VitalVision MS-2100

Professional

Hemodynamics Monitor

User Manual

Software

(Amendment 1)
Dec. 22, 2008

Table of Contents

1 Operating the VitalVision MS-2100 Specific Software

Note: Please read this instruction manual carefully and make sure all of the properties, cautions and warnings on the device are noted before measurements.

These instructions provide a brief overview of the tasks required to use the Vital Vision MS-200 software and measuring devices. Each step provides a link to more detailed information or instructions available in this User Manual.

1-01 Preparing for Measurements

1. Install the VitalVision MS-2100 software and the USB drivers. For instructions, see page 8.
2. Connect the VitalVision MS-2100 device to the computer using the USB cable provided. See COM Port page 121
3. Connect the device to the AC adaptor and turn on the power switch to check the power.
4. Start the VitalVision MS-2100 software. For instructions, see page 15.

   Warnings and cautions of the device are displayed on the opening screen
5. Establish the default settings for test and Facility information when the application is started the first time. This task is only required once when the software application is first used. See page 115 for details.
6. Open the Measuring Screen Display to start testing and data management.

   The measuring screen is displayed as soon as the software is activated. You can open the patient information screen, the measurement printing screen and use other functions from this screen. See page 16 for more information.

1-02 Measuring Instructions:

1. On the Patient Information and Measurement Data screen, click the New button.
2. On the Patient Profile page, enter the patient information. For instructions, see "Patient Information" on page 67.

   If you have previously digitized patient profiles, you can use the Import function to transfer the information into the Patient profile database from a CVS file. For details, see "Importing patient information" on page 131.
3. Select and open the Patient Profile. For instructions, see page 52.
4. To start the measuring process, press the [START/STOP] button on the equipment. Measuring begins immediately. For details on the measuring process, see "Running the measurement, display and analysis process" on page 27.

   Note: To stop the measurement immediately, press the [START/STOP] button at any time during the process.
5. Apply the Blood Pressure Cuffs to the patient as described on page 10.
6. Select the proper measurement site and set the Initial Cuff Pressure Value for the patient to be monitored. See page 8 for details.
7. After the measuring process ends, review the data displayed on the Measuring screen. "See Understanding the Measuring screen" on page 16.
8. The MS-2100 software automatically saves the measurement data in the patient profile. For more information, see Saving Measurements on page 30..
9. Measurement data can be printed automatically if desired. See page 73 for details..

   You can add additional health information to the system using the Other Tests screen. This function allows you to co-manage blood profile data with other health-related information collected by the system. For details, see the Other Tests Screen on page 33.

1-03 Applying the Blood Pressure Cuff

The VitalVision MS-2100 devices provides two types of blood pressure cuffs for testing: one for the brachia and the other for the ankles.

Types of blood pressure cuffs

Type of blood pressure cuff	**Description**
The right brachial cuffs	To be applied on the right brachium
The left brachial cuffs	To be applied on the left brachium
The right ankle cuffs	To be applied on the right ankle.
The left ankle cuffs	To be applied on the left ankle

Warning: When applying the blood pressure cuffs, please avoid any wounded or infected area.

Notes: During the blood pressure measuring process, enormous pressure will be applied to either the brachium or the ankle. Therefore, depending on the status of the patient, huge pain or temporary spots caused by subcutaneous hemorrhaging may occur. These spots will fade and eventually disappear over time. However, be sure to notify patients about these possible side effects beforehand and adjust the cuff pressure value according to different situations.

If a patient experiences an overwhelming amount of pain, stop the measuring process immediately.

Do not start the measuring process until the blood pressure cuffs are properly applied. If any air leakage occurs, the resulting measurements are not accurate.

Applying the blood pressure cuff to the brachium

Note: The blood pressure cuffs for the brachia come in two types, one for right brachia and the other for the left brachia. Make sure that the cuffs are applied to the correct side of the body.

1. Ask the patient to lay down with the brachium exposed or covered with thin clothing.

   Do not roll up the sleeves of shirts or jackets. If the blood pressure cuff is placed on top clothing, make sure that clothing does not overlap on the arterial side...

   Do not exert excess pressure on the brachium because it can cause inaccurate measurements.

Figure 1.

2. Place the brachial cuff on the right brachium.

   Face the Shoulder mark in the direction of the shoulder.

   Figure 2

3. Place the ARTERY mark of the brachial cuff directly on top of the artery.

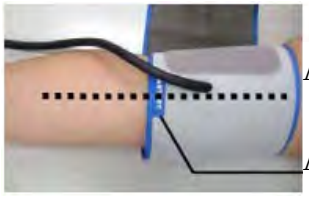


   Figure 3

4. Wrap the cuff around the patient's brachium

   Figure 4

5. Follow the same procedure when applying the brachial cuff on the left brachium.

Applying the Blood Pressure Cuff on Ankles

Note: The blood pressure cuffs for the ankle come in two types, one for right ankle and the other for the left ankle. Make sure that the cuffs are applied to the correct side of the body.

1. Place the ankle cuff on the right ankle.

   Blood pressure cuffs for the ankle are specially designed, taking into account the fact that the circumference of the leg gets slimmer as one move closer to the ankle.

   The position where the ankle cuff is wrapped around the ankle is very important.

   Use the Knee mark to confirm the direction of the cuff, and use the "ARTERY" mark to verify the position of the cuff.

Face the “Knee” mark towards the knee.

Figure 5

2. Align the “ARTERY” mark to the posterior tibial artery.

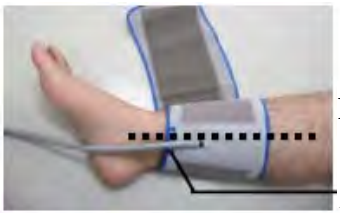


Figure 6

If the position of the “ARTERY” mark shifts, it can result in inaccurate measurements.

Position the bottom edge of the cuff approximately 1cm above the edge of the bulge which is located on the inner side of the ankle.

3. Wrap the cuff around the patient’s ankle

Figure 7

Make sure that the cuff is properly wrapped around the ankle. Any added space between the ankle and the cuff can cause measurement inaccuracies.

Check that the blood pressure cuff is not shifted downwards and avoid overlapping the cuff at the ankle position.

4. Follow the same procedures when applying the ankle cuff on the left ankle.

1-04 Selecting the Measurement site and the Initial Cuff Pressuring Value

Before measuring, convert the measurement site and the initial cuff pressure value using the rotary knob located on the main unit.

Warning: When applying the blood pressure cuffs, avoid any wounded or infected areas.
The initial cuff pressure value control knob can be used to test and select a proper site for cuff application.

The rotary switch that controls the cuff pressure values for each corresponding measurement site is located on the main unit.
During the measuring process, pressure is continually exerted by the cuff until the pressure value reaches the limit set by the initial cuff pressure value control knob.
There are a total of 4 initial cuff pressure control knobs, each targets one specific measurement site: the right brachium, the left brachium, the right ankle and the left ankle.
Select a cuff pressure value from the four options of 140mmHg, 180mmHg, 230mmHg, and AUTO.
When the AUTO option is selected, the pressure exerted by the cuff is adjusted automatically according to the patient's blood pressure value.
Select the OFF option for other sites that are not being measured.

Rotary Knob Message descriptions

Name of Display	Description
OFF	No measurement performed
AUTO	The cuff pressure is adjusted accordingly to the patient's systolic pressure
140	Pressurizes until the value of 140mmHg is reached
180	Pressurizes until the value of 180mmHg is reached
230	Pressurizes until the value of 230mmHg is reached

Warning: About the AUTO mode
On patients with cardiac arrhythmia or a weak pulse, the Auto mode pressure might not work properly. When you are working with such a patient, do not use Auto mode.
Select the most appropriate pressure value from the 140, 180, and the 230 options.

Note: Set the proper pressure maximum using the standard value of *systolic pressure + 40~60mmHg*.

Applying too much pressure can cause the patient pain and insecurity. Therefore, set the proper initial cuff pressure value according to each patient's status. An improper initial cuff pressure value can lead to a lower measured blood pressure value. Refer to the pulse wave envelope display (Figure 8) to set the initial cuff pressuring value

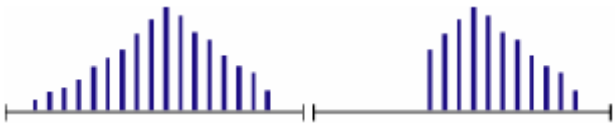


Figure 8

The following example illustrates how to set up and measure the right brachium and the right ankle

1. Select "AUTO" as the initial cuff pressure value for the right brachium and the right ankle. Select "OFF" as the initial cuff pressure value for the left brachium and the left ankle.

Right Brachium (Select AUTO) Left Brachium (Select OFF)

Right Ankle (Select AUTO) Left Ankle (Select OFF)

Figure 9 Measuring the right brachium and right ankle

1-05 Starting the VitalVision MS-2100 Software

1. Start the VitalVision MS-2100 software from the Windows system.
   - On the Windows task bar, click the Start menu.
   - Select All Programs. Then, click the VitalVision MS-2100 option on the All Programs menu.

     The labeling information, software version and device label information is displayed on the Startup screen.
2. Click OK to open the Measuring screen.

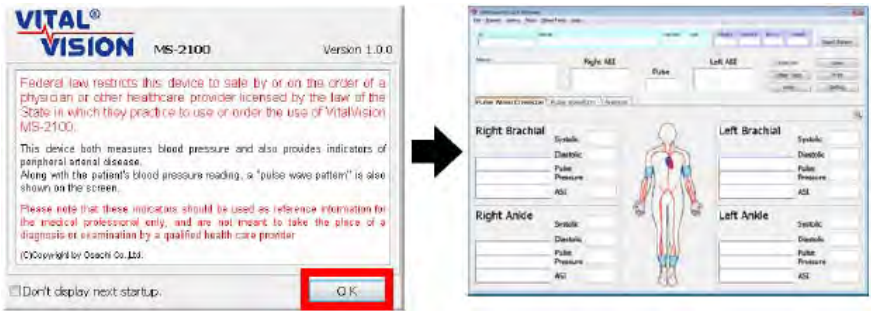


Figure 10

Warning: If the option 〔Don't display next startup〕 is selected on the Startup screen. The Startup screen does not show up when the VitalVision MS-2100 software application starts. To restore the display on startup, click 〔 Help About〕 on the menu bar of the Measuring screen. On the Startup screen, click Display next startup in the menu bar of the measuring screen and uncheck the Don't display next startup option. The startup screen (Figure 10) will appear thereafter.

Important: When the VitalVision MS-2100 software opens the first time, the Initial Setting screen is displayed so you can specify the default settings for some of the tests along with information about the facility where the tests are run. For details on setting these values, see "Initial Setting" on page 115.

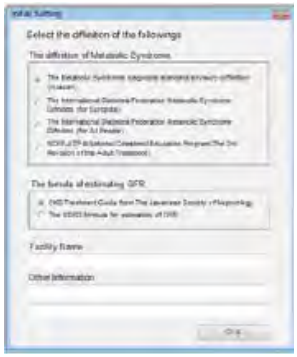


Figure 11

2 Understanding the Measuring screen

The Measuring screen has two parts: 1) A header bar that you can use to open, manage, and save measurement information, and 2) the display screen which shows all the measurements such as the measured pulse wave and all other measurements (Figure12).

The header bar on the measuring screen is used to operate and display the patient's profile and ABI (Ankle Brachial Index) measurements. It is also used to access all kinds of displays.

The information display at the bottom of the measuring screen provides three measuring display options: the Pulse Wave Envelope Panel (Figure 17), the Pulse Wave Panel (Figure 21), and the Data Analyzing Panel (Figure 24).

Use the panel tabs to select the panel you want to view.

The Pulse Wave Envelope Panel and the Pulse Wave Panel display a visual representation of the measurement process as it runs. After the process completes, the measurement data is also displayed on these panels.

The Data Analyzing Panel displays the results of the measurement analysis.

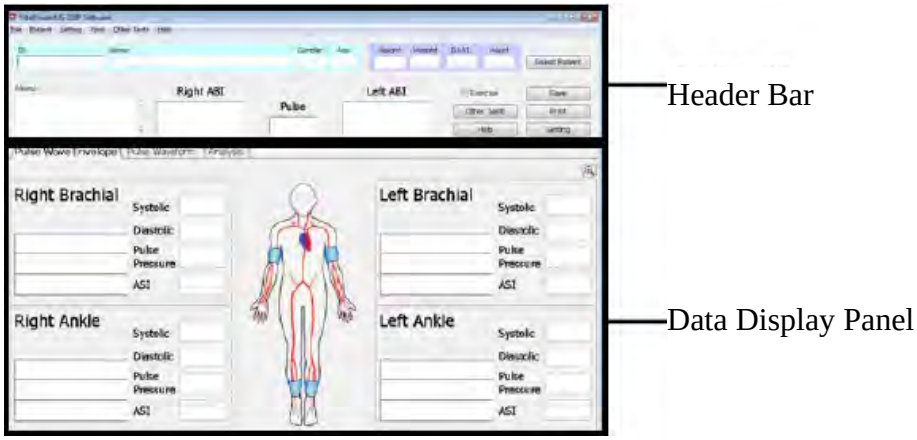


Figure 12 Data Analyzing Panel

Notes: The display and print settings of the measuring screen (Figure 12) can be modified.Please refer to the "Option Setting" section on page 116 of this manual for details. When a measurement is taken under a screen that is not the measuring screen, the system switches immediately to the measuring screen (the pulse wave envelope page). The data from the current job might be lost, or you might not be able to save it.

2-01 Header Bar

The header bar of the measuring screen (Figure 13) is used to manage operations such as the savings and the openings of measuring profiles. It is also used to display patient profiles and the ABI results, etc.

Figure13 Header Bar

2-02 Menu Button, the Exercise Flag and the Memo Box

Used to operate the measuring screen, open other screen displays, making memo during the measuring process, and selecting the exercise status.

Figure 14 Menu Button

The Menu Button

Opening Different Screens from the Menu Button

Name of Button	Description
Select patients	Open the patient profile managing screen and the measuring information screen
Save	Save the entered information.
Other tests	Open other test screens.
Print	Open the printing screen.
Setting	Open the option setting screen.
Help	Activate the help feature.

The Memo Box

Supplemental information can be entered along with the measuring information as text. Please click on the “Save” button after input.

The Exercising Flag

If the patient is measured under the exercising mode, an exercise flag will be attached to the data when saved. Click Save after making your selection.

> **Note:** The saved measurement and the existence of the exercise status can be verified as measurement supplemental information. Export the measurement results when printing printouts for facility use and when printing the measurement data.

2-03 Displaying the Patient Profile･ABI Results

Use the Patient Profile display to review patient information and measured values such as the ABI values.

Patient Information Display

Measurements Display

Figure 15 Patient's Profile Display

Patient's Profile Display

Patient's Profile Display - field descriptions

Name of Display	Description
ID	Display the ID.
Name	Display the name.
Sex	Display the sex.
Age	Display the age.
Height	Display the height.
Weight	Display the weight.
BMI	Display the BMI (Body Mass Index)
Waist	Display the waist.

Searching by Patient ID

1. On the ID display bar, type the patient's ID in the ID display bar located in front of the patient's profile, then click on the Enter.

   The profile of that patient is displayed on the measuring screen.

   If the profile is not found, the patient profile screen is displayed so you can search for another using an ID and other information.

2. Click OK to return to the measuring screen.

   The status on the measuring screen shows that the patient information has been input. The barcode device used in Windows as the keyboard device can be used with the ID search function.

Note: The “Reading Value + Enter” setting needs to be performed when using the barcode.

-(Hyphens) and _ (underscores) cannot be used when typing in ID’s.

Reviewing measurement data

After the measuring process completes, the ABI and the pulse rate values calculated from the measure blood pressure value are displayed on the screen. See the following table for information on the fields displayed.

ABI measurement data output field descriptions

Name of Display	Description
Right ABI	Display the ABI of the right side.
Left ABI	Display the ABI of the left side.
Pulse	Display the pulse rate.
	Displayed when shaking or irregular pulse intervals occur during the measuring process.

Menu Bar

You can change the settings for the Menu bar from the Unit Options Screen Window.

Menu Bar option description

Menu		Description
File	Save	Saves the information displayed on the measuring screen.
	Close	Closes the software.
Patient	Add Patient	Opens the patient’s profile screen.
	Select Patients	Opens the “Manage Patient Information” screen.
Settings	Options Settings	Opens the options setting screen.
Print	Printer Settings	Opens the printer setting screen.
	Print	Opens the printing screen.
Other tests	Other Tests	Opens other test screens.
Help	Help	Opens the help feature.
	About	Opens the startup screen.

Information Display Screen

Use the Information Display screen to view data and reports for three types of data: Pulse Wave Envelope, Pulse Waveform, and the results of the measurement analysis.

You can view the data by selecting one of the tabs on the Select a panel tab.

Figure 16

Information Display screen panel descriptions

Name of display	Description
Pulse wave envelope	Displays the pulse wave envelope for each measurement site.
Pulse waveform	Displays the pulse waveform for each measurement site.
Analysis	Displays the analyzing results of measurements.

Note: You cannot switch the panel view during the measurement process. If you do switch views, the data might be lost or you might not be able to save it.

Pulse Wave Envelope Panel

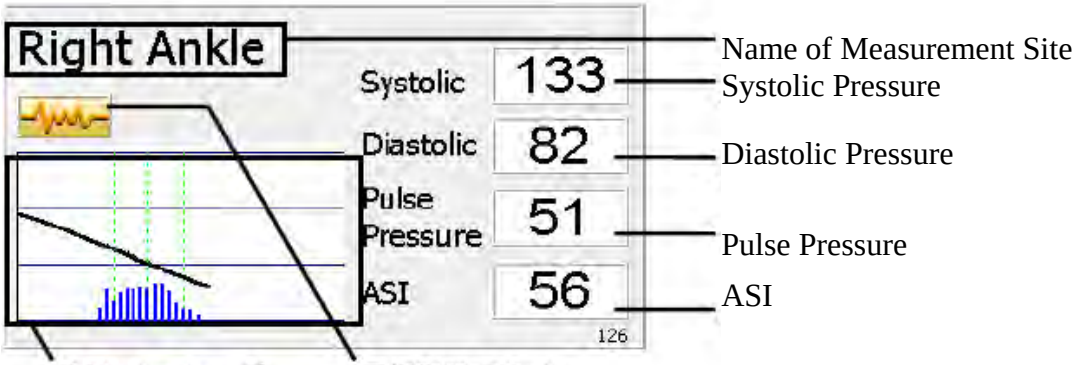
This panel displays the pulse wave envelope for each measurement site. During the measurement process, the panel automatically switches into the magnified display (Figure 19)..When this occurs the MS-2100 software displays the mercury column image, the current pressure value, the pulse amplitude and the air-release rate.

After the measuring process is completed, the system switches into the Standby mode (Figure 17) and displays the pulse wave envelope, diastolic pressure, systolic pressure, pulse pressure value and ASI in each part of the screen.

During Standby mode, the size at termination is measured.

After the measuring run, the pulse wave envelope and the measurements are displayed.

Figure17



Pulse Wave Envelope Irregular Pulse Icon

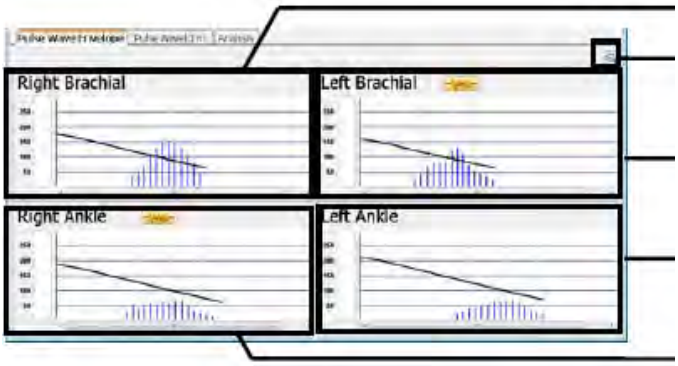
Pulse Wave Envelope Panel - display and button descriptions

Name of Displays	Description
Name of measurement site	Display the name of the measure site.
Pulse wave envelope	Display the pulse wave envelope recorded during the measuring process. (Displays the wave lines representing the air-release rate)
Systolic pressure	Display the measured systolic pressure.
Diastolic pressure	Display the measured diastolic pressure.
Pulse pressure	Display the value derived from subtracting the measured systolic pressure value from the measured diastolic pressure value.
ASI	Display the Arterial Sclerosis Index.
Irregular pulse icon	Displayed when shaking or irregular pulse wave intervals occur during the measuring process.
The magnifying button	Switch to the magnified pulse wave envelope display screen.

Note:ASI can be switched between ASI and ASI bp. For details, see page 117.

During the measuring process and the time when the pulse wave envelope the display is magnified.

The lines representing the mercury column image, the current pressure value, the pulse amplitude, and the air-release rate are displayed along with the pulse waveform during the measuring process.



Right Brachium Measurement Result

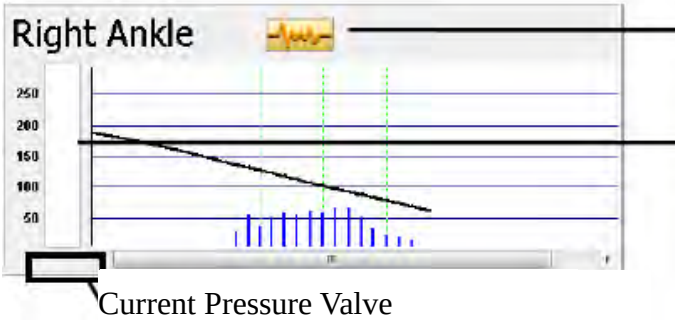
Zoom-Out Button

Left Brachium Measurement Result

Left Ankle Measurement Result

Right Ankle Measurement Result

Figure19



Irregular Pulse Icon

Mercury Column Image

Current Pressure Valve

Figure 20

Pulse Wave Envelope Panel -buttons and image descriptions

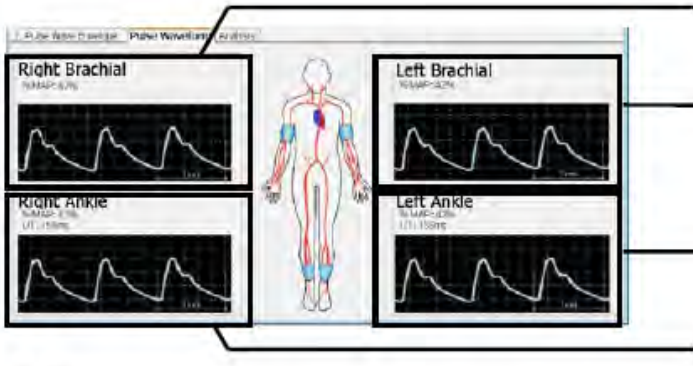
Name of the Display	Description
The magnifying button	Switch to the measurement end screen during the standby mode.
The mercury column image	Changes according to the cuff pressure value during measurements.
The current pressure value	The displayed value represents the current cuff pressure value.
Irregular pulse icon	Displayed when shaking or irregular pulse wave intervals occur during the measuring process.

Pulse Waveform Panel

This panel displays the pulse waveform of each measurement site individually. During the measuring process, the screen switches to the *during-measurements* display (Figure 23) to immediately display the current pressure value and the pulse waveform shape. After the measuring has completed, the system switches into the *Standby display* mode (Figure 21) and individually displays the UT pulse waveform (ankle only) and the %MAP of each measurement site at the Mean±1 beat.

