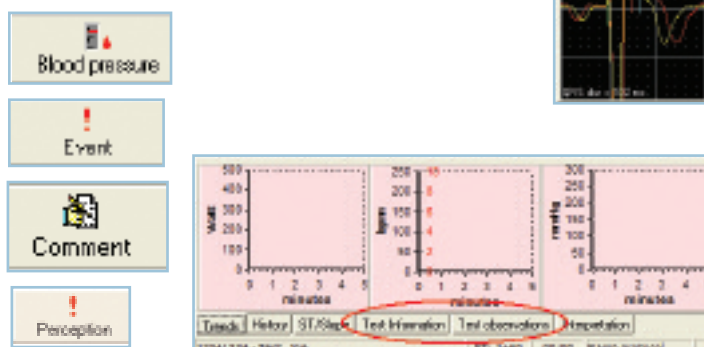
Warn your patients when the next stage is approaching to prepare them for changes in speed and elevation.



10 Add Relevant Data to the Test

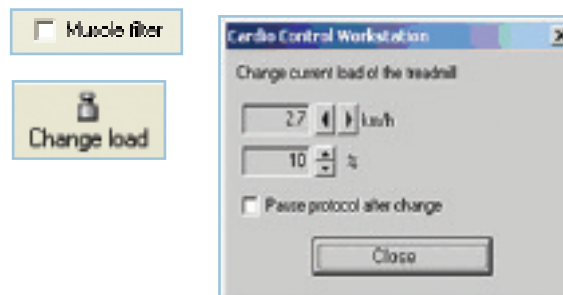
Throughout the test you can add relevant data, including:

- Blood pressure – BP can be added at any time by clicking the BP button.
- An event marker, or a comment, can be added by using the Event or Comment buttons
- Patient perceptions of perceived exertion, chest pain, or dyspnea can be entered using the Perception button.
- Test information or observations can be entered at any time during or after the test by clicking on the Test Information or Test Observation tabs.



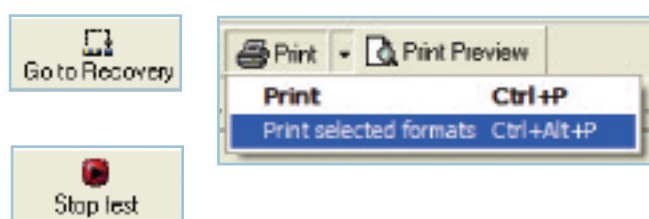
11 Manually control the test, if required

- Filter settings can be changed at any time during the test using the check boxes above the waveform display window.
- You can manually control the treadmill or ergometer by clicking on the Change Load button.
- With the proper Exercise ECG settings, the treadmill can be controlled instantaneously via the change load window, or by holding the CNTRL key down and using the arrow keys.
- With the proper Exercise ECG settings, an ergometer can also be controlled instantaneously via the change load window.



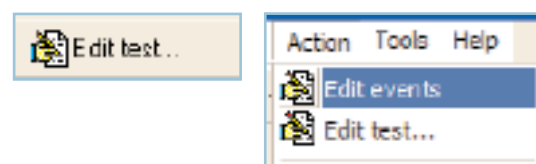
12 Stop the test, enter final data, and print test results

- When test goals are met (i.e.: patient has reached target heart rate), you can go to the Recovery Phase by clicking the Go To Recovery button. During Recovery test data will still be recorded.
- You can stop the test at any time by clicking the Stop Test button. If the Print after recording box is checked in the Stress ECG Print settings, post test reports will now print.
- Or you can click on the down arrow next to the Print icon and choose "Print Selected Formats" to initiate printing.
- If you just want to print one page, click on the Print icon, and select the desired report page.
- During Recovery or after the test is stopped, you can enter additional test data using the Test Information and Test Observation tabs.

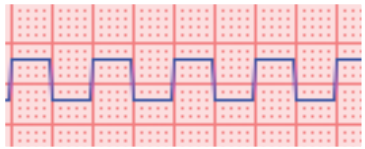
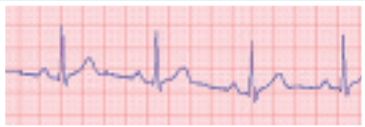
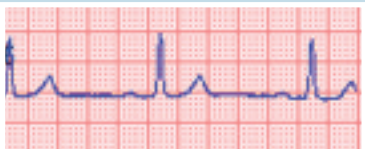


13 Edit the test results, after the test is complete

- Test Information and Test Observation data can be added after the test by clicking the Edit Test button. From this same window, the Physician names can be edited. Post-test editing can continue until the Interpretation is confirmed.
- Events (User events, Comments, and BP values) can be edited after the test is complete by clicking Action – Edit Events.



LEAD QUALITY PROBLEMS

Condition	Causes	Actions
<p>A dot is flashing on the Lead Off screen. OR Lead-off information is displayed on the screen. OR One or more leads prints as a square wave:</p>	<ul style="list-style-type: none"> • Electrode contact may be poor. • A lead may be loose. 	<ul style="list-style-type: none"> • Reattach the lead. • Replace the electrode. • Verify that the electrode area has been properly prepared: shaved, cleaned with alcohol or acetone, allowed to dry. • Verify that electrodes have been properly stored and handled.
	<ul style="list-style-type: none"> • Electrodes that are dirty, corroded, or loose. • Insufficient or dried electrode gel. • Oily skin or body lotions. • Rising and falling of chest during rapid or apprehensive breathing. 	<ul style="list-style-type: none"> • Clean skin with alcohol or acetone. • Reposition or replace electrodes. • Help patient relax. • If wandering baseline persists, turn the baseline filter on.
<p>Wandering baseline (an upward and downward fluctuation of the waveforms):</p> 	<ul style="list-style-type: none"> • Patient is uncomfortable, tense, nervous. • Patient is cold and shivering. • Exam bed is too narrow or short to comfortably support arms and legs. • Arm or leg electrode straps are too tight. 	<ul style="list-style-type: none"> • Help patient get comfortable. • Check all electrode contacts. • If interference persists, turn the muscle-tremor filter on. If interference still persists, the problem is probably electrical in nature. See the following suggestions for reducing AC interference.
<p>Muscle tremor interference (random, irregular voltage superimposed on the waveforms). May resemble or coincide with AC interference:</p> 	<ul style="list-style-type: none"> • Electrodes that are dirty, corroded, or loose. • Insufficient or dried electrode gel. • Patient or technician touching an electrode during recording. • Patient touching any metal parts of an exam table or bed. • Broken lead wire, patient cable, or power cord. • Electrical devices in the immediate area, lighting, concealed wiring in walls or floors. • Improperly grounded electrical outlet. • Incorrect AC filter frequency setting or AC filter is turned off. 	<ul style="list-style-type: none"> • Verify that the patient is not touching any metal. • Verify that the AC power cable is not touching the patient lead cable. • Verify that the proper AC filter is selected. • If interference still persists, the noise may be caused by other equipment in the room or by poorly grounded power lines. Try moving to another room.
<p>AC interference (even-peaked, regular voltage superimposed on the waveforms). May resemble or coincide with muscle tremor interference:</p> 