The following figures show examples of displays during standby and at the end of measurements.

After the measuring process completes, the pulse waveform shape is displayed.



Right Brachium Measurement Result

Left Brachium Measurement Result

Left Ankle Measurement Result

Right Ankle Measurement Result

Figure 21

Name of Measurement Site

%MAP・UT

PVR

Figure 22

Pulse Waveform Panel - Standby display and field descriptions

Name of the Display	Description
Name of measurement site	Display the name of the measurement site
%MAP・UT	Display the %MAP and UT from the pulse waveform Only %MAP is displayed for the brachia
PVR	Display the PVR of each measurement site.

The following figure shows the Pulse Waveform Panel display during the measurement process.

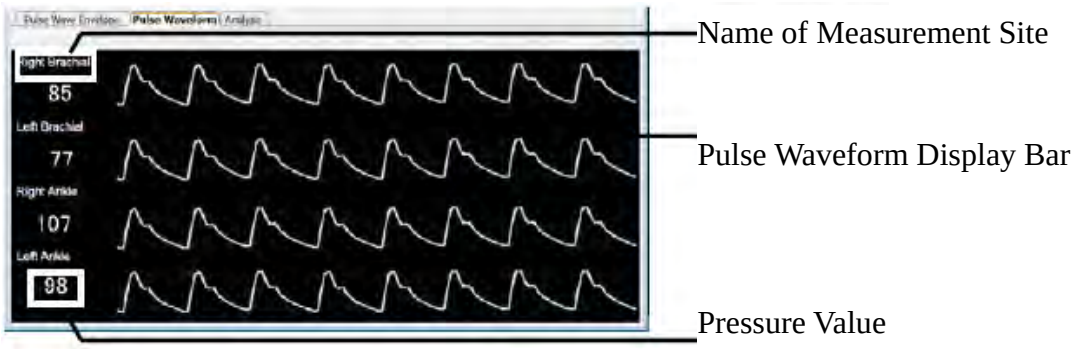


Figure 23 Pulse waveform shape during measurement

Pulse Waveform Panel - real-time measurement display and field descriptions

Name of the Display	Description
Name of measurement site	Displays the name of the measurement site
Pressure Value	Displays the current cuff pressure value
The pulse waveform display bar	Displays the pulse waveform shape of each measurement site.

Note: The unit of pressure values can be selected from the option settings.

Analyses Panel

Use the Analysis panel to review the measurement analysis results after the measuring process has finished.

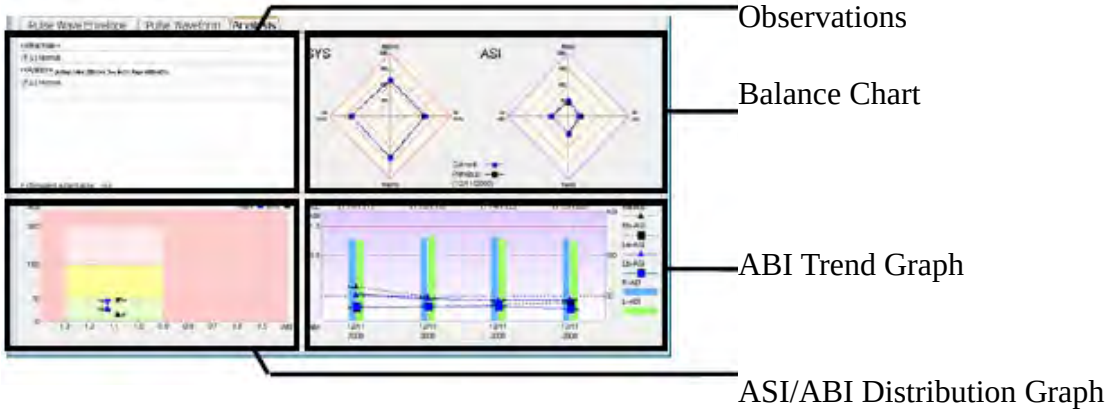


Figure 24

Analyses Panel - field and display descriptions

Name of the Display	Description
Observations	Displays reference commentaries/memo for diagnosis. Estimated Arterial Age.
BP Balance Chart	Displays the systolic pressure chart of the 4 limbs. Solid line = normal value Blue solid line = the current measured value Black solid line = the last measured value
ASI Balance Chart	Displays the ASI chart of the four limbs Blue solid line = the current measured value Black solid line = the last measured value
ASI/ABI Distribution Graph	Displays the ASI and the ABI distribution graphs of the 4 limbs. The X-axis: ABI (Blue＝the right ABI, Black＝the left ABI) The Y-axis: ASI (▼＝Legs、▲＝Brachium)
ABI Trend Graph	Displays the graph representing the ABI and ASI trend changes. X-axis: ABI (left), ASI (right) Y-axis: Time

3 Running the measurement, display and analysis process

You begin the measurement process by selecting the measurement type. The type of measurement determines how information displays during the measurement process. MS-2100 software provides two types of measurement display:

- Pulse Wave Envelope measurements display the pulse wave envelope of each measurement site.
- Pulse Waveform measurement displays the pulse waveform of each measurement site.

Measurement display types

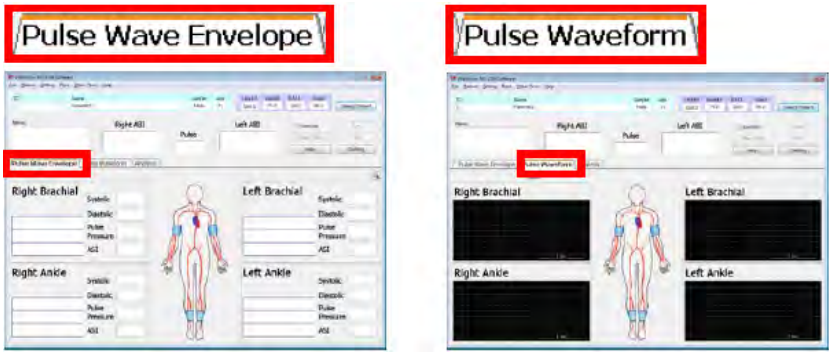


Figure25

Take measurements

1. On the Measuring screen, select either the Pulse Wave Envelope tab or the Pulse Waveform measurement tab to switch to the Measurement screen. Select the measurement display type
2. Press the [START/STOP] button to begin the measuring process.
   The LCD display of the device lights up.

Figure26 LCD display for measuring device

After the measuring starts, the system displays a measuring screen like the ones shown below in Figures 27 and 28.

The Pulse Wave Envelope panel displays the mercury column image, the current pressure value, the pulse wave amplitude and the wave line represent the air-release rate. For more information on these screens, see Reviewing measurement data on page 20.

Figure 27 Pulse Wave Envelope Panel

The Pulse Waveform Panel displays the pulse waveform during measurements.

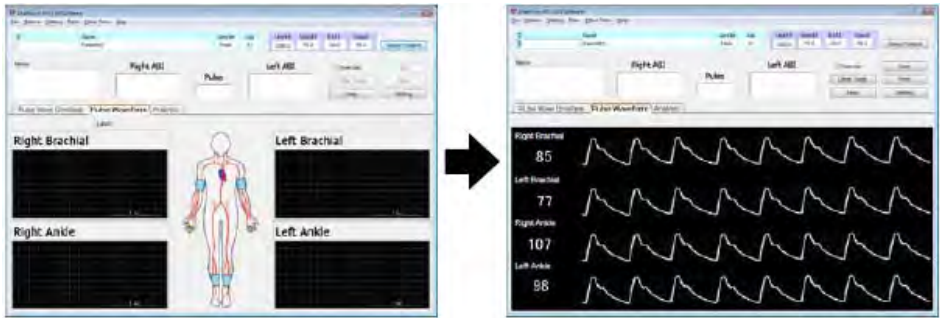


Figure28 The Pulse Waveform Panel

This panel also displays the %MAP, UT (ankle only) and PVR of each measurement site and calculates ABI according to the measurements as shown in Figure 29.

Figure 29

Display measurements

After the measurements are displayed, the measuring process stops immediately.

The Pulse Wave Envelope Pane

Individually displays the pulse wave envelope, diastolic pressure, systolic pressure, pulse pressure, ASI and ABI of each measurement site.

Click on the zoom in button to display the magnified pulse wave envelope immediately.

Figure 30

The arrhythmia icon is displayed when shaking or irregular pulse wave intervals occur during the measuring process. If this happens, measure the patient again.

If an error occurs during the measurement process, the measurements are not accurate. See the "01 Error Messages" on page 148 to troubleshoot the problem. Resume the tests after the problem is resolved.

Saving Measurements

The MS-2100 software automatically saves the measurement information for each patient. If a patient performed exercise during the test and has an exercise flag, you can enter a memo into the system to keep track of the patients exercise status. (For more information, see "The Exercising Flag" on page 18.

The measurement data is automatically saved after the measuring process ends. However, if you enter or edit additional information after the measurement session, make sure to click Save to store your work.

If no measurement data exist, the measurement memo and the existence of the exercise status cannot be saved.

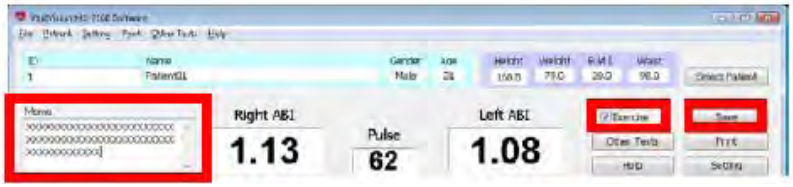


Figure31

Note: To update previous data such as the measurement memo and the existence of the exercise status, open the data from the measuring screen. The data can then be edited and saved on the measuring screen.

Print measurements

To print the measurement data from the Patient Information and Measurement screen, click Print. Then, set up the printer options to print the job. For more detailed instructions, see on page 75.

To print manually, please click on the “Print” button and perform the print job from the Print screen (Figure 32)

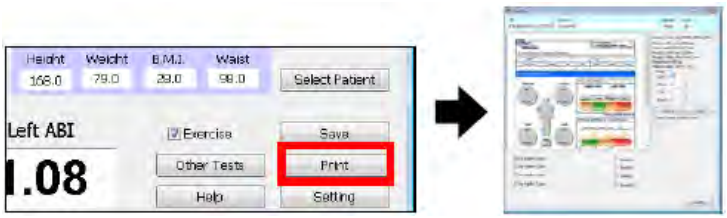


Figure32

Display Analysis Results

After completing the measurements, the Analysis panel displays the analyzed results.

(Display Content)

Diagnostic Comment

Estimated Arterial Age

Balance Chart

Figure33

3. The ending of measurements

Click on the “Close” button to close the program (Figure 34)

Figure34

4 Other Tests Screen

The blood profile can be co-managed with the measurements. After the blood profile data is entered, it can be used in the Framingham risk evaluation, the metabolic syndrome and the e-GFR diagnostic programs.

The diagnosis standards for the Framingham risk evaluation and the metabolic syndrome analysis are displayed on this screen and in printed reports. These standards are determined by the default settings specified using the Initial Settings screen. For more information on these options, see Initial Setting on page 115.

Figure35 Other Tests Screen

The following sections provide more information about each section of the Other Tests screen.

Note: You can change the display and print setting for the Other Tests screen. For details, see "Option Setting" on page 117.

4-01 Patient Information Display Bar

Displays the registered patient information

Descriptions on the displays

Name of Display	Description
ID	Displays the ID.
Name	Displays the name
Gender	Displays the gender

Age	Displays the age
Height	Displays the height
Weight	Displays the weight
BMI	Displays the Body Mass Index
Waist	Displays the waist

4-02 Other Test Information Display Bar

Use the Other Test Information display bar to review existing and imported test data (Figure 36).

These results are required to run the additional diagnostic tests for Framingham risk, Metabolic Syndrome, and e-GFR programs. After the test data is entered, the diagnostics tests can run and display the result immediately.

See the tables below for information on the fields and buttons provided in each section of this display.

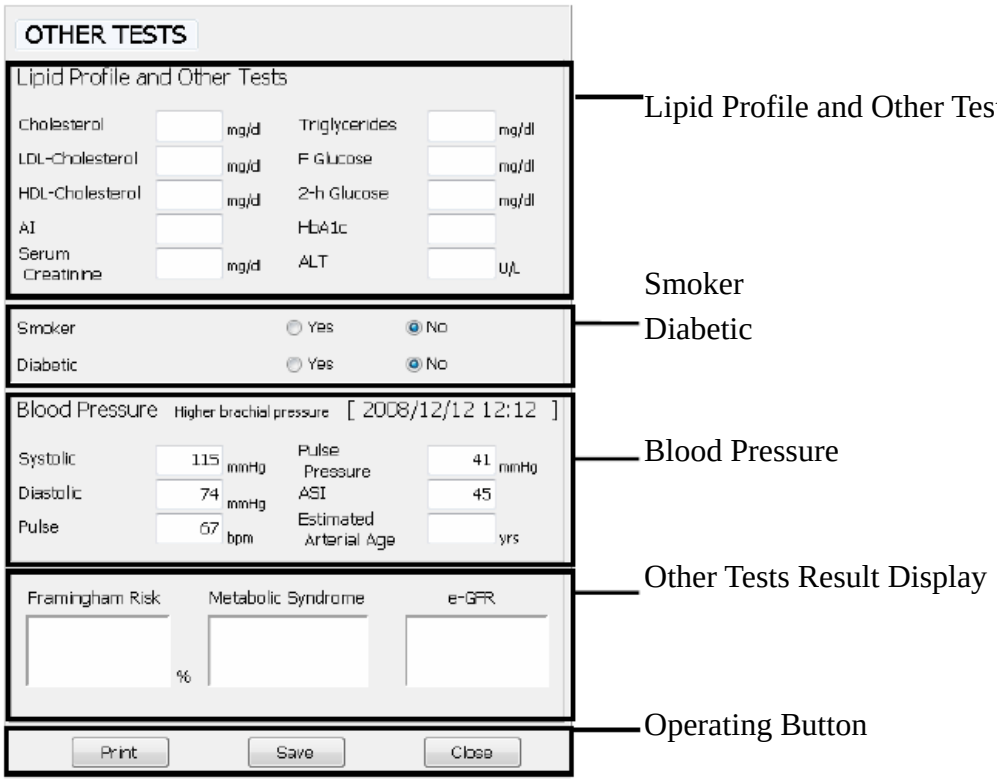


Figure36 Other Test data screens

Lipid Profile and Other Tests

Use this section to enter blood test results.

Field descriptions

Field Names	Description
Cholesterol	The total cholesterol level
LDL- Cholesterol	The low density lipoprotein cholesterol level
HDL- Cholesterol	The high density lipoprotein cholesterol level
AI	Atherogenic Index = (T-Cho. – HDL)/HDL
Serum Creatinine	Serum creatinine；Scr
Triglycerides	Triglyceride level value
F. Glucose	The Fasting blood glucose level
2 h Glucose	The 2 hour blood glucose level
HbA1c	Hemoglobin A1C (glycated hemoglobin)
ALT	Alanine Aminotransferase ;ALT

Smoker/Diabetic

You can enter the risk factor data required to run the Framingham Risk Evaluation Analysis.

Risk factor field descriptions

Field Name	Description
Smoker	Smoker or not (Yes/No)
Diabetic	Diabetic or not (Yes/No)

Blood Pressure

In this section, you can enter the blood pressure data required for the ASI (Arterial Stiffness Index) and estimated arterial age test. The results of the test are also displayed in this section. This section also provides information on the higher brachial pressure (left and right).

Blood pressure field descriptions for a ASI analysis

Field Name	Description
Systolic Pressure	The systolic pressure level
Diastolic Pressure	The diastolic pressure level
Pulse	The pulse
Pulse Pressure	The value derived from subtracting the diastolic pressure from the systolic pressure.
ASI	The Arterial Sclerosis Index
Estimated Arterial Age	The estimated arterial age (interpreted according to ASI)

Other test displays

This section displays the results of the Framingham risk evaluation, metabolic syndrome, and e-GFR diagnosis programs using the information entered.

Results for diagnostics tests - field descriptions

Field Name	Description
Framingham Risk	Displays the Framingham risk evaluation (%)
Metabolic Syndrome	Displays the metabolic syndrome diagnosis (Metabolic syndrome/non-metabolic syndrome)
e-GFR	Displays the estimated Glomerular Filtration Rate (e-GFR value)

Note: The diagnosis standard can be selected from Option Setting”

Other Test screen - Operating button descriptions

Name of Display	Description
Print	Opens the print screen
Save	Saves the entered information
Close	Closes the screen

4-03 Other Tests Display Panel

Use the Other Tests display panel to view the details about results of the Framingham risk, metabolic syndrome, and e-GFR diagnoses. To view information, select the panel tab for the test that you are interested in. (Figure 37)

Figure 37 Diagnostic test display panels

Test Display panel descriptions

Name of Panel	Description
Framingham Risk	Displays the Framingham Risk Estimation Panel (Figure 38).
Metabolic Syndrome/ e-GFR	Displays the Metabolic Syndrome/e-GFR Panel (Figure 41).

Framingham Risk Panel

Use this panel to review and confirm the scores on the Framingham risk. The panel also lists all other risks factors discovered by analysis (Figure 38).

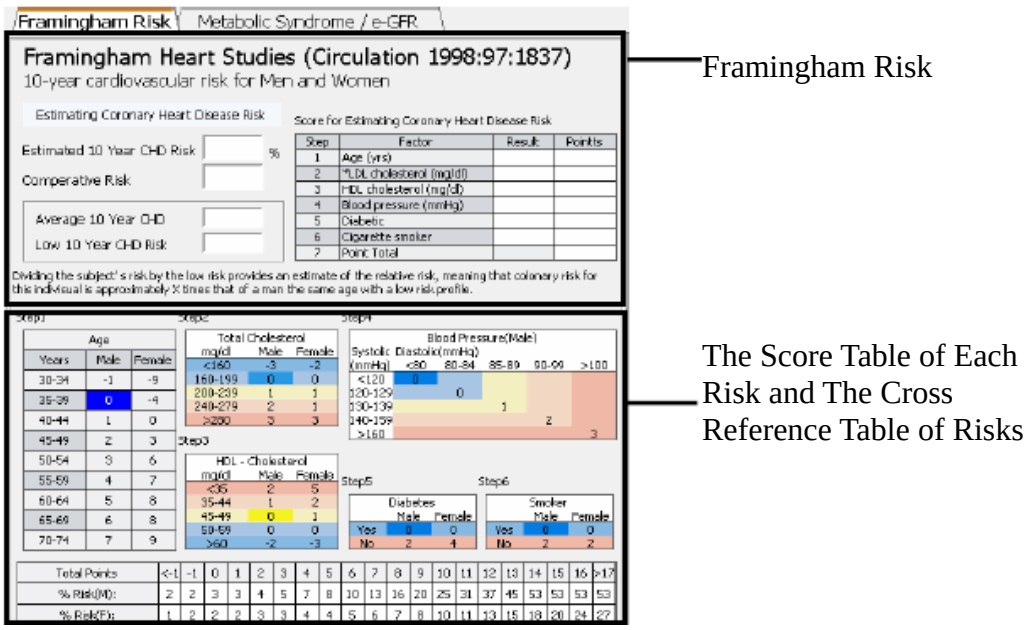


Figure 38 Framingham Risk Panel

Estimating the Framingham Risk analysis

On the Framingham Risk panel, type the values for the elements required for the estimation of Framingham Risk. Then, the risk value is calculated.

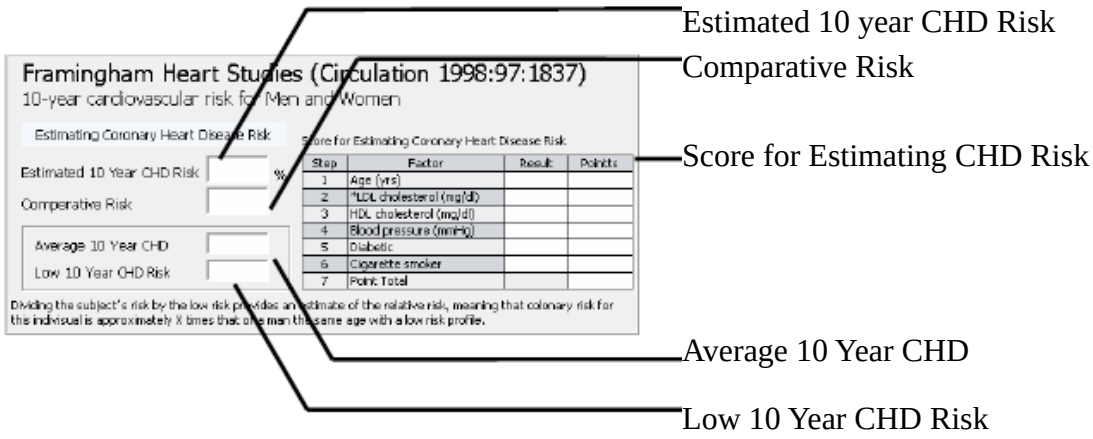


Figure 39 Framingham Risk Analysis

Risk analysis results - field descriptions

Name of Display	Description
Estimated 10 Year CHD Risk	Displays the Framingham Risk estimation.
Comparative Risk	Displays the comparative value against the low 10 year CHD
Average 10 Year CHD	Displays the average risk value within the 10 year range
Low 10 Year CHD Risk	Displays the average risk of the low risk group within the 10 year range.
Score for Estimating Coronary Heart Disease Risk	Displays the record and sum of Step 1～6

The Score Table of Each Risk and the Corresponding Table of Risk (Figure 40)

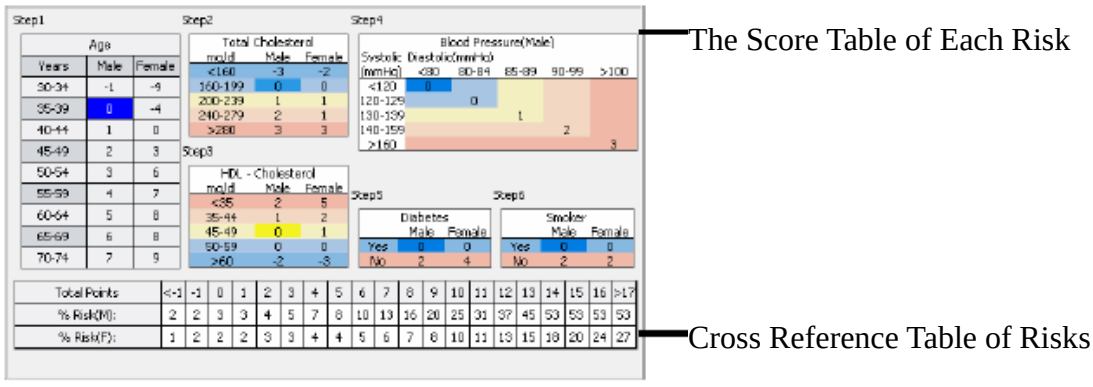


Figure 40 Score Table of Each Risk and the Corresponding Table of Risk

Table of risk field descriptions

Name of Display	Description
The Score Table of each Risk	Displays the risk analysis table of Step1~6 In principle, the LDL-Chol. is prioritized for the Step2 cholesterol test. In situations when the LDL-Chol. is not entered, but the T-Chol. is, the focus and the risk % table item is displayed and estimated using the T-Chol. value.
The Corresponding Table of Risk	Displays the corresponding table of risk

The Metabolic Syndrome/e-GFR Panel

The details of the Metabolic Syndrome Diagnosis and all e-GFR Risks can be confirmed here.

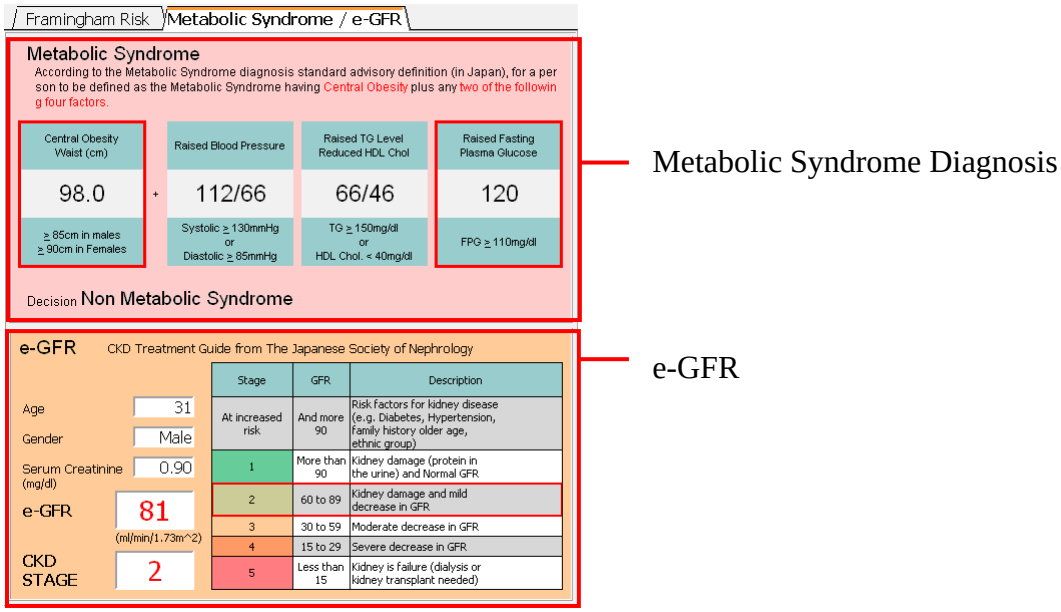


Figure 41 Metabolic Syndrome/e-GFR Panel

Name of Display	Description
Metabolic Syndrome	Displays details on the Metabolic Syndrome Diagnosis (Figure 42)
e-GFR	Displays details on e-GFR (Figure 47)

Metabolic Syndrome

This panel displays details on the Metabolic Syndrome Diagnosis (Figure 42).

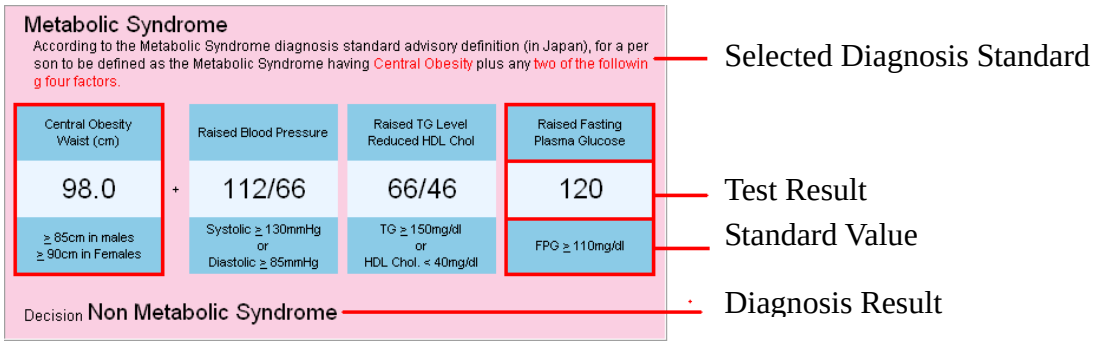


Figure 42 Metabolic Syndrome panel

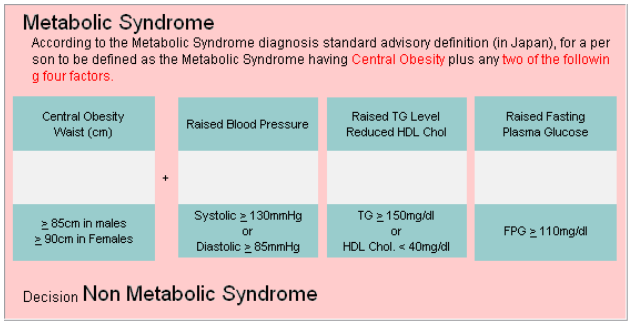
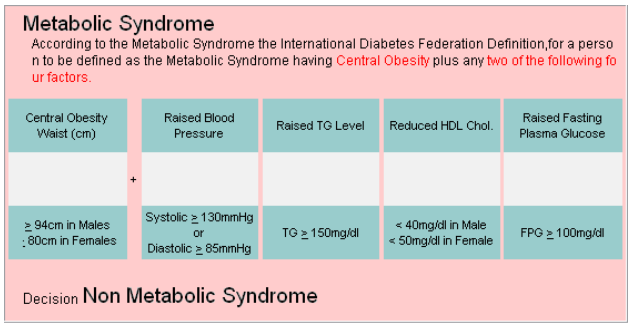
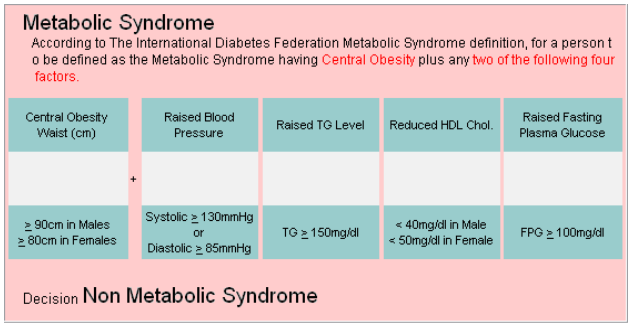
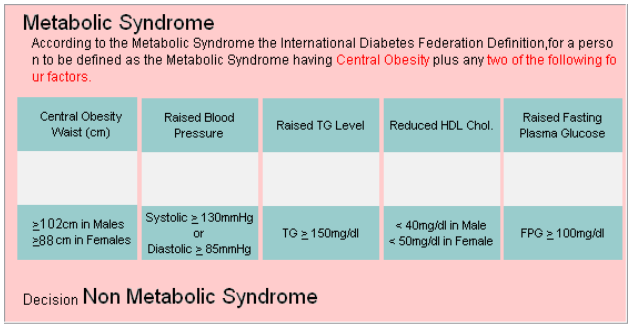
The following information can help evaluate these test results.

- The items included in the display change based on the diagnostic standard selected on the Option Settings screen, thus the test items 4~5: Waist, blood pressure, total cholesterol, HDL-cholesterol, and fasting plasma glucose.
- Compare the test results with the standard values.
- All information entered into the patient profile and the Other Tests display (Figure 36) is displays on the screen.
- If a value exceeds the standard, the frame for the value is marked in red.
- If the standard of Metabolic Syndrome is being met, the *Defined as Metabolic Syndrome* signal is included in the display.
- If the standard of Metabolic Syndrome is not being met, the display indicates *Defined as not Metabolic Syndrome* signal.

Summary of Metabolic Syndrome diagnosis standard and display panel

The Metabolic Syndrome diagnosis standard has four categories. Any of these can be selected as the basis for the Metabolic Syndrome diagnosis. The following summary provides a list of each category and shows the product display panel associated with the standard.

Metabolic Syndrome diagnosis standards - panel descriptions

Diagnosis Standard	Display Panel
The corporate Metabolic Syndrome standard advise defined by 8 academic associations in Japan (Japan)	 Figure 43
IDF Standard (For Europids) Metabolic Syndrome defined by the International Diabetic Federation (Europe)	 Figure 44
IDF Standard (For non-Euro-Americans) Metabolic Syndrome defined by the International Diabetic Federation (For All People)	 Figure 45
NCEP-ATP III Standard NCEP-ATP III(National Cholesterol Education Program - The 3rd Revision of the Adult Treatment.)	 Figure 46

e-GFR

Displays details on the estimation of Glomerular Filtration Rate (e-GFR)(Figure47).

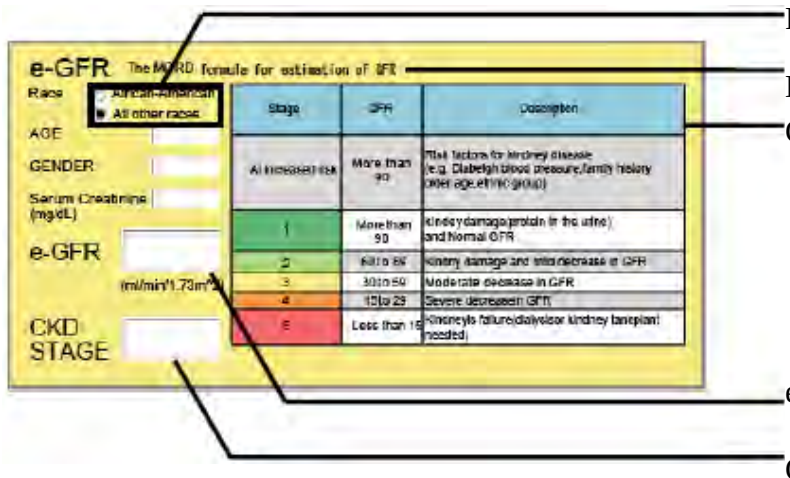


Figure 47

The e-GFR is calculated once the required items are typed in.

The displayed stage (1~5) of Chronic Kidney Disease (CKD Stage) is derived from the calculated e-GFR value.

The 2 categories of e-GFR calculating formulae are: the Japanese Society of Nephrology Standard formula and the Modification of Diet in Renal Disease standard formula.

The e-GFR panel displayed will vary depending on different e-GFR formulae and serum creatinine (Scr) units being used.

The formula and the unit can be selected from the unit options

Diagnosis Standard

Calculate e-GFR by the selected diagnosis standard.

The CKD (Chronic Kidney Disease) Treatment Guide from the Japanese Society of Nephrology.

Sex	**Formula**
Male	$GFR=194*(Scr)^{-1.094}*(age)^{-0.287}$
Female	GFR= (Male)GFR*0.739

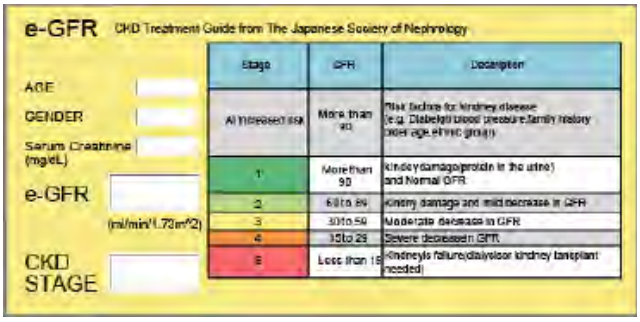
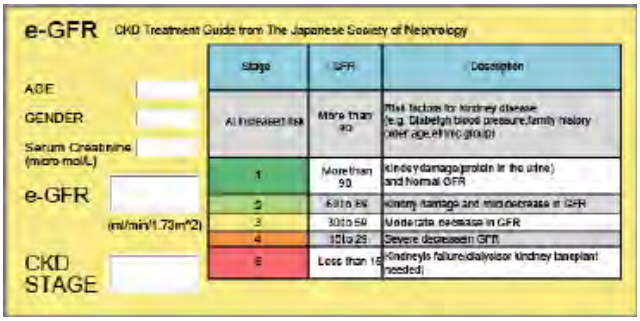
The MDRD (Modification of Diet in Renal Disease) formula:

```
Standard unit (mg/dL)
GFR (mL/min/1.73 m2) = 186 x (Scr)-1.154 x (Age)-0.203 x (0.742 for female)
x (1.210 for African-Americans) (Standard unit)
```

Race

If you are using the MDRD formula, select a race on the panel.

Summary of the e-GFR formulae and panels

Formula	Panel Displayed According to the Unit Selected
The CKD Treatment Guide from the Japanese Society of Nephrology	Unit: Standard unit (Scr unit = mg/dL)  Figure 48
	Unit: International unit (Scr unit = micro mol/L)  Figure 49
The MDRD formula for the estimation of GFR	Unit: Standard unit (Scr unit = mg/dL)  Figure 50
	Unit: International unit (Scr unit = micro mol/L)

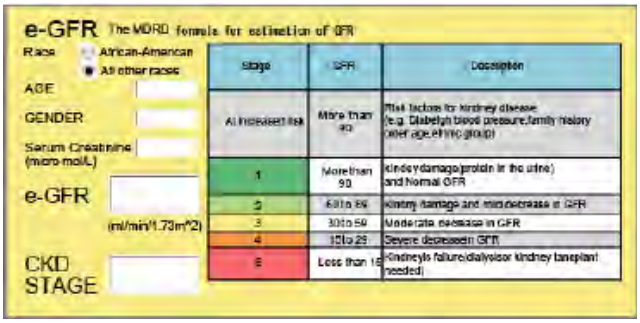


Figure 51

4-04 Entering information from other tests

Use the Other Test functions to enter additional patient information and measurement data. This information can be used to run additional tests such as the for Framingham Risk, Metabolic Syndrome, and e-GFR diagnosis tests. For information about these tests and others related tests, see "05 Other Derivatives" on page 158.

You can only enter data on the Other Tests screen if measurement data exists.

1. On the Measuring screen, click Other Tests.

Figure 52

2. On the Other Tests screen, review the patient information and measurement data.

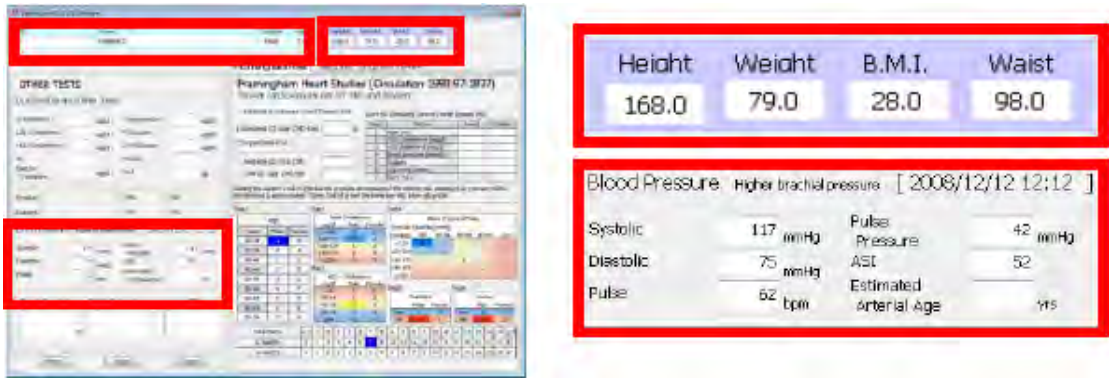


Figure 53

The waist information shown on the right is located on the Patient Information screen. If this information is not available on the Other Tests screen, enter the data provided on the Patient Information screen. Enter as much information from the Patient Information and Measurement Data screen as you need to.

3. After entering all the updates, review the relevant risk factors and update the information as required.

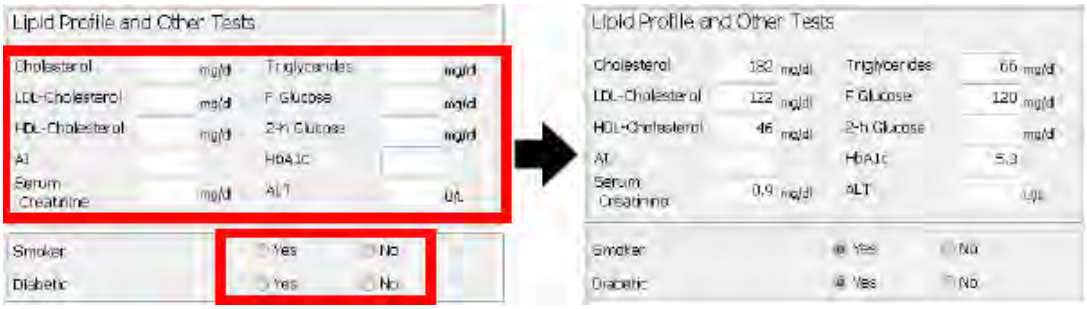


Figure 54

4. To save the data you entered together with the measurement data, click Save.

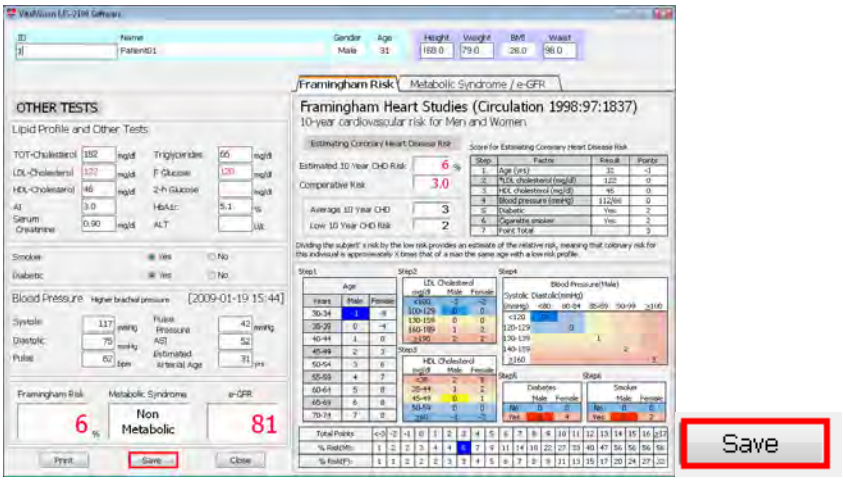


Figure 55

5. Complete the information required for Framingham Risk diagnosis program.

After the required fields are completed, the results are displayed on the bottom left part of the screen (Figure 56).

Figure 56

6. Complete and verify the information required on the Metabolic Syndrome and the e-GFR diagnosis programs.

   After the required fields are completed, the results are displayed on the bottom left part of the screen (Figure 57)

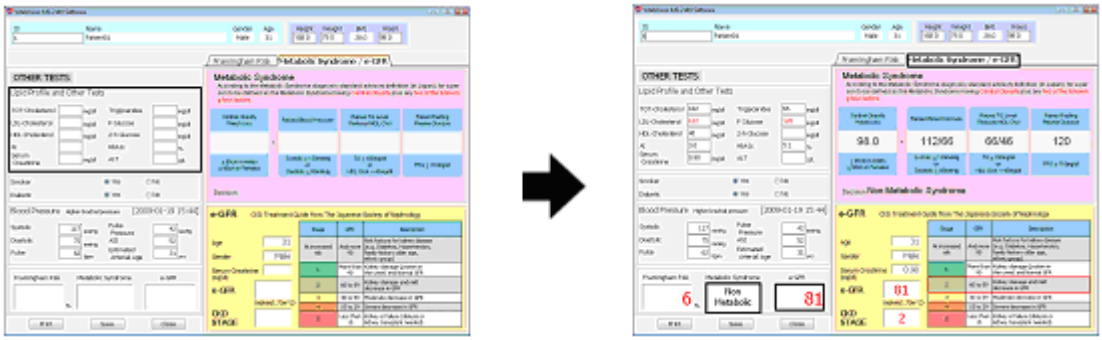


Figure 57

7. To print the results, click Print on the Other Tests screen. Then, set up and run the print job.

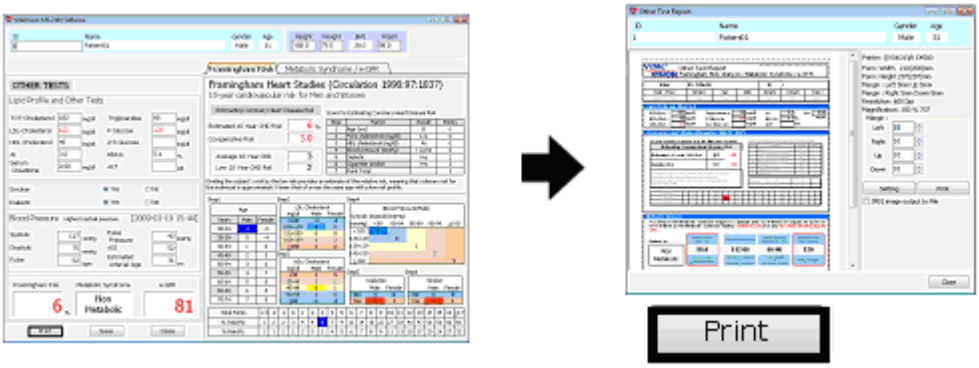
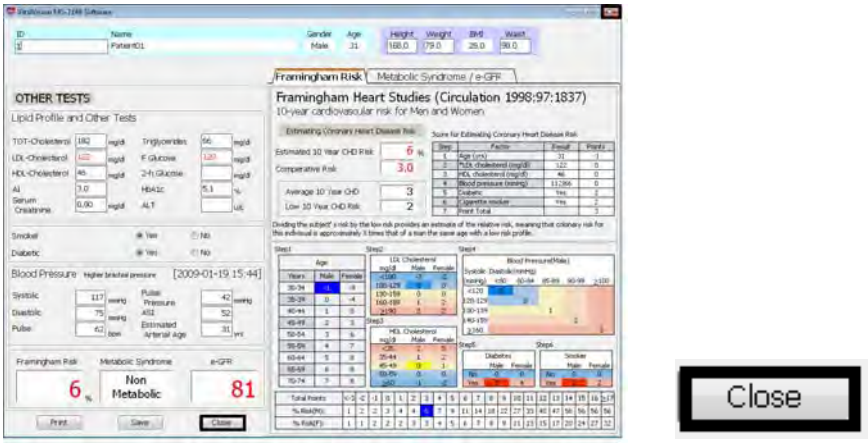


Figure 58

8. To return to the Measuring screen, click Close.

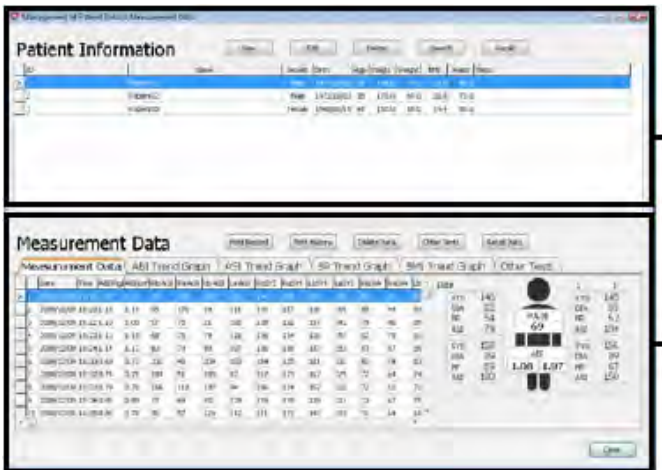

Framingham Risk
Metabolic Syndrome / e-GFR
OTHER TESTS
Lipid Profile and Other Tests
Framingham Heart Studies (Circulation 1998;97:1837)
10-year cardiovascular risk for Men and Women
Framingham Risk
Metabolic Syndrome
e-GFR
6 %
Non Metabolic
81
Print
Save
Close

Close

Figure 59

5 Patient Information and the Measurement Data Screens

Use the Patient Information and Measurement Data screens to view and manage patient profiles, measurement data, and test results. To view these screens, click Search Patient on the Measuring screen.



Patient Information Display Bar

Measurement Data Display Bar

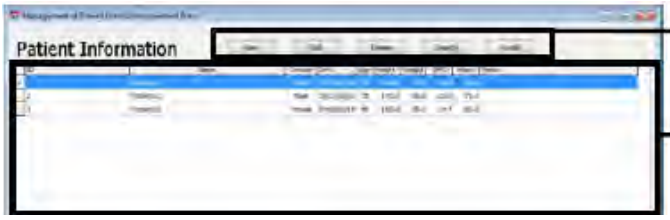
Figure 60 Patient Information screen

Note：You can change the display and print options for the data screens from the Option Setting screen. See page 117.

Patient Information Display Bar

Use the Patient Information display bar to view summary data for registered patients (Figure 61).

To view the data, select a patient name. The selected item is displayed in blue (differs depending on the computer settings) and the patient information can then be opened and edited.



Operating Button

Patient Information List

Figure 61 Patient Information Display Bar

Patient Information Display bar -button descriptions

Name of Button	Description
New	Opens the patient information screen. Register new patient information.
Search	Opens the search screen. Search patients using the ID number and Name.
Edit	Opens the patient information screen. Edits the selected patient information.
Delete	Deletes the selected patient information. The measurement data of the selected patient will be deleted at the same time.
Recall	Opens the selected patient information onto the measuring screen.

Patient information list: Patient Managing Item descriptions

Name of Display	Description
ID	Displays the ID number
Name	Displays the name
Gender	Displays the gender
Age	Displays the age
Height	Displays the height
Weight	Displays the weight
BMI	Displays the BMI (Body Mass Index).
Waist	Displays the waist

General button descriptions

Name of Button	Description
Close	Closes the Patient Information and Measurement Data screens and return to the measuring screen.

Menu Bar

The display settings of the menu bar can be carried out from the Unit Selection screen window.

Menu bar option descriptions

Menu		Description
File	Close	Closes the patient information and measurement data screen and return to the measuring screen.
Patient	New	Opens the patient information screen. Register new patient information.
	Update	Opens the patient information screen. Edit the selected patient information.
	Delete	Deletes the selected patient information.
	Search	Opens the search screen.
	Recall	Opens the selected patient data onto the measuring screen.
Print	Printer Setting	Opens the printer settings screen.
	Print History	Opens the print screen. Prints the measurement data of the selected patient.
	Print Report	Opens the print screen. Prints the selected measurement data. Switches the print style according to the measurement data tab.
Other Tests	Other Tests	Opens the “Other Tests” screen.
Help	Help	Opens the help feature.

5-01 Finding patient information

Open the previously registered patient information from the measuring screen.

1. On the Patient Information and Measurement Data screen, highlight the name of the patient in the patient information list. Then, click to select it.

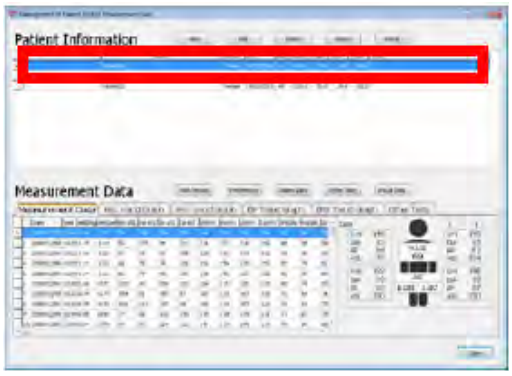


Figure 62

2. With the patient name selected, click the Recall button under the status to open the patient file and view the data.

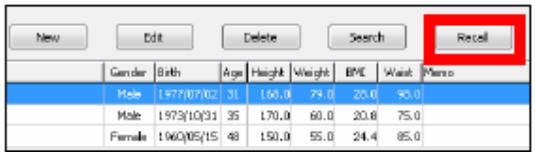


Figure 63 Selecting a patient name to open record information.

Figure 64 Patient information screen

5-02 Deleting patient information

Note: After the patient data is deleted, all information regarding the patient (including the Data No) is removed. Use extra precaution when managing by Data No.)

1. To select data to delete, click the desired patient information from the patient information list on the Patient Information and Measurement Data screen (Figure 65).

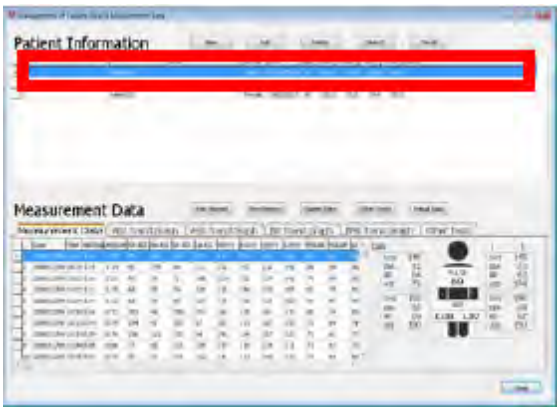


Figure65 Patient Information and Measurement Data screen

2. Click Delete.

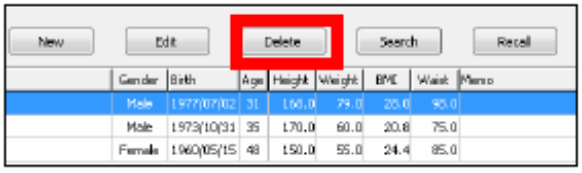


Figure66 Patient Information and Measurement Data screen

3. Check to see that the correct patient information is displayed on the screen.
4. Click OK to confirm the remove request and delete the selected information.

5-03 Measurement Data Display Bar

Use the Measurement Data Display bar to view and managing existing measurement results.

To select the data list and trend graph, click the desired panel tab.

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time are deleted.

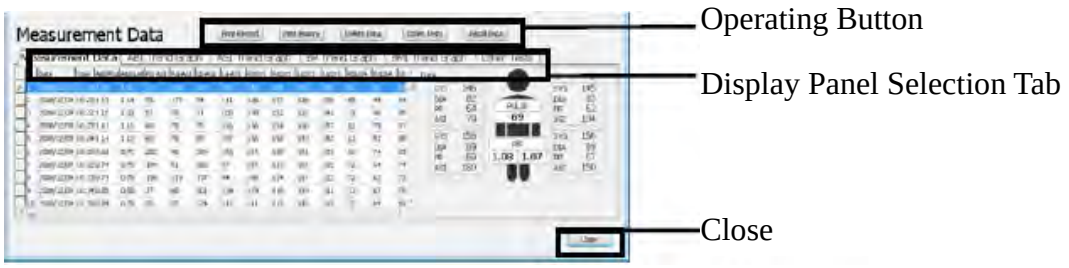


Figure67 Measurement Data Display Bar

Measurement Data Display - button descriptions

Name of Button	Description
Delete Data	Delete the selected measurement data on the measurement data.
Print Record	Print the analyzing results of the selected measurement data. The print format changes according to the display panels.
Print History	Print the measurement data, blood profile and trend graphs of the selected patient. The print format changes according to the display panels.
Other Tests	Open other test data that corresponds to the measurement data onto the “Other Tests” screen.
Recall Data	Open the selected measurement data onto the measurement screen.
Close	Close the screen and return to the measuring screen.

Display Panel and the Print Format

The print format changes according to the display panels. The following print options are available.

Name of Button	Display Panel	Description
Print Record	Measurement Data	Print the analyzing result of the measuring screen.
	Other Tests	Print the analyzing result of the other test screen.
Print History	Measurement Data	Print the measurement data.
	Other Tests	Print the other test measurement data.
	ABI Trend Graph	Print the trend graph.

	ASI Trend Graph	The setting of each Trend Graph panel is reflected onto the printings. The time-axis is shared by all.
	BP Trend Graph	
	BMI Trend Graph	No print job performed.

Displays the selection tabs (displays the panel selection tabs)

Select the measurement data display panel from the tabs (Figure 68)

Figure68

Test measurement displays - data descriptions

Name of the Panel	Description
Measurement Data	Displays the measurement data panel (Figure 69) and data summary.
ABI Trend Graph	Displays the ABI trend graph panel (Figure 70) showing the ABI measurement data.
ASI Trend Graph	Displays the ASI trend graph panel (Figure 71) showing the ASI measurement data.
BP Trend Graph	Displays the BP trend graph panel (Figure 72) showing the blood pressure measurement data.
BMI Trend Graph	Displays the BMI trend graph panel (Figure 73) showing weight, height, and BMI statistics.
Other Tests	Displays the other tests panel (Figure 74) showing any existing blood profile data available in the system.

Measurement Data Panel

Use this panel to display the measurement data summary for a selected patient (Figure 69)

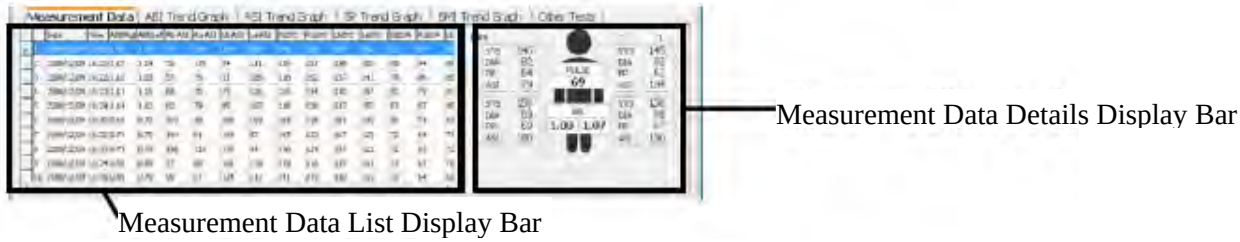


Figure 69 Measurement Data List Display Bar

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time are deleted.

The saved measurement data is managed by the unit of rows. The following table provides field descriptions for the data display.

Measurement data list - field descriptions

Field Name	Description
Date	The date of measurements
Time	The time of measurements
Empty Column(e)	(e)Exercise (If “yes” is selected for the exercise status, then “e” is displayed)
ABI(Right)	The right ABI
ABI(Left)	The left ABI
Rb ASI	The right brachial ASI
Ra ASI	The right ankle ASI
Lb ASI	The left brachial ASI
La ASI	The left ankle ASI
RbSYS	The right brachial systolic pressure
RaSYS	The right ankle systolic pressure
LbSYS	The left brachial systolic pressure
LaSYS	The left ankle systolic pressure
RbDIA	The right brachial diastolic pressure
RaDIA	The right ankle diastolic pressure
LbDIA	The left brachial diastolic pressure
LaDIA	The left ankle diastolic pressure
RbPP	The right brachial pulse pressure

RaPP	The right ankle pulse pressure
LbPP	The left brachial pulse pressure
LaPP	The left ankle pulse pressure
Pulse	The Pulse

The detailed display of the measurements

Display the selected measurements on the image

ABI Trend Graph Panel

Displays the Trend Graph of the ABI Measurement Data (Figure70).

To change the display, click the check box in front of each graph selections to change what is included and excluded from the display.

In the ABI Trend graph, the Y-axis: is the ASI value and the X-axis: shows the time, or the order of measurements.

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time are deleted.

Figure70

ABI Trend Graph display descriptions

Displayed Item	**Description**
Right ABI	Displays the trend graph of the right ABI
Left ABI	Displays the trend graph of the left ABI

Change the displayed time scale by selecting from the menu buttons.

Displayed Time Scale	Description
Year	Displays graphs using year as the unit.
Month	Displays graphs using month as the unit.
Measurement	Displays graphs using the order of measurements as the unit.

ABI Trend Graph change data display button descriptions

Displayed Time Scale	Description
	Displays information in the past by the displayed graph (backward).
	Displays information in the future by the displayed graph (forward).
	Displays the most recent information from the graph.
Measurement	Check the “Display Measurements” check box and the measurements will immediately be displayed on the graph.

The Trend Graph range of standard color codes

Range of Standard	Description
White	Normal range
Yellow	Abnormal ranges (under 0.9, over 1.3)

ASI Trend Graph Panel

Use this panel to display the trend graph of the ASI (Arterial Stiffness Index) measurement data (Figure 71). To change the display, click the check box in front of each graph selections to change what is included and excluded from the display.

In the ASI Trend graph, the Y-axis: is the ASI value and the X-axis: shows the time, or the order of measurements.

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time are deleted.

Figure71 ASI Trend Graph Panel

ASI Trend Graph Panel - description of data types represented on graph

Displayed Item	Description
Rb ASI	Displays the trend graph of the right brachial ASI.
Ra ASI	Displays the trend graph of the right ankle ASI.
Lb ASI	Displays the trend graph of the left brachial ASI.
La ASI	Displays the trend graph of the left ankle ASI.

Changing the time scale for the graph - button descriptions

Displayed Time Scale	Description
Year	Displays graphs using year as the unit.
Month	Displays graphs using month as the unit.
Measurement	Displays graphs using the order of measurements as the unit.

Trend Graph change data display button descriptions

Displayed Time Scale	Description
	Displays information in the past by the displayed graph (backward)
	Displays information in the future by the displayed graph (forward)
	Displays the most recent information from the graph
Measurement	Check the “Display Measurements” check box and the measurements will immediately be displayed on the graph.

The Trend Graph display range of standard color codes

Range of Standard	Description
White	Normal range
Yellow	Abnormal ranges (ASI over 70)

BP Trend Graph Panel

Use this panel to displays the trend graph of the Blood Pressure (BP) measurement data (Figure 72). To change the display, click the check box in front of each graph selections to change what is included and excluded from the display.

In the this graph, the Y-axis: is the Blood Pressure (BP) value and the X-axis: shows the time, or the order of measurements.

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time are deleted, but the time scale and the graphs remain unchanged.

Figure72 BP Trend Graph Panel

BP Trend Graph Panel - description of data types represented on graph

Displayed Item	Description
Right	Displays the trend graphs of the highest diastolic pressure of the right brachium and the right ankle.
Left	Displays the trend graphs of the highest diastolic pressure of the left brachium and the left ankle.

Change the displayed time scale by selecting from the menu buttons.

Displayed Time Scale	Description
Year	Displays graphs using year as the unit
Month	Displays graphs using month as the unit
Measurement	Displays graphs using the order of measurements as the unit

Graph Page - buttons to change time scale for the data display

Displayed Time Scale	Description
	Displays information in the past by the displayed graph (backward)
	Displays information in the future by the displayed graph (forward)
	Displays the most recent information from the graph

Measurement	Check the Display Measurements check box and the measurements are immediately displayed on the graph.

The Trend Graph display bar - component description

- Displays the BP trend graphs of the 4 limbs.
- The Blood Pressure values are displayed as bar graphs. The displayed values on top are the systolic pressure and those on the bottom are the diastolic pressure.
- The upper part of the graph displays the trend graph of the brachial diastolic and systolic pressures.
- The lower part of the graph displays the trend graph of the ankle diastolic and systolic pressures.

BMI Trend Graph Panel

The trend graphs of height and weight are displayed as bar graphs. The BMI trend graph is displayed as curve lines (Figure 73). To change the display, click the check box in front of each graph selections to change what is included and excluded from the display.

In this graph, the x- and y-axes represent the following:

Y1-axis (left): Height and Weight

Y2-axis (right): BMI (Body Mass Index = Weight/Height2)

X-axis: Time (or the order of measurements)

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time are deleted.

Figure73 BMI Trend Graph Panel

Items displayed by graph

Displayed Item	Description
Height	Displays the trend graph of height
Weight	Displays the trend graph of weight
BMI	Displays the trend graph of BMI

Change the displayed time scale by selecting from the menu buttons.

Displayed Time Scale	Description
Year	Displays graphs using year as the unit.
Month	Displays graphs using month as the unit.
Measurement	Displays graphs using the order of measurements as the unit.

Graph Page - buttons to change time scale for the data display

Displayed Time Scale	Description
	Displays information in the past by the displayed graph (backward)
	Displays information in the future by the displayed graph (forward)
	Displays the most recent information from the graph.
Measurement	Check the “Display Measurements” check box and the measurements will immediately be displayed on the graph.

The Trend Graph display bar

Displays the trend graphs of height, weight and BMI

Height and weight are displayed as bar graphs, and BMI is displayed as curve lines.

Other Tests Panel

Displays other test results and the blood test summary (Figure74)

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time are deleted.

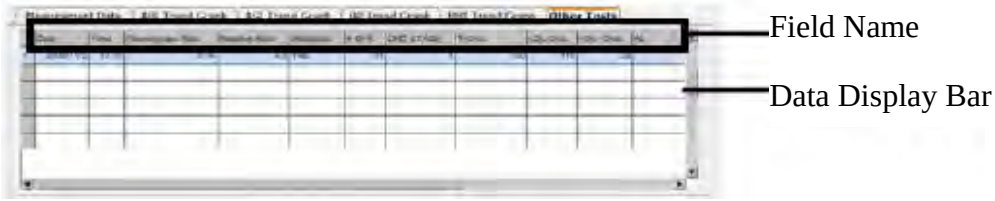


Figure74 Other Tests Panel

List of other tests - field descriptions

Field Name	Description
Date	The date of measurements
Time	The time of measurements
Framingham Risk	Estimated 10 year CHD risk
Relative Risk	Estimated 10 year CHD risk/low 10 year CHD risk

Metabolic Syndrome	Metabolic Syndrome diagnosis (Yes or No)
e-GFR	Estimated-GFR
CKD	Chronic kidney disease stage
T-Chol.	The total cholesterol level
LDL-Chol.	The low density lipoprotein cholesterol level
HDL- Chol.	The high density lipoprotein cholesterol level
AI	Atherogenic Index = (T-Cho. – HDL)/HDL
Scr	The Serum creatinine; Scr
TG	The Triglycerides level
F. Glucose	Fasting blood glucose level
2 h Glucose	2 hour blood glucose level
HbA1c	Hemoglobin A1C (glycated hemoglobin)
ALT	Alanine Aminotransferase ;ALT
Smoke	Smoker or not (Yes or No)
DM	Diabetic or not (Yes or No)
Height	Height
Weight	Weight
BMI	Body Mass Index
Waist	Waist

5-04 Accessing the measurement data

You can access previous measurement data from the Patient Information and Measurement screen so you can verify or reprint it, for example.

1. On the Patient Information and Measurement Data screen, highlight the name of the patient and click to select it.
2. On the measurement data panel, select the desired data.
   The selected patient information displays in blue.

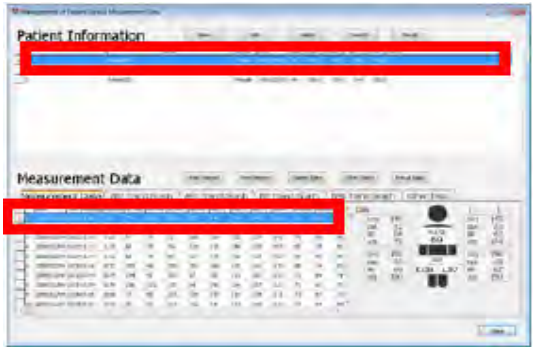


Figure75 Select patient information and data

3. Click Recall to display the selected measurement data on the measuring screen.

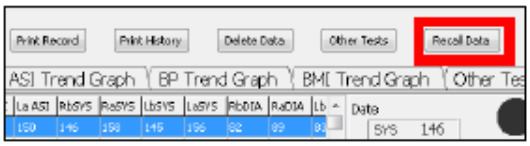


Figure76

Figure77

5-05 Accessing other test data

You can review existing data on other tests from the Other Tests screen so you can verify or reprint it, for example.

1. On the Patient Information and Measurement Data screen, highlight the name of the patient and click to select it.
2. On the measurement data panel, select the desired data.
   The selected patient information displays in blue.

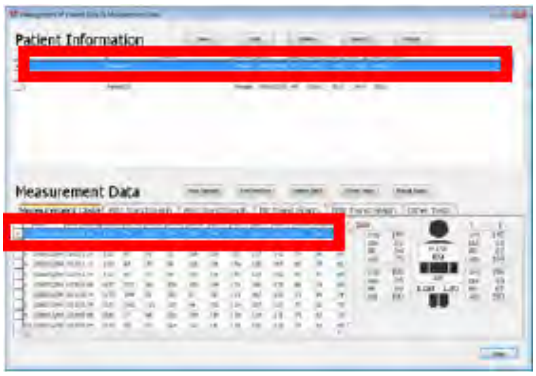


Figure78

4. Click Other Tests to display the selected measurement data on the Other Tests screen.

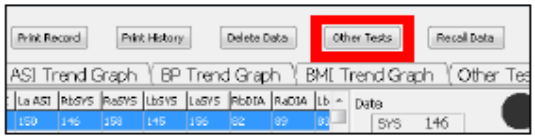


Figure79

Figure80

5-06 Deleting measurement data

Measurement data that were saved can be deleted.

1. On the Patient Information and Measurement Data screen, highlight the name of the patient and click to select it.
2. On the measurement data panel, select the data you want to delete.

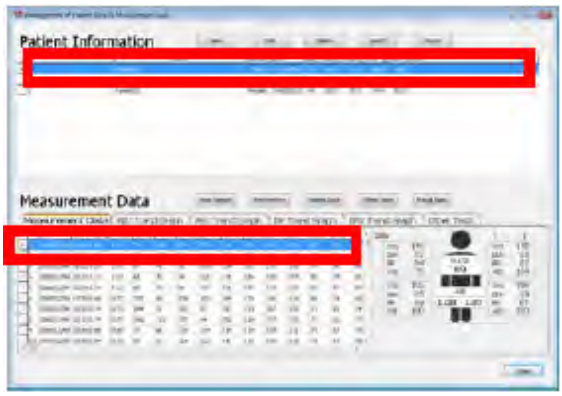


Figure81

3. Verify that the information you want to delete is displayed on the screen.
4. Click Delete Data.
5. Deleting the measurement data. Then, click OK on the delete confirmation message box.

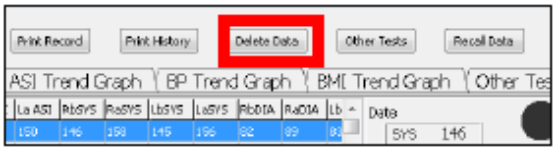


Figure82

Please make sure that the patient information you wish to delete is displayed on the screen.

6. Click OK to delete the measurement data.
   Click Cancel to cancel the delete request and return to the previous screen ; click Cancel. The data will not be deleted.

6 Patient Information

To manage patient health information using the VitalVision MS-2100 software, patients must be registered in the system. If a patient is not registered, any measurement data collected by the measuring device cannot be saved.

You can register patients and manage patient information from the Patient Information Screen.

6-01 Patient Information Screen

Click New on the Patient Information and Measurement Data screen to display the patient information window.

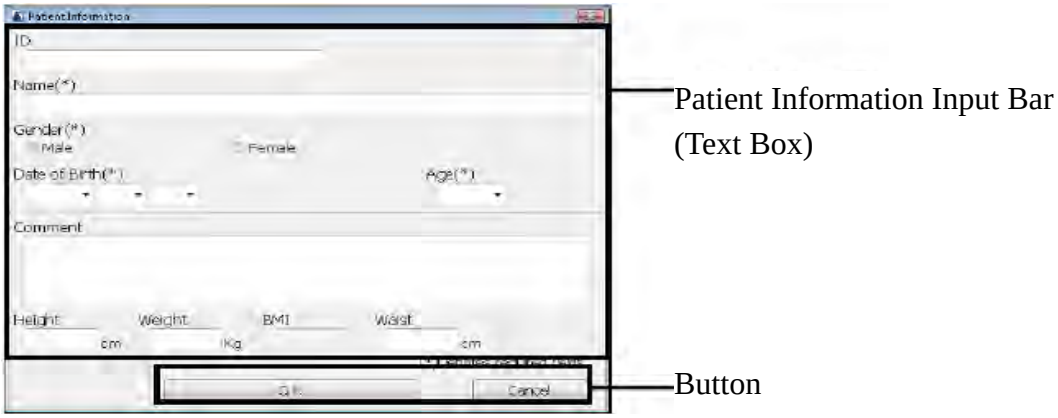


Figure83

Use the following field and button descriptions to determine what information is needed for this screen.

Patient Information - field descriptions

Name of Field	Description
ID	Type in the ID number
Name	Type in the name
Gender	Select the gender
Age	Select an age
Height	Type in the height
Weight	Type in the weight
BMI	The Body Mass Index (automatically calculated)
Waist	Type in the waist
Comment	Type in comments

Patient Information - button descriptions

Name of Button	Description
OK	Save the entered information and return to the previous panel
Cancel	Close the patient information window and return to the previous panel

06-02 Registering a patient

1. On the Patient Information and Measurement Data screen, click the New button to open the

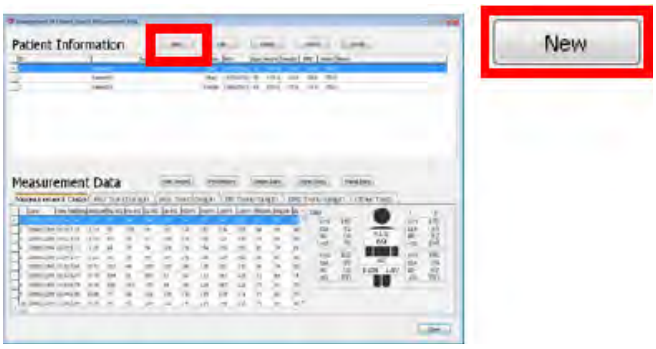


Figure 84 Patient Information window

2. On the Patient Information window, type the patient information in the fields provided. You must specify information in the required fields marked with an *.
3. After completing the fields, click OK to register the patient.

   Click Cancel to return to the previous screen without saving the patient information.

Note: The age is calculated and displayed automatically after the date of birth is entered.

If the age is specified first, the date of birth is automatically calculated and displayed as being January 1st of that specific year. Before saving the record, verify the month, day and age carefully to make sure it is correct.

06-03 Editing patient information

If necessary, you can update patient information that has already been saved in the system.

1. On the Patient Information and Measurement Data screen, highlight the name of the patient and click to select it.
   The selected patient information is displayed in blue, although the color might differ based on the computer display settings.

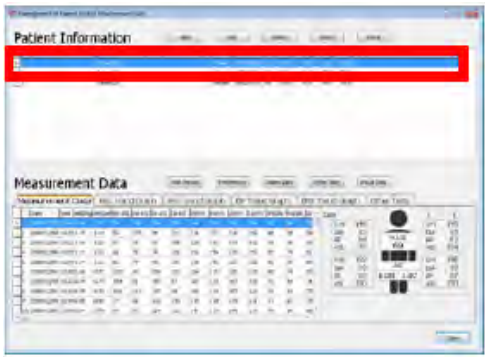


Figure86

2. After selecting the patient, click Edit to open the Patient Information editing screen.

Figure87

3. Change the information as required. Make sure that all required fields are complete.
   Items marked with “*” are required items.
4. Click OK to save the changes and return to the previous screen.
   Click Cancel to close the screen and return to the previous screen without saving your changes.

7 Search

Use the Search function to find patients by name, gender, age or ID. After you specify the search conditions, you can run searches against a selected patient information list. The patient information search is operated from the “Patient Information and Measurement Data” screen. The Search screen Figure 60 shows the Search interface where you specify search criteria and run commands. You can also review an example of a search on the next page.

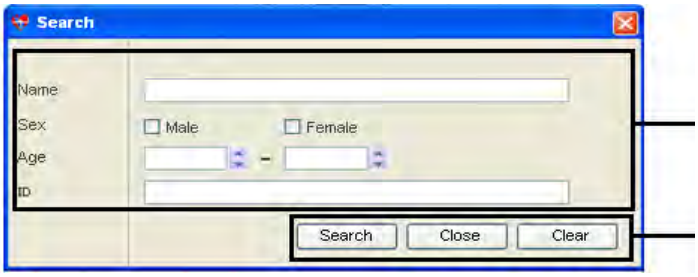


Figure89 Search screen

Search screen buttons and descriptions

Name of Button	Description
Search Condition Bar	Enter the searching conditions
Search	Searches the patient information according to the conditions set
Close	Closes the search screen
Clear	Close the search condition window

Items of Patient Search

Search Item	Search Condition
Name	Search by the patient name
Gender	Search by selecting either the male or female category
Age	Search by the age or age range of the patient (only half-form characters can be entered)
ID	Search by the patient ID (only half-form characters can be entered)

Searching for Patient Information

1. On the Patient Information and Measurement Data screen, click Search.

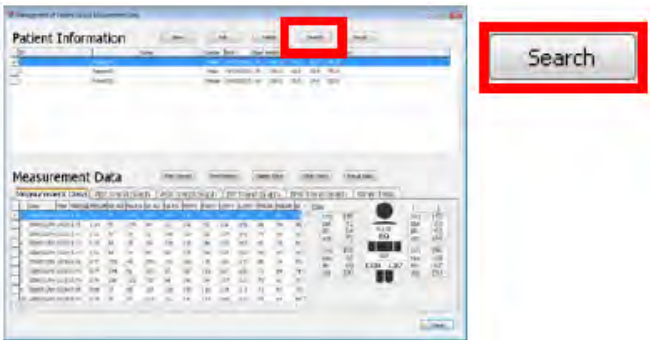
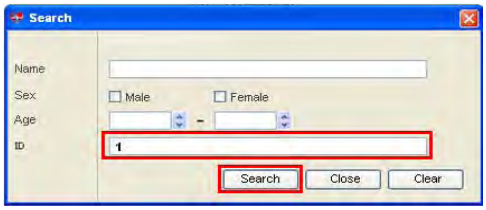


Figure90

1. On the Search screen, type the search criteria in the appropriate fields. For example, to search by ID, enter a value in the ID field.



When Searching by the ID Number 1

Figure91

2. Click Search.
   A list of all patients matching the specified criteria is displayed on the Patient Information and Measurement Data screen.
3. Click Close when you are finished with your work.

When Searching by the ID Number 1
Patient Information Display of ID Number 1

Figure92

8 Print

The measurement data can be exported to printers that are registered on the Windows system,

Using the MS-2100 software you can generate and print reports on current data as it is collected and processed, or you can create reports on historical measurement data.

This chapter describes the reports, the different ways to generate them, and provides examples. You also have a number of different print format options for reports to help generate the right type of content for your audience. Table provides an overview of the available formats.

Print Style format descriptions

Print Format	Description
For Facility Type 1	Automatically prints the results of the measuring screen (can be set as ON or OFF) For Facility use The difference between 1 and 2 is how the results are being displayed When under the manual printing mode, print jobs can be activated by clicking the “print” button on the measuring screen and the “Print Record” button on the Patient Information and Measurement Data screen.
For Facility Type 2	
For Patient Type 1	Automatically prints the results of the measuring screen (can be set as ON or OFF) Measurement results given to the patients for records The difference between 1 and 2 is how the results are being displayed When under the manual printing mode, print jobs can be activated by clicking the “print” button on the measuring screen and the “Print Record” button on the Patient Information and Measurement Data screen.
For Patient Type 2	
Print Measurement History	Prints the Measurement History Print jobs can be activated by clicking the “Print History” button on the Patient Information and Measurement Data screen.
Print Other Tests History	Prints the Other Tests History Print jobs can be activated by clicking the “Print History” button on the Patient Information and Measurement Data screen.
Print Trend Graphs	Prints the Trend Graphs Prints the trend graphs of ABI, ASI and the blood pressure level. Print jobs can be activated by clicking the “Print History” button on the Patient Information and Measurement Data screen.
Print Other Tests Report	Prints the results on the Other Tests screen Print jobs can be activated by clicking the “Print” button on the Other Tests screen and the “Print Record” button on the Patient Information and Measurement Data screen.

Note: For details on setting print options, see “Print" on page 73.

Printing the measurement analysis report

After the measuring process is finished, the measurement analysis report can be printed automatically. Two types of report are printed, one for facility use and the other for patients.

You can also use the Print button on the measuring screen to manually start the print job. If you want to print a report based on existing data, use the Print Record button provided on the Patient Information and Measurement Data screen.

Notes:

- The print screen does not display when the measuring screen analysis report is printed automatically (Figure 93)
- Automatic printing can be set as “On” of “Off”. The exported print style can also be configured.
- For details on setting print options, see “Print" on page 73.

Print screen (Printing the Measuring Screen Analysis Report)

To print measurement data directly from the screen, click Print on the measuring screen or Print Record on the Patient Information and Measurement screen.

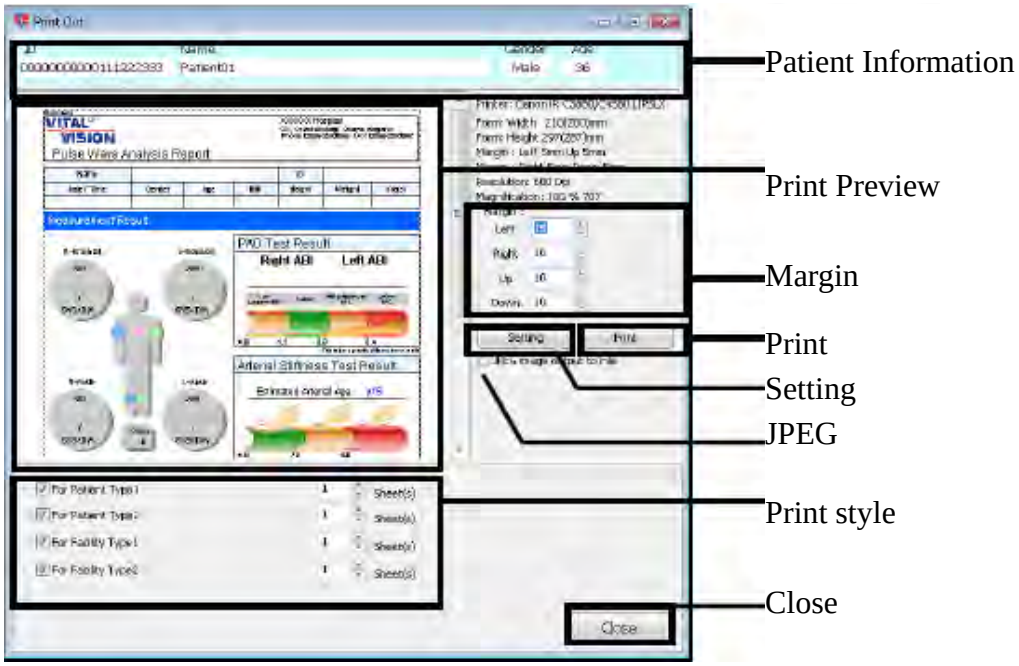


Figure93 Print Out screen

Print screen field descriptions

Name of Display	Description
Patient Information	Displays the Patient Information
Print Preview	Displays the print preview Left click to zoom in Right click to zoom out
Margin	Set the blank spaces of the print outs.
Print	Carries out the print job
Setting	Opens the printer setting screen
JPEG	Check the check box then click on the “Print” button, the print image will then be saved in the JPEG format.
Print style	Configure the print style and the copy number.
Close	Close the Print screen

Printing the Measuring Screen Analysis Report

1. On the Measuring screen, click Print.

Figure94 Printing a report

2. On the Print screen, configure the print style and the number of copies.

   For details on the available print styles, see the descriptions on page 73.

3. Click Print.

   After printing, a “Print End” message is displayed and the Print screen automatically closes.

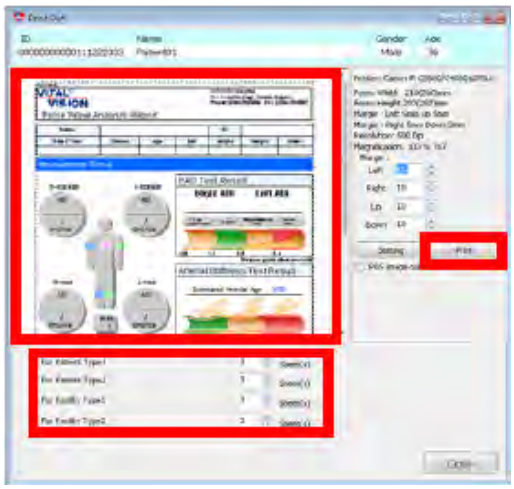


Figure95

Printing reports on historical data

1. On the Patient Information and Measurement Data screen, select the patient information that you wish to print.

Figure96

2. Click Print Record.

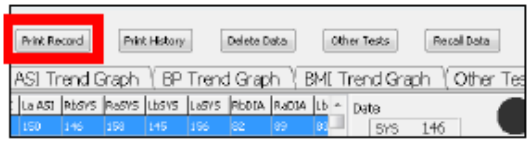


Figure97

4. On the Print screen, configure the print style and the number of copies.

   For details on the available print styles, see the descriptions on page 73.

3. Click Print to start the print job.

   After printing, the “Print End” message is displayed and the print screen automatically closes.

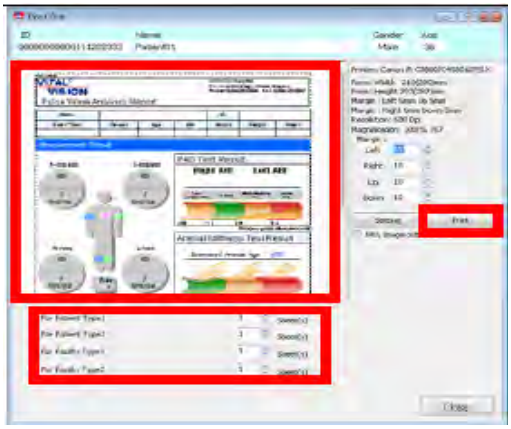


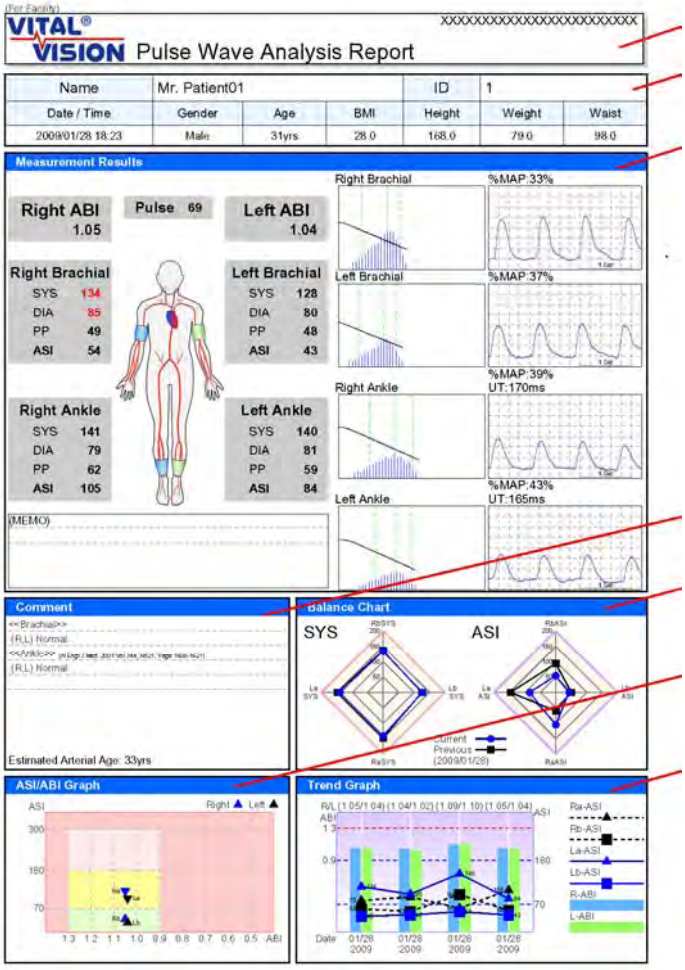
Figure98

5. Click Print.

   After printing, a print end message is displayed and the Print screen automatically closes.

Print style (For Facility)

The Facility print style generates measurement reports that are kept by the facility. This style has two versions that report different types of information. Figure 99 shows the information included in the Facility 1 report. Figure 100 shows the information included in the Facility 2 report.



Header

Patient Information/Measurement Date and Time

Measurement Result

Comment

Radar Chart

ASI/ABI Graph

Trend Graph

Figure99 Facility Type 1 Print style

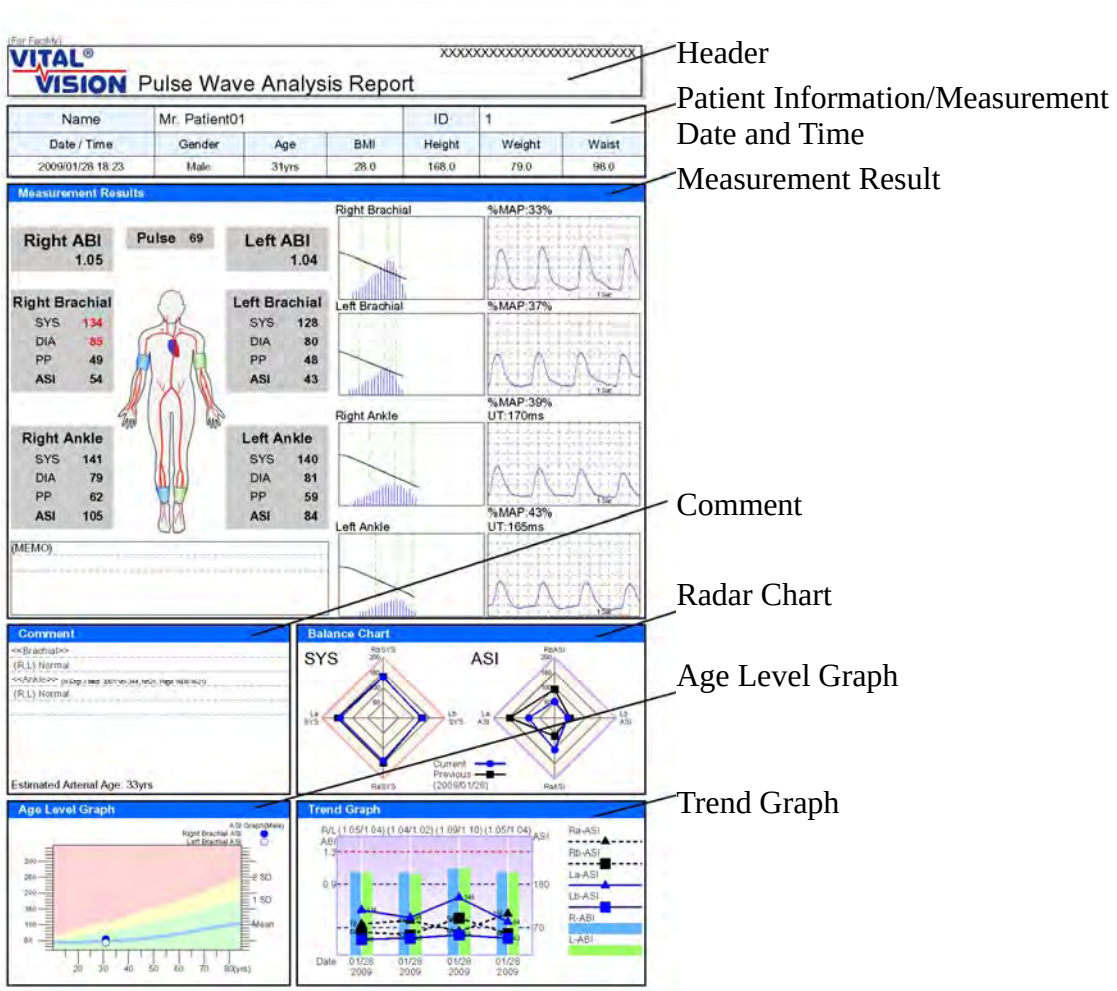


Figure100 Facility Type 2 Print style

Header

The Header field displays the print title and the facility information.

> **Note:** The Facility information is specified from the Print Setting screen. Other information such as the address is not displayed on print outs for the facility. For details, see Setting Print options on page 143.

Patient information/Date and time

This group of fields provides patient information and the date and time of measurements.

Patient information/Date and time field descriptions

Name of Display	Description
Date/Time	Displays the date and time of measurements
ID	Displays the ID number
Name	Displays the name
Gender	Displays the gender
Age	Displays the age
Height	Displays the height

Weight	Displays the weight
BMI	Displays the Body Mass Index
Waist	Displays the waist

Measurement Results

This display provides the measurement results of each measurement site.

The brachial measurement results which are out of standard range will be displayed in red.

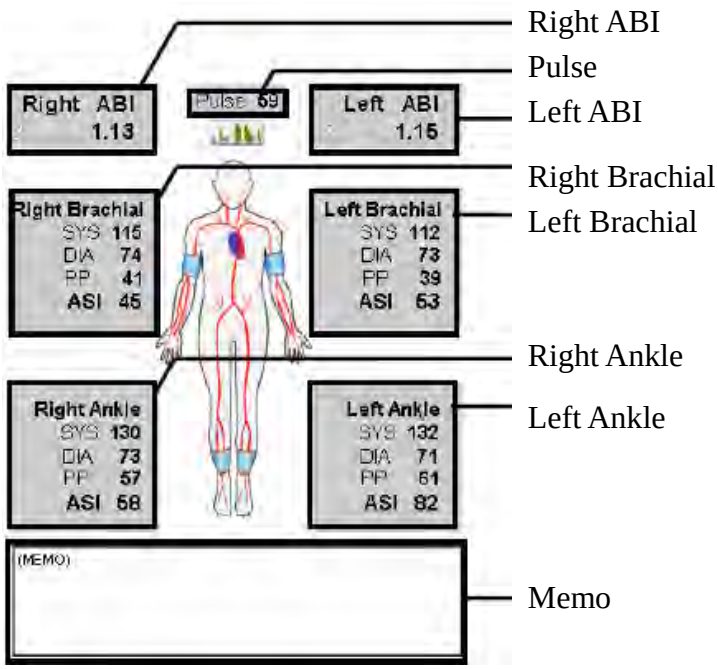


Figure101

Measurement results - field descriptions

Name of Display	Description
Right ABI	Displays the right ABI
Left ABI	Displays the left ABI
	Displayed on the screen if “Yes” is selected for the exercise status.
Pulse	Displays the pulse number
Right Brachial	Displays the right brachial blood pressure, pulse pressure and ASI
Left Brachial	Displays the left brachial blood pressure, pulse pressure and ASI
Right Ankle	Displays the blood pressure, pulse pressure and ASI of the right ankle
Left Ankle	Displays the blood pressure, pulse pressure and ASI of the right ankle
Memo	Memo items entered in the memo box of the measuring screen is displayed here.
	Displayed when shaking or irregular pulse intervals occur during the measuring process.

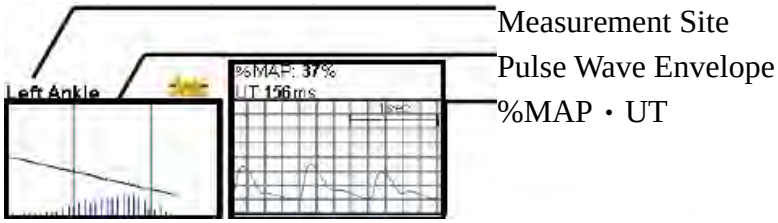


Figure102

Measurement results displays - descriptions

Name of Display	Description
Measurement site	Displays the measurement site
Pulse Wave Envelope	Displays the pulse wave envelope recorded during the measuring process. (Also displays the wave lines representing the air-release rate)
%MAP・UT	Displays the %MAP and UT from the pulse waveform Only %MAP is displayed for the brachia
	Displayed when shaking or irregular pulse intervals occur during the measuring process.

Comment

The Comments display shows the comparative result between each measurement and its standard value.

This comment box shows the estimated arterial age.

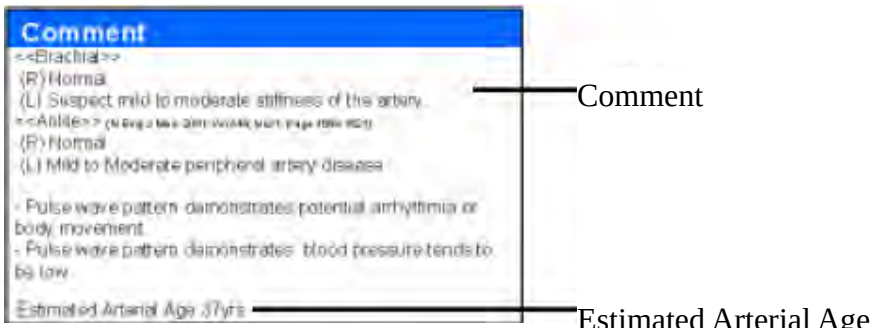


Figure103

Systolic Pressure/ASI Balance Chart

This chart provides the systolic pressure value and ASI using balance charts.

It also shows the values of current and previous measurement.

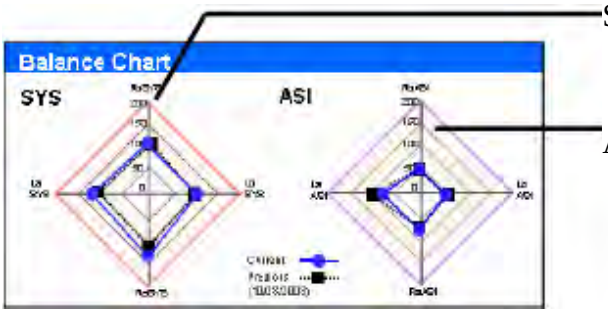
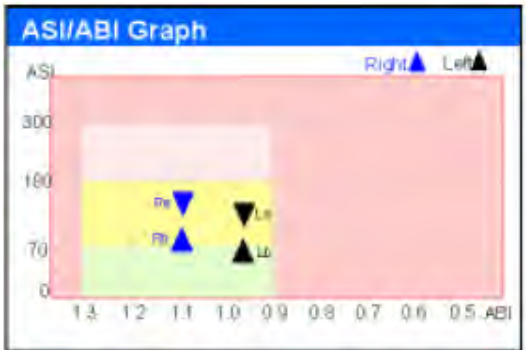


Figure104

ASI/ABI Graph (When the “For Facility Type 1” print style is selected)

This display provides the distribution graph of ASI of the 4 limbs and that of the left and right ABI.



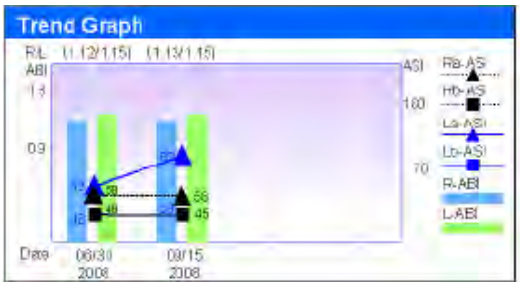
Y-axis: ASI
X-axis: ASI

Figure105

Trend Graph

This graph shows the ABI and ASI trends.

The ABI is displayed as bar graphs and the ASI as line graphs



Y1-axis (Left): ABI
Y2-axis (Right): ASI
X-axis: Measurement Date

Figure106

Age Level Graph (When the “For Facility Type 2” print style is selected)

Displays the ASI-Age graph

The X-axis represents the patient’s age, and the Y-axis represents ASI

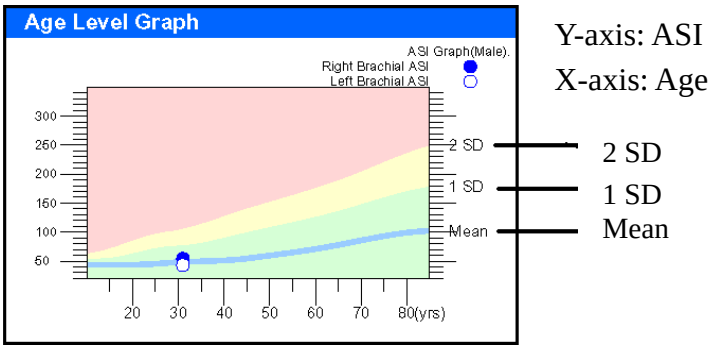


Figure107

Print style (For Patient)

The Patient print style generates measurement reports that are issued to the patient. This style has two versions that report different types of information. Figure 99 shows the information included in the Facility 1 report. Figure 100 shows the information included in the Facility 2 report.

The printing of the measuring screen (For Patient) is divided into 2 types

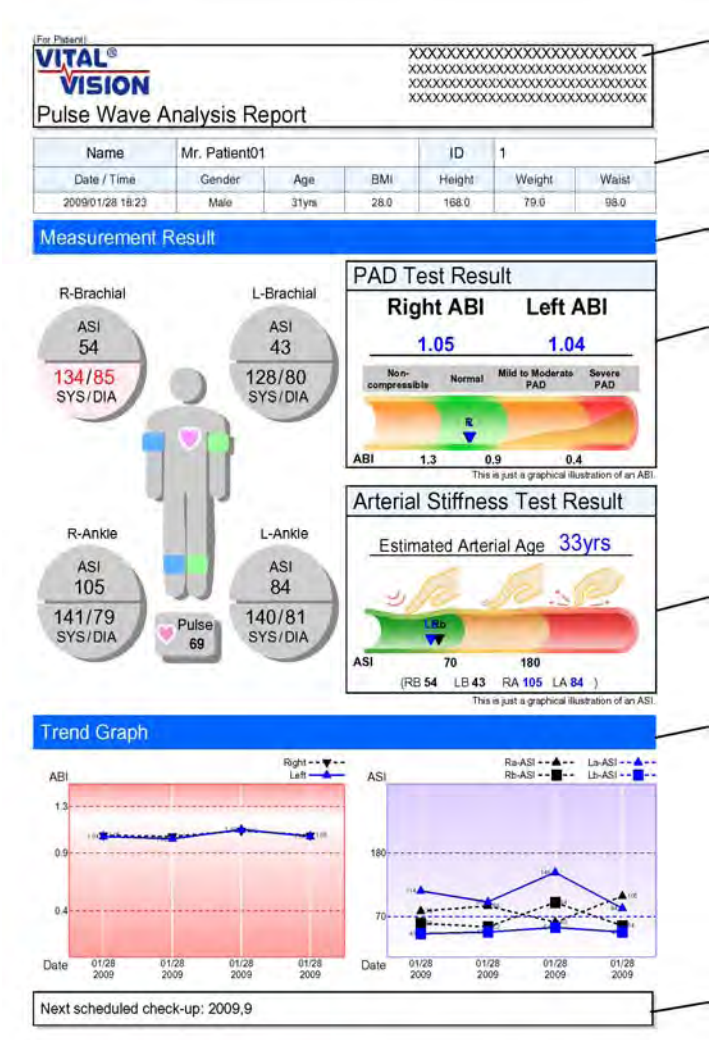


Figure108 Report Output for Patient Type 1

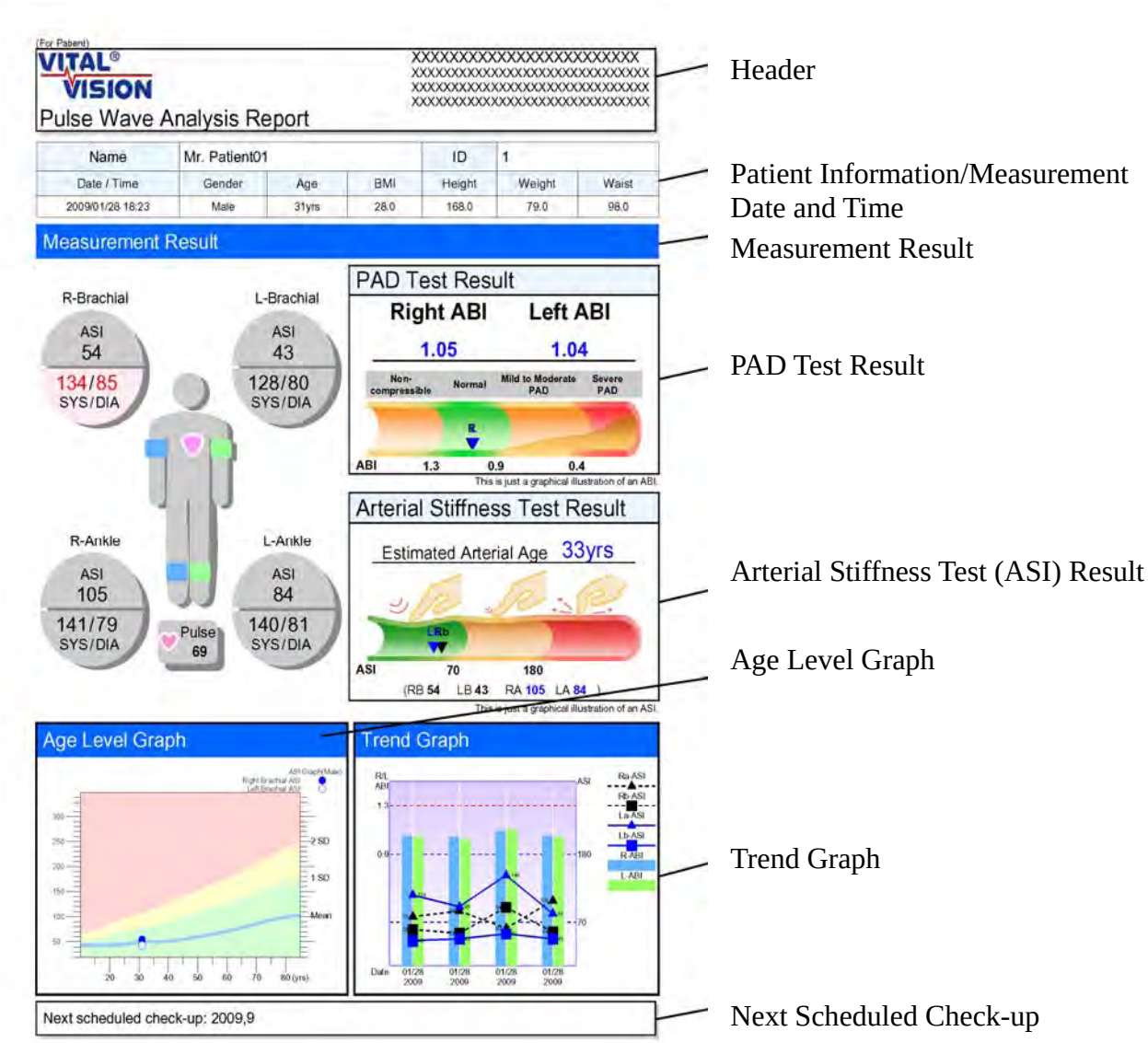


Figure109 Report output for Patient Type 2”

Header

The header field shows the print title, the Facility and other information (address, etc) that provides information about the report context.

Note: the Facility and other information (address, etc) can be entered from the print setting section. (See “ Print setting” on page 142)

Patient information/Date and time

These fields provide information about the patient and the date and time of measurements.

Patient Information Date and Time report output field descriptions

Name of Display	Description
Date/Time	Displays the date and time of measurements

ID	Displays the ID number
Name	Displays the name
Gender	Displays the gender
Age	Displays the age
Height	Displays the height
Weight	Displays the weight
BMI	Displays the Body Mass Index
Waist	Displays the waist

Measurement Results

This display includes the measurement results for each measurement site.

The brachial measurement results that are out of standard range are displayed in red.

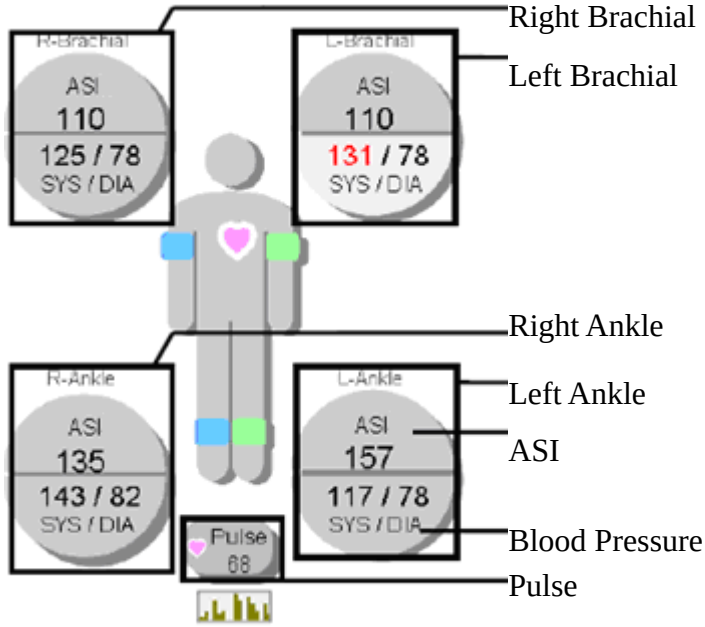


Figure110 Measurement Results report output

Measurements Results report field descriptions

Name of Display	Description
Right Brachial	Displays the right brachial blood pressure, pulse pressure and ASI
Left Brachial	Displays the left brachial blood pressure, pulse pressure and ASI
Right Ankle	Displays the blood pressure, pulse pressure and the right ankle ASI
Left Ankle	Displays the blood pressure, pulse pressure and the right ankle ASI
Pulse	Displays the pulse number
	Displayed when shaking or irregular pulse intervals occur during the measuring process.

Measurement Results (ABI Test Results)

This screen shows the left and right ABI test results. Test results that are out of the standard range are displayed in red.

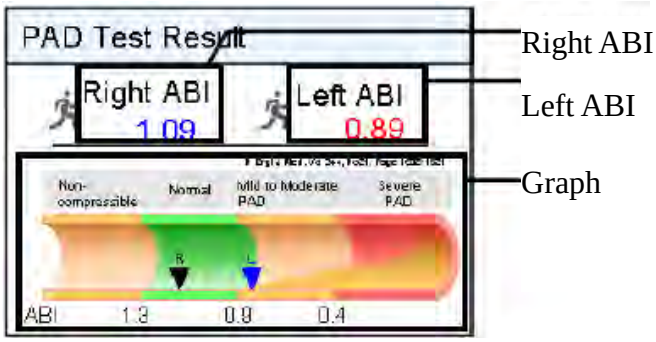


Figure111

ABI Measurement Results - result filed descriptions

Name of Display	Description
Right ABI	Displays the right ABI
Left ABI	Displays the left ABI
	Displayed on the screen if “Yes” is selected for the exercise status.
Image Graph	Displays the ABI and the arterial risk using images

Measurement Results (ASI Test Results)

This display provides the ASI test result for each measurement site. Test results that are out of the standard range are displayed in red.

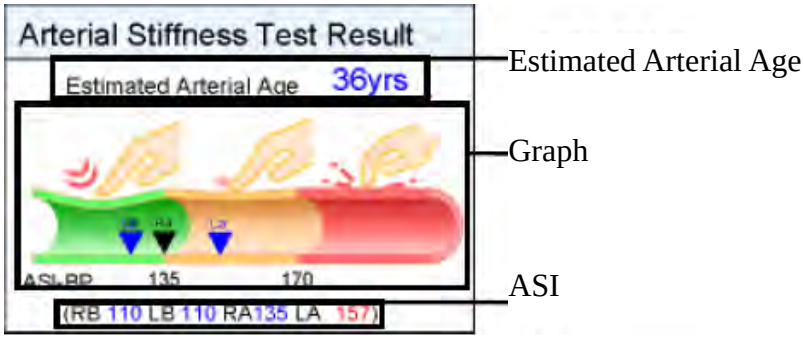


Figure112

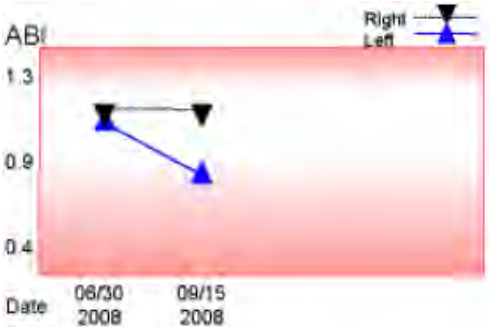
ASI Measurement Results - result filed descriptions

Name of Display	Description
Estimated Arterial Age	Displays the estimated arterial age

Graph	Displays the ASI and the arterial risk using images
RB	Displays the right brachial ASI
LB	Displays the left brachial ASI
RA	Displays the ASI of the right ankle
LA	Displays the ASI of the left ankle

Trend Graph in *For Patient Type 1* print style

Displays the ABI trend graph

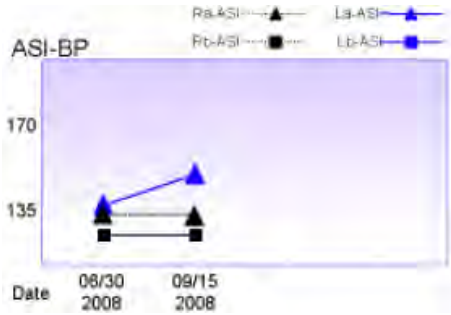


ABI Trend Graph
Y-axis: ABI
X-axis: Measurement Date

Figure113

ASI Trend Graph.

Displays the ABI trend graph



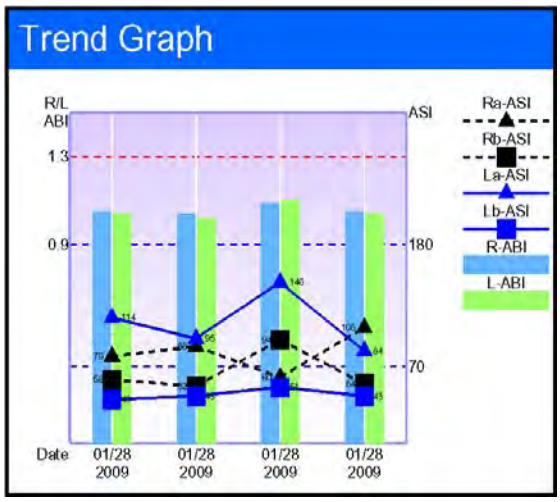
ABI Trend Graph
Y-axis: ABI
X-axis: Measurement Date

Figure114

Trend Graph (When the “For Patient Type 2” print style is selected)

This display shows the ABI and ASI trends.

The ABI is displayed as bar graphs. The ASI is shown as line graphs



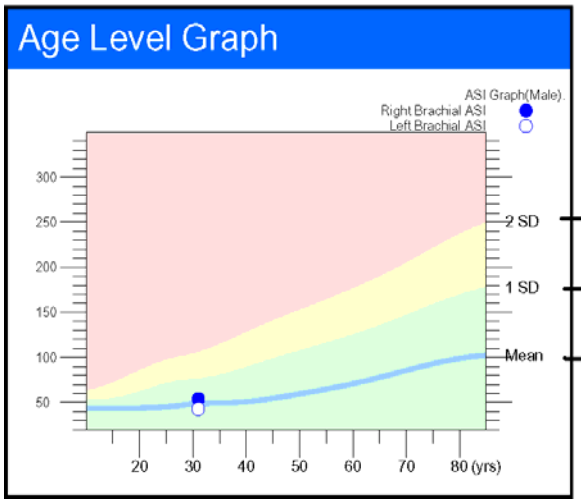
Y1-axis (Left): ABI
Y2-axis (Right): ASI
X-axis: Measurement Date

Figure115

Age Level Graph (When the “For Patient Type 2” print style is selected)

Displays the ASI-Age graph

The X-axis represents the patient’s age, and the Y-axis represents ASI



Y-axis: ASI
X-axis Age

2SD
Mean
1SD

Figure116

Next Scheduled Checkup

Displays the next scheduled check-up date.

> **Note:** You can enter the next scheduled check-up date from the Print Setting screen. See page 143.

7-01- Printing Other Tests History reports

Use the Patient Information and Measurement Data screen to generate history reports for measurement data and data from other tests.

To print, click the Print History button on the Patient Information and Measurement Data screen. Specify any print settings required, and then click Print.

You can also print historical data from the Measurement Data and Other Tests display panels.

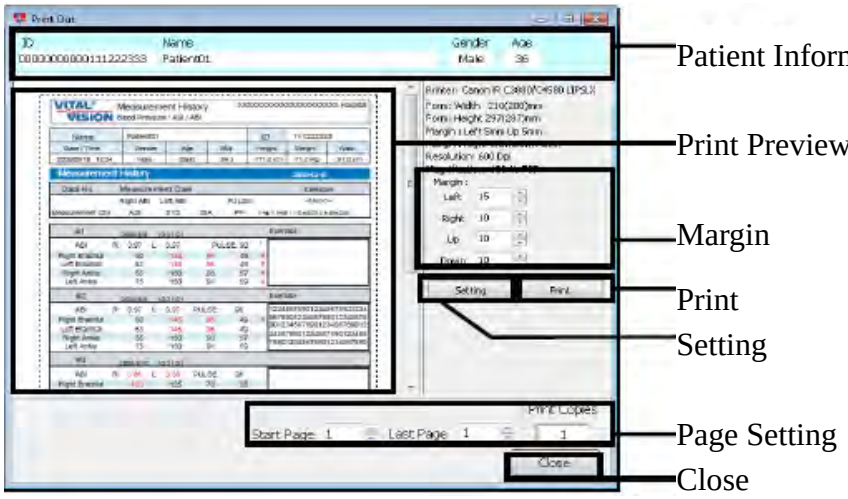


Figure117 Information and Measurement Data screen

Patient Information and Measurement Data display field descriptions

Name of Display	Description
Patient Information	Displays the Patient Information.
Print Preview	Displays the print preview. Left click to zoom in. Right click to zoom out.
Margin	Set the blank spaces of the print outs.
Print	Carries out the print job.
Setting	Opens the printer setting screen.
Print Setting	Configure the print pages and print copies.
Close	Close the Print screen.

Printing patient history for measurement and other tests

1. On the Patient Information and Measurement Data screen, select the patient information that you wish to print.

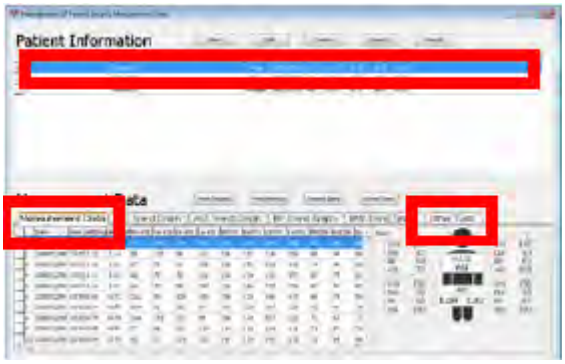


Figure118

2. Click Print History.

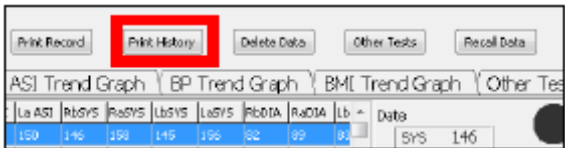


Figure119

3. On the Print screen, configure the print style and the number of copies.

   The print preview box displays the ready-to-print images (Figure 120). For details on the available print styles, see the descriptions on page 73.

4. Click Print to start the print job.

   After printing, the “Print End” message is displayed and the print screen automatically closes.

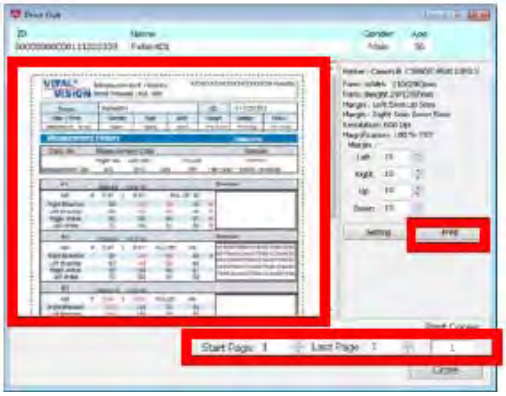


Figure 120

Print style (Measurement History)

The Measurement History print style generates a report like the one in Fig. 121. Detailed information about the data fields is provided below.

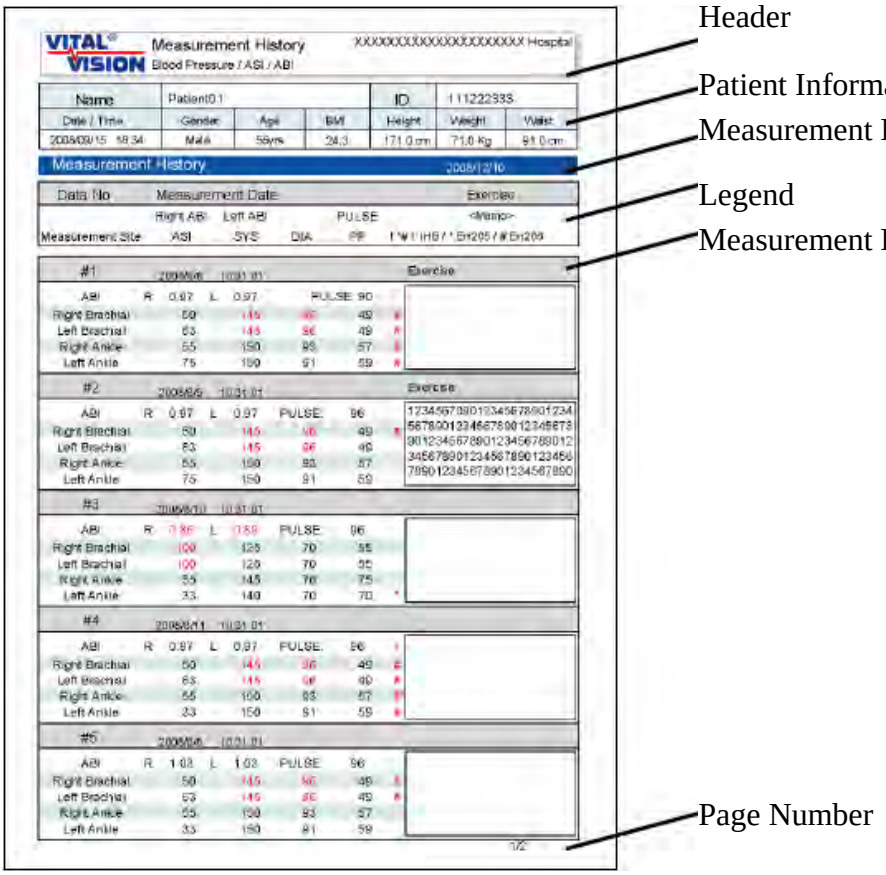


Figure121 Measurement Data print display

Header

The header fields provide the print title and the facility information.

> **Note:** The facility information can be entered from the print setting section. Other information (address, etc) will not be displayed on the measurement data print outs. (See “Print Setting” on page 142)

Patient information/Date and time

Displays the patient information and the date and time of printing

Patient Information - report output field descriptions

Name of Display	Description
Date/Time	Displays the date and time of measurements
ID	Displays the ID number
Name	Displays the name
Gender	Displays the gender
Age	Displays the age
Height	Displays the height
Weight	Displays the weight
BMI	Displays the Body Mass Index
Waist	Displays the waist

Measurement History

The measurement information is arranged sequentially and displayed in tables.

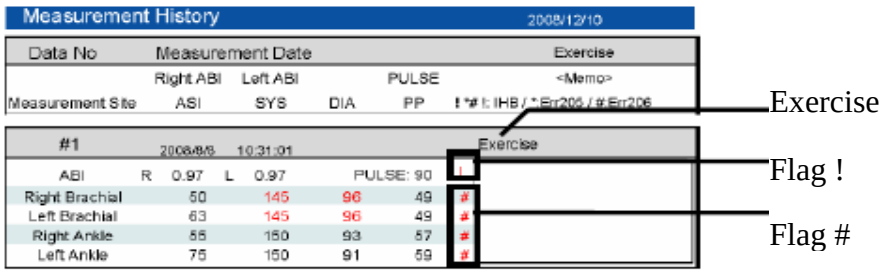


Figure122 Measurement History reports

Measurement History report data fields

Name of Display	Description
Data No	Displays the Data Number (registered according to measuring order)
Measurement Date	Displays the measurement date
Exercise	If the exercise box on the measuring screen is checked, then “Exercise” will be displayed on the screen
Measurement Site	Displays the name of the measurement site
Right ABI	Displays the right ABI
Left ABI	Displays the left ABI
Pulse	Displays the pulse number
Memo	Displays the measurement memo
ASI	Displays the ASI according to the measurement site

SYS	Displays the systolic pressure according to the measurement site
DIA	Displays the diastolic pressure according to the measurement site
PP	Displays the pulse pressure according to the measurement site
Flag	Displays the flags of the corresponding data

Measurement History - error flag field descriptions

Display Flag	Error Code	Description
!	Err200	During measurements, all measurement sites experienced shaking or irregular pulse wave intervals. The measurement results may thus be inaccurate. Recommended running the measurement process again.
*	Err205	The measurement results might be inaccurate due to problems in the test. Recommended running the measurement process again.
#	Err206	During measurements, the patient's body experienced shaking or irregular pulse wave intervals. The measurement results may thus be inaccurate. Recommended to measure again.

Page Number

This field displays the page number on reports.

Print style (Other Tests History)

Prints out the data entered on the Other Tests screen and the diagnosis history created by the diagnostic programs. Detailed information about the data fields is provided below.

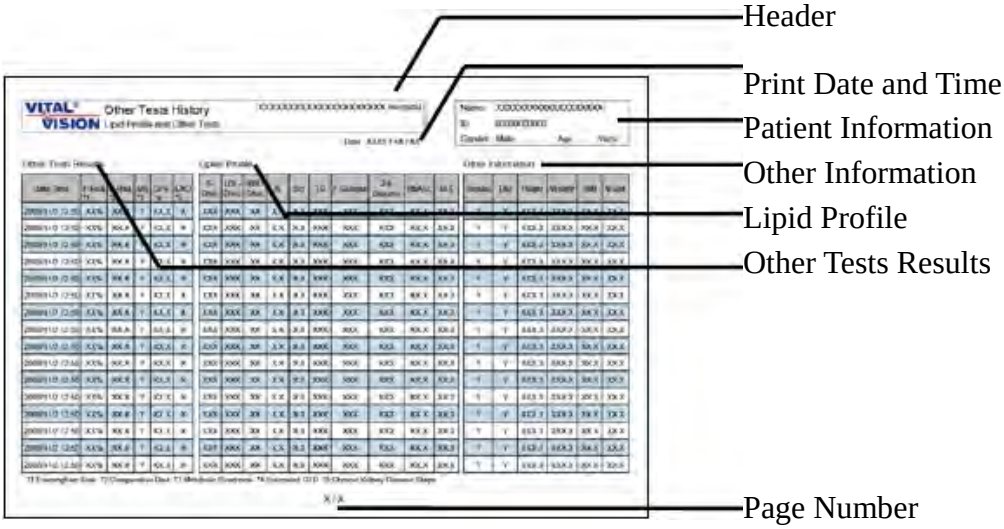


Figure123

Header

This field displays the print title and Facility information.

Note: The Facility information can be entered in the print setting section. Other information such as the address is not displayed on the Other tests reports. For details, see Setting Print options on page 142.

Date Time

These fields show the date and time that the report was generated.

Patient Information

Displays the patient's information

Patient Information output field descriptions

Name of Display	Description
ID	Displays the ID number
Name	Displays the name
Gender	Displays the gender
Age	Displays the age

Other Tests Results

This group of field includes information about the diagnosis history made by the Framingham Risk, Metabolic Syndrome, and e-GFR diagnosis programs.

Report field descriptions

Name of Display	Description
Date Time	The date of the tests; The time of the tests
F-Risk*1	Framingham Risk evaluation Estimated 10 Year Coronary Heart Disease (CHD) Risk
C-Risk*2	Comparative Risk Estimated 10 Year CHD risk/low 10 Year CHD Risk
MS*3	Metabolic Syndrome
GFR*4	Glomerular Filtration Rate
CKD*5	Chronic kidney disease stage

Lipid Profile

This group of data provides the history of the blood lipid profile

Lipid Profile data fields

Name of Display	Description
T-Chol	The total cholesterol level
LDL-Chol	The low density lipoprotein cholesterol level
HDL- Chol	The high density lipoprotein cholesterol level
AI	Atherogenic Index = (T-Cho. – HDL)/HDL
Scr	The Serum creatinine; Scr
TG	The Triglycerides level

F. Glucose	Fasting blood glucose level
2 h Glucose	2 hour blood glucose level
HbA1c	Hemoglobin A1c (glycated hemoglobin)
ALT	Alanine Aminotransferase ;ALT

Other Information

This group of fields provides miscellaneous information

Other information report output field descriptions

Name of Display	Description
Smoke	Smoker or not (Yes or No)
DM	Diabetic or not (Yes or No)
Height	Height
Weight	Weight
BMI	Body Mass Index
Waist	Waist

Page Number

This output field provides the page number for the prints

7-02- Printing Trend Graphs for current data

You can print ABI, ASI, and blood pressure trend Graphs directly from the measuring screens.

Print Screen (Trend Graph)

To print a Trend Graph from the Patient Information and Measurement Data screen, click Print History on the Patient Information and Measurement Data screen. The history is displayed on the screen. You can print the display from the ABI Trend Graph, the ASI Trend Graph, or the BP Trend Graph display panels.

Figure124 Trend Graph print screen

Trend Graph report field descriptions

Name of Display	Description
Patient Information	Displays the Patient Information
Print Preview	Displays the print preview Left click to zoom in Right click to zoom out
Margin	Set the blank spaces of the print outs.
Print	Carries out the print job
Setting	Opens the printer setting screen

Printing Trend Graphs

Note: The time axis is linked to the displaying position in all panels. After the tab is changed, information from the same date and time is displayed using the same time scale. After the patient is switched, the displayed date and time is deleted, but the time scale and the graphs remain unchanged.

1. On the Patient Information and Measurement Data screen, select the patient information that you to print.

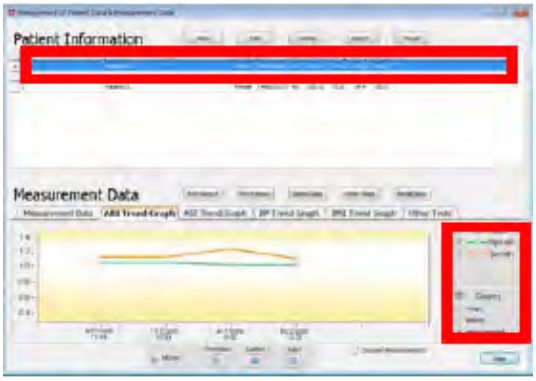


Figure125

2. Click Print History.

The Print History button is available when either one of the Measurement Data or the Other Tests display panels is selected

Print jobs can be run from the any of the following panels: ABI Trend Graph. ASI Trend Graph, or BP Trend Graph.

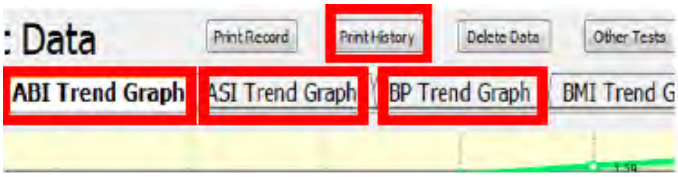


Figure126

3. Start the print job

Click on the Print" button on the print screen (Figure 127) and the printing begins

After printing, the "Print end" message will appear and the print screen will be automatically closed

Print style for Trend Graphs

The Trend Graphs print style generates a report like the ones in figures 128, 129, and 130. This report prints the data entered on the Trend Graphs screen. Detailed information about the data fields on the Trend Graph report are provided below.

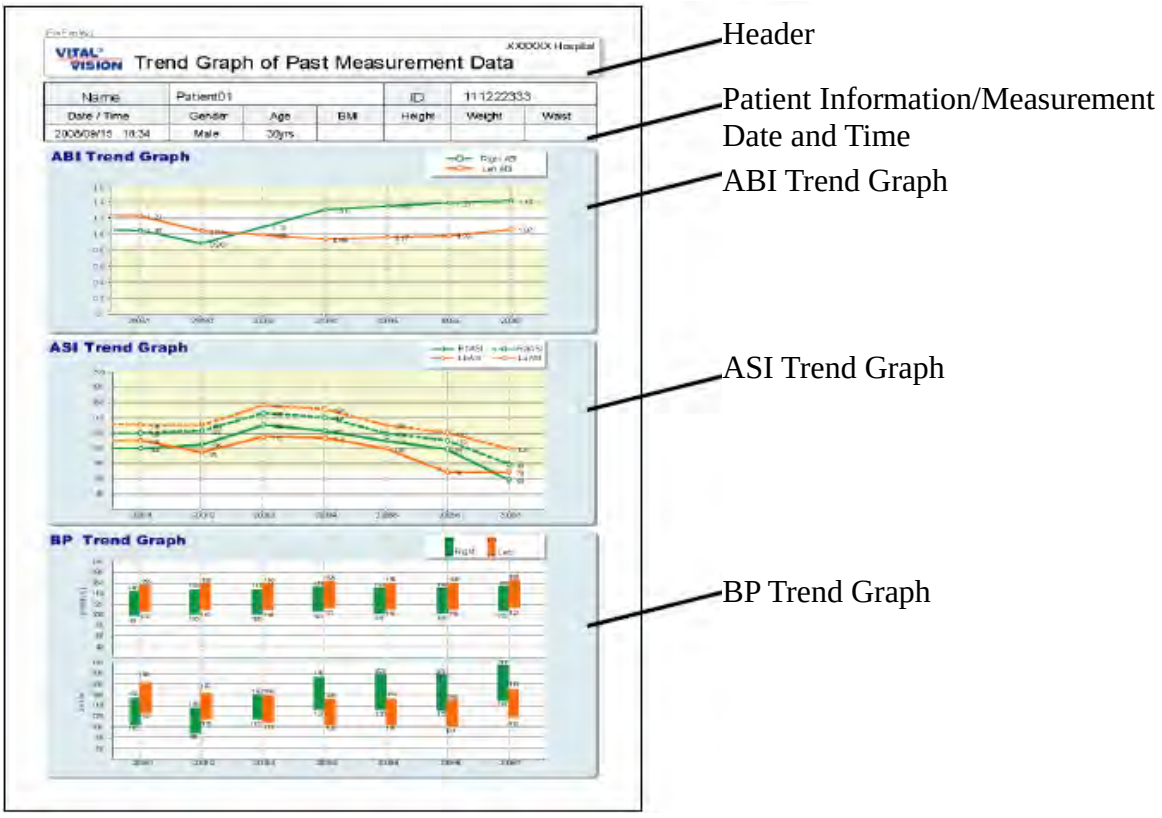


Figure128

Header

Displays the title and Facility information

> **Note:** the Facility information can be entered from the print setting section. Other information (address, etc) will not be displayed on the trend graph print outs. (Please refer to the “Print Setting” section on page 115 of this manual for detailed instructions)

Patient information/Date and time

This group of fields provides the patient information and the date and time of measurements.

Patient Information Date and Time report output field descriptions

Name of Display	Description
Date/Time	Displays the date and time of measurements
ID	Displays the ID number
Name	Displays the name

Gender	Displays the gender
Age	Displays the age
Height	Displays the height
Weight	Displays the weight
BMI	Displays the Body Mass Index
Waist	Displays the waist

Trend Graph reports

Prints the ABI, ASI, and blood pressure trend graphs

Note: The trend graph display reflects the Trend Graph Settings of the Patient Information and Measurement Data screen

ABI Trend Graph

Displays the trend graph of the ABI measurement data

Figure129 ABI Trend Graph

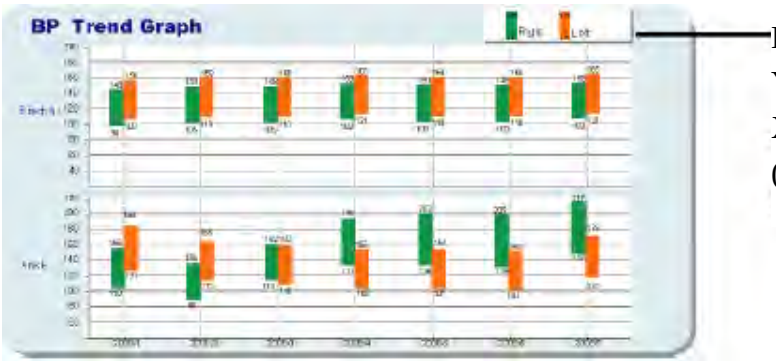
ASI Trend Graph

Displays the trend graph of the ASI measurement data

Figure130 ASI Trend Graph

BP Trend Graph

Displays the trend graph of the blood pressure measurement data



Legend
Y-axis: Blood Pressure
X-axis: Time
(or Order of Measurements)

Figure131 BP Trend Graph

7-03- Printing Other Tests reports on current data

Use the Print option on the Other Tests screen to generate reports from the other test data. You can use the Print Record option on the Patient Information and Measurement Data screen to create reports on previous data.

Print screen for Other Tests reports

Click Print on the Other Tests screen or the Print History button on the Patient Information and Measurement Data screen, to display the print screen (Figure 132). Descriptions of the report output fields are provided below.

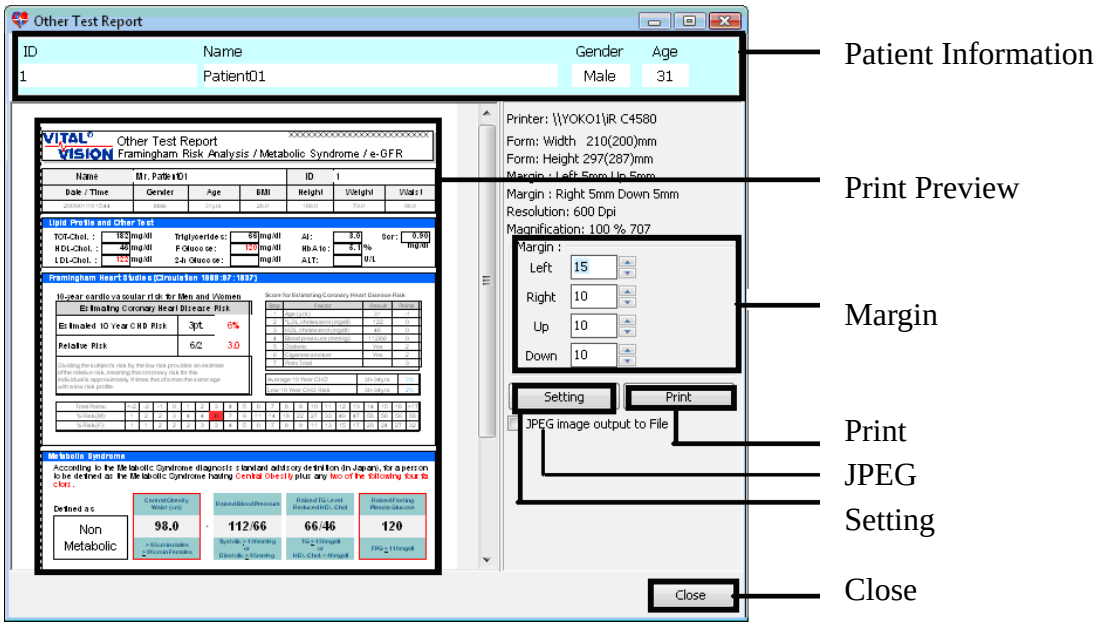


Figure132

Other Tests Reports report output field descriptions

Name of Display	Description
Patient Information	Displays the Patient Information
Print Preview	Displays the print preview Left click to zoom in Right click to zoom out
Margin	Set the blank spaces of the print outs.
Print	Carries out the print job
Setting	Opens the printer setting screen
JPEG	Check the check box then click on the “Print” button, the print image will then be saved in the JPEG format.
Close	Close the Print screen

Printing reports on current data

1. On the Other Tests screen, click Print to open the print screen.

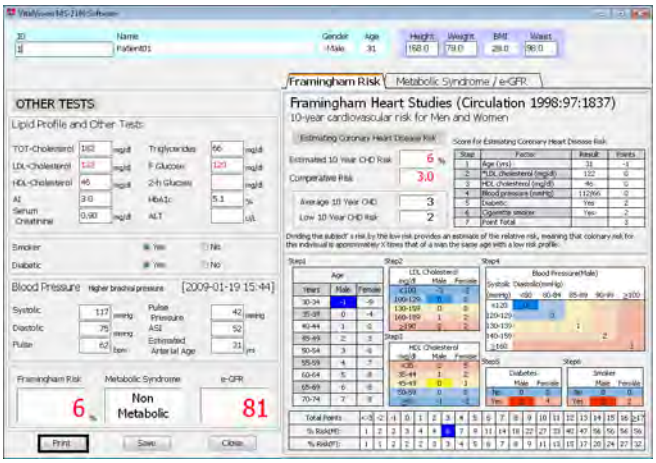
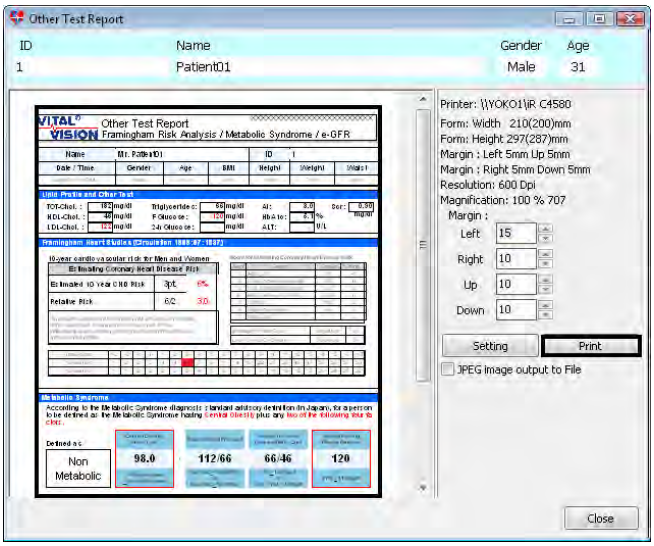


Figure133

The print preview is displayed on the print screen (Figure134).



2. On the Print screen, click Print.
3. Click Print to start the print job.

After printing, a “Print end” message is displayed and the print screen automatically closes (Figure 134).

When planning to print previous data

Carry out the print job from the Patient Information and Measurement Data screen

1. Selecting the patient information you wish to print

   Select the patient information you wish to print from the patient information list on the “Patient Information and Measurement Data” screen (Figure 135)

2. Selecting the information you wish to print

Select the blood profile you wish to print from the Other Tests panel of the Patient Information and Measurement Data screen (Figure 135).

The selected measurement data will be displayed in blue (differs depending on the computer settings)

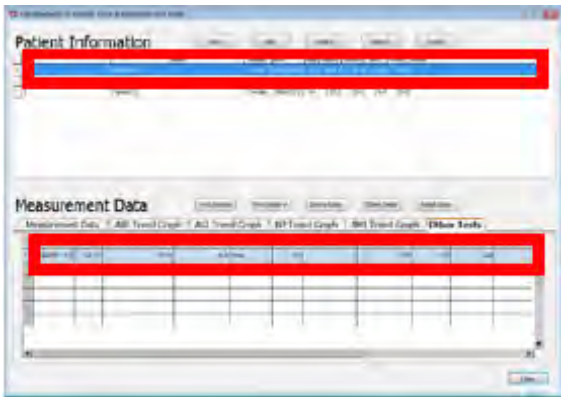


Figure135

3. Displaying the print screen

Click on the “Print Record” button on the “Patient Information and Measurement Data” screen (Figure 137) and the print screen will immediately be displayed (Figure 137)

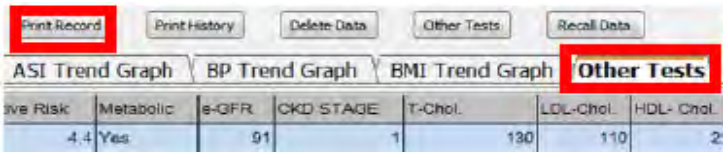


Figure136

6. Performing the print job

Click on the “Print” button on the print screen and the printing begins (Figure137).

After printing, the “Print end” message will appear and the print screen will be automatically closed

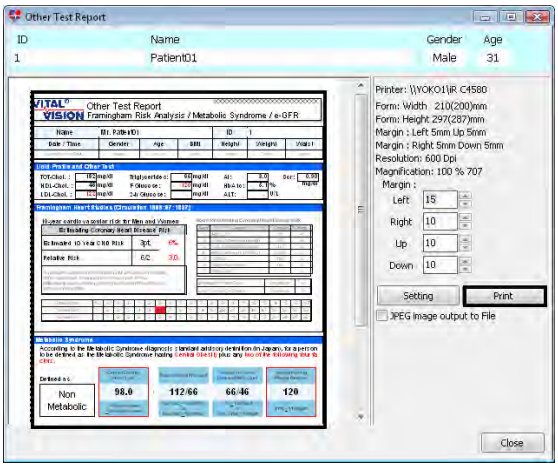


Figure137

Print style for Other Tests current data report

The Other Tests print style generates a report like the one in Fig. 138. Detailed information about the data fields is provided below.

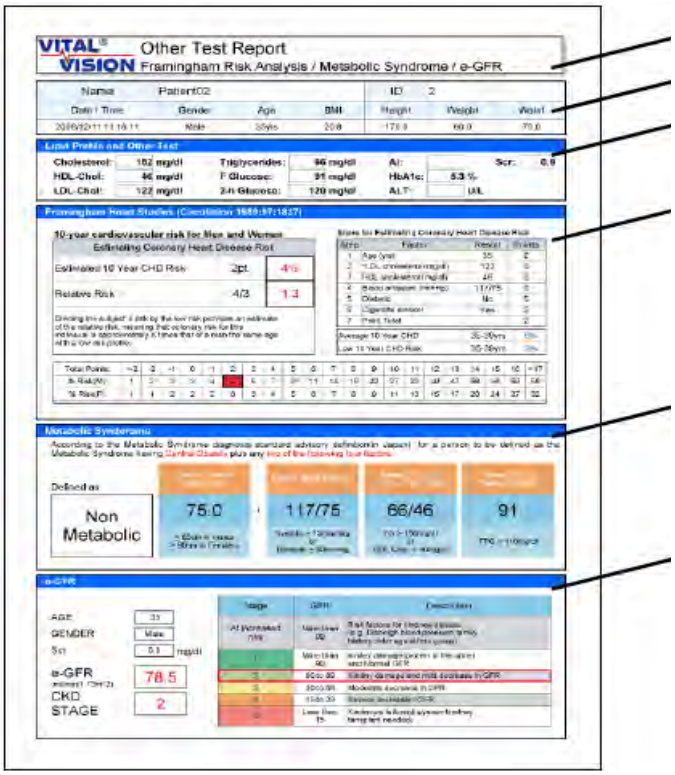


Figure138

Header

Displays the print title and the Facility information entered during the initial setting

> **Note:** The facility information can be entered from the option settings section. Other information (address, etc) will not be displayed.

Patient information/Date and time

These output fields displays the patient information and the date and time of printing.

Patient Information Date and Time report output field descriptions

Name of Display	Description
Date/Time	Displays the date and time of measurements
ID	Displays the ID number
Name	Displays the name
Gender	Displays the gender
Age	Displays the age

Height	Displays the height
Weight	Displays the weight
BMI	Displays the Body Mass Index
Waist	Displays the waist

Lipid Profile and Other Tests

Fig 139 calls out some of the output fields that can be included in a report on Lipid Profile and Other Tests data. Detailed descriptions of the fields are provided below.

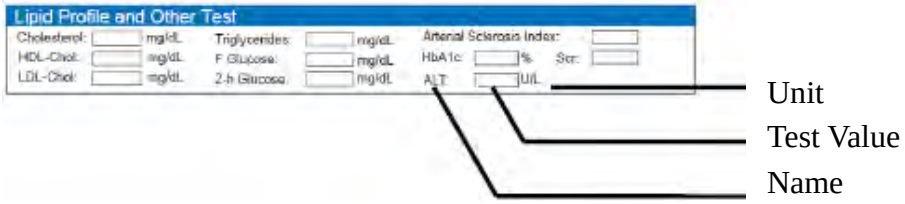


Figure139 Lipid Profile and Other Tests

Lipid Profile and Other Tests report output field descriptions

Name of Display	Description
Cholesterol	The total cholesterol level
LDL- Chol	The low density lipoprotein cholesterol level
HDL- Chol	The high density lipoprotein cholesterol level
Triglycerides	The triglycerides level
F. Glucose	Fasting blood glucose level
2 h Glucose	2 hour blood glucose level
HbA1c	Hemoglobin A1C (glycated hemoglobin)
ALT	Alanine Aminotransferase ;ALT
AI	Atherogenic Index = (T-Cho.– HDL)/HDL
Serum Creatinine	The Serum creatinine; Scr

Framingham Risk

Report output for Framingham Risk data includes the output fields shown in Figure 140. Values that are out of the standard range will be displayed in red

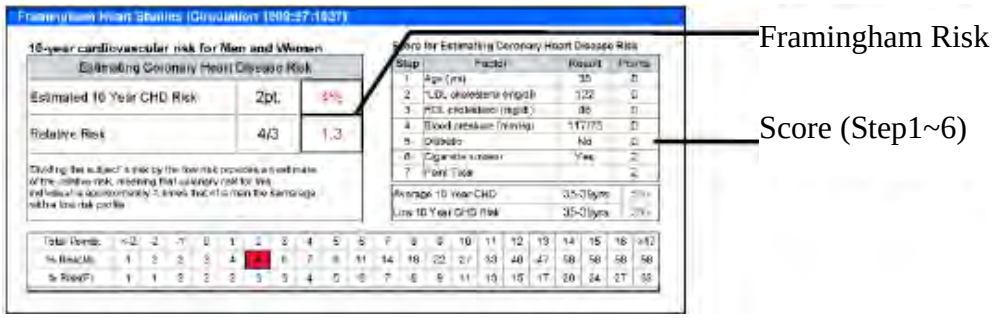


Figure140 Framingham Risk test results

Metabolic Syndrome

Report output for the Metabolic Syndrome results includes the data shown in Fig 141. Values that are out of the standard rage are displayed in red.

Figure141 Metabolic Syndrome test results as displayed on the Other Tests screen.

Estimated Glomerular Filtration Rate (e-GFR)

The data fields from the Estimated Glomerular Filtration Rate (e-GFR)) test are shown below. This data can be extracted in a report by using the Print function from the data display screen.

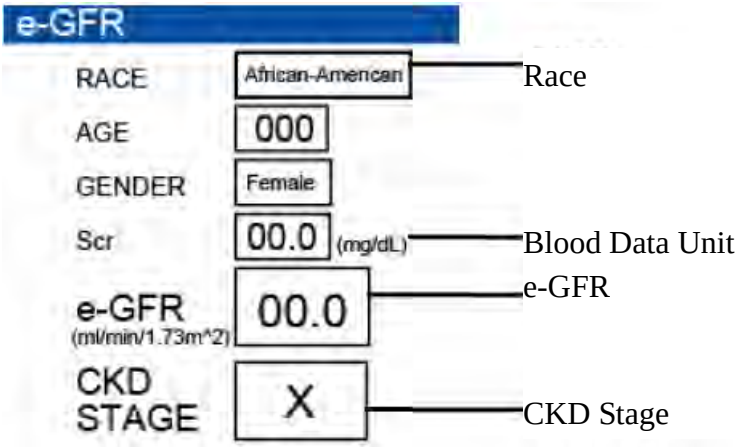


Figure142

9 Closing the application

1. When you are finished using the MS-2100 software program, close the application.
   - Click the Close button in the upper right corner of the screen, or select **Close** from the File menu. See Figure 143.
   - When the close confirmation message is displayed, click OK to close, or cancel to return to the measuring screen.

Figure143

2. Turn off the power switch. Then, unplug the AC adaptor.

10 The Help Feature

When you are using the software, click the Help button or press the F1 key to get additional information on a product function and how to use it.

Appendices

1 Initial Setting

When the MS-2100 software starts the first time, the Initial Setting screen is displayed to set the default values for the Metabolic Syndrome definition and the facility.

If you need to change the settings after the initial settings have been configured, click the Setting button on the measuring screen.

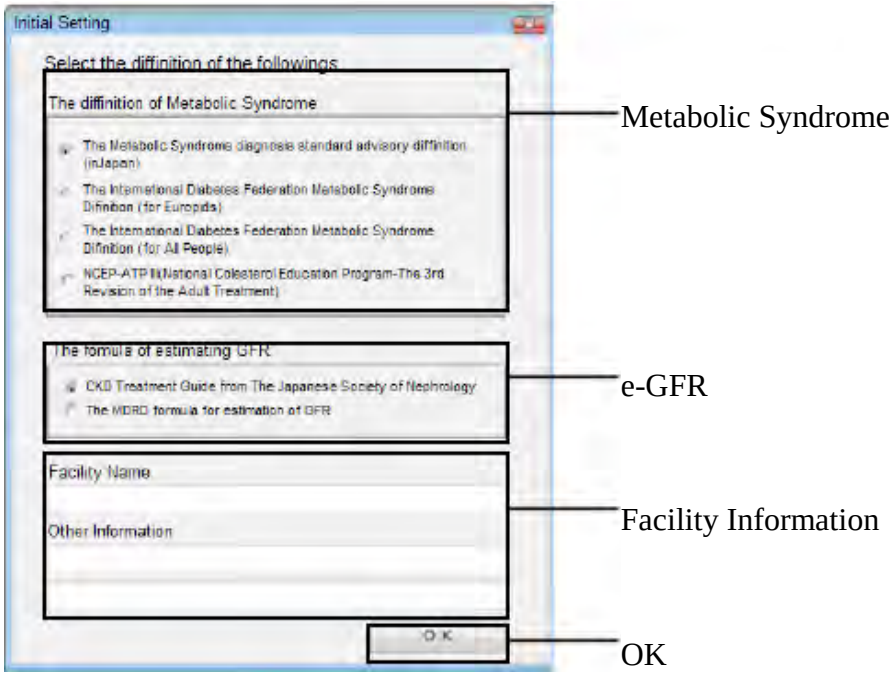


Figure144

Initial Settings window: field and button descriptions

Name of Display	Description
Metabolic Syndrome	Select the definition of the Metabolic Syndrome - The IDF Definition (For Europeans) - The IDF Definition (For All People except Europeans) - The Metabolic Syndrome diagnosis standard advisory definition (Japan) - The NCEP ATP III Standard Guideline
e-GFR	Select the formula to estimate GFR. (See page 161 for e-GFR reference information.) - CKD Treatment Guide from the Japanese Society of Nephrology - The MDRD formula for estimation of GFR

Facility Name	Enter the facility information that is used during printing
OK	Enables the setting and closes the screen

2 Option Setting

Use the Option Setting screen to configure default settings and options for measurement devices, communications, data management and printing. Click Setting on the measuring screen to open the Option Setting window.

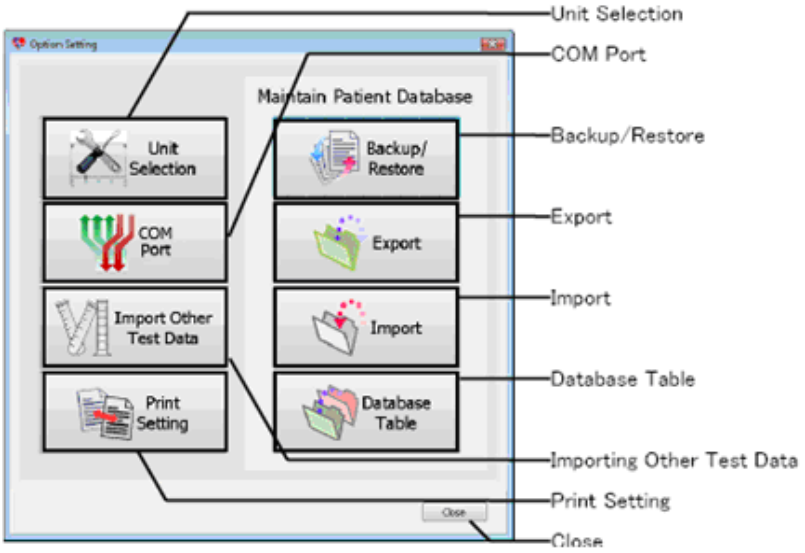


Figure145

Option Setting button descriptions

Name of Display	Description
Unit Selection	Opens the Unit Selection screen. Configures the diagnosis standard, the formula, the unit of pressure, the unit of blood test, ASI display, and the option bar.
COM Port	Opens the Serial Port window. Configures the serial port
Import Other Tests Data	Opens the Other Test Data screen Imports results of the blood lipid test
Print Setting	Opens the Print Setting screen Configures the print style, the next scheduled check-up date, and the Facility information.
Backup/Restore	Opens the Backup/Restore screen
Export	Opens the Export Screen Exports patient information and measurement data in the CSV format
Import	Opens the Import screen Imports the patient information into the database.

Database Table	Opens the Selected Database Table screen Switch to create a new table object
Close	Enables the settings and closes the screen

02-1 Unit Setting

Use the Unit Setting option to configures the measurement markers (ASI, Metabolic Syndrome, e-GFR), units, and the Menu bar display. On the Option Setting screen, click Unit Selection to open the Unit Selection window.

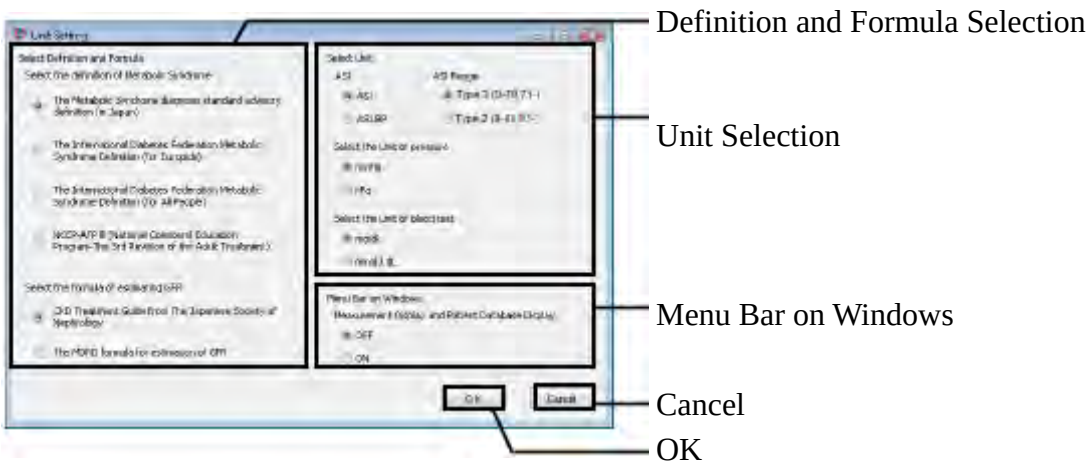


Figure146: Unit Selection screen

Field and button descriptions

Name of Display	Description
Select Definition and Formula	Select the definition and formula of the Metabolic Syndrome diagnosis.
	Select the formula of estimating GFR.
Select Unit	Configures the ASI Display.
	Configures the ASI Range.
	Select the Unit of pressure.
	Select the Unit of blood test.
Menu Bar on Windows	Configures the Measurement display and the Patient Database Display Settings.
OK	Enables the settings and returns to the Option Setting screen.
Cancel	Cancel the settings and return to the Option Setting screen.

Select Definition and Formula group

Use these options to select the definition of Metabolic Syndrome and the formula to estimate GFR.

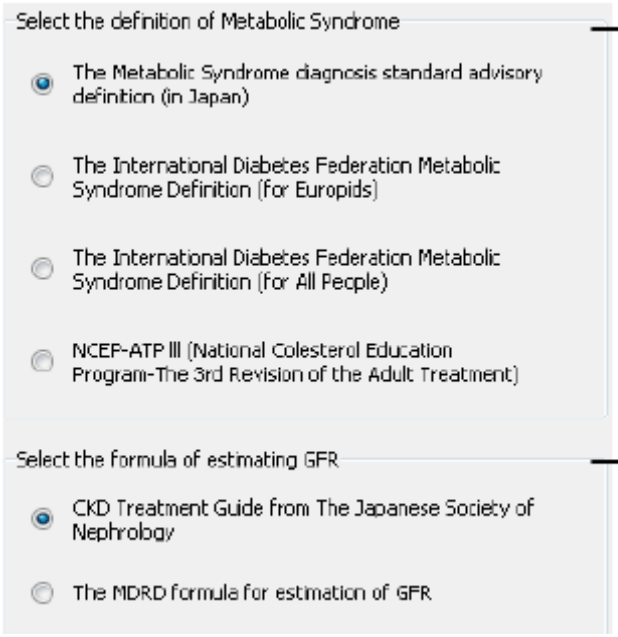


Figure147

Item of Setting	Definition of Setting
The Metabolic Syndrome Diagnosis	The Metabolic Syndrome diagnosis standard advisory definition (in Japan)
	The IDF definition (for Europeans)
	The IDF definition (for All People)
	The NCEP-ATP III definition
The formula of estimating GFR	CKD Treatment Guide from The Japanese Society of Nephrology
	The MCRD formula for estimation of GFR

Unit Setting group

Use these settings to configure the ASI display, the pressure unit, and the blood test results.

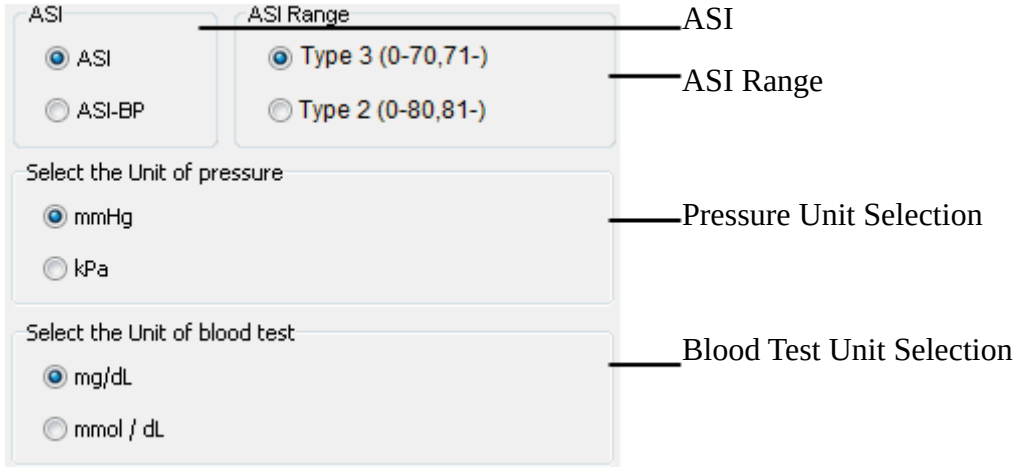
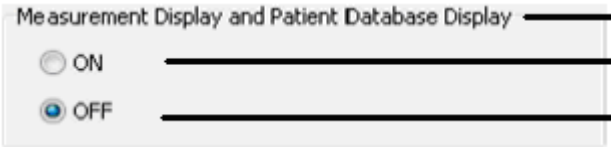


Figure148

Item of Setting	Unit of Setting			
ASI	ASI			
	ASI bp			
ASI Range	ASI Range	ASI Cardiovascular Risk	ASI	ASI bp
	Type 3	Low	<71	<130
		Intermediate	71-179	130-159
		High	180+	160+
	Type 2	Low	<81	<135
		Intermediate	81-209	135-164
		High	210+	165+
The Pressure Unit Selection	mmHg			
	kPa			
The Blood Test Unit Selection	mg/dL			
	mmol/ dL			

Menu Bar on Windows group

Use these options to configure the Menu Bar Display.



Measurement Display and Patient Database Display

Display On

Display Off

Figure149

Item of Setting	Setting
Measurement Display and Patient Database Display	ON
	OFF

02-2 COM Port

Use the COM Port option to set up the connection between the measurement device and the computer.

Note: If this the first time the device is being used with this computer, make sure that the USB driver program is installed on the computer before connecting the device.

COM Port device setting

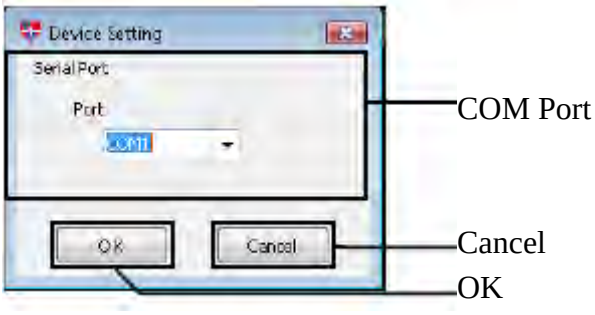


Figure150

(Descriptions on the buttons)

Name of Display	Description
Serial Port	Select the desired serial port. Serial ports that are registered on the computer system are displayed.
OK	Set the selected port as default and close the window.
Cancel	Forgo the selected port and close the window.

Setting the Serial Port

1. Before you begin, verify that the device and software are in the following state:
   - Turn on the power for the device.
   - Connect the device to the computer using the USB cable.
   - Make sure the USB driver program is successfully installed.
   - Verify which port is used to connect the device to the computer and select the port number.
2. Determine the port number used to connect the device to the computer.
3. On the Option Setting screen, click COM Port.
4. Select the Port. Then, click OK to set the port number.

02-3 Importing Other Test information

Use the Import Other Test Information function to transfer data such as blood lipid test results from a CSV file into the patient database of the MS-2100 software. After information has been imported, it can be managed using the MS-2100 software functions. You can only import data if the patient is already registered in the system.

Other Test Data File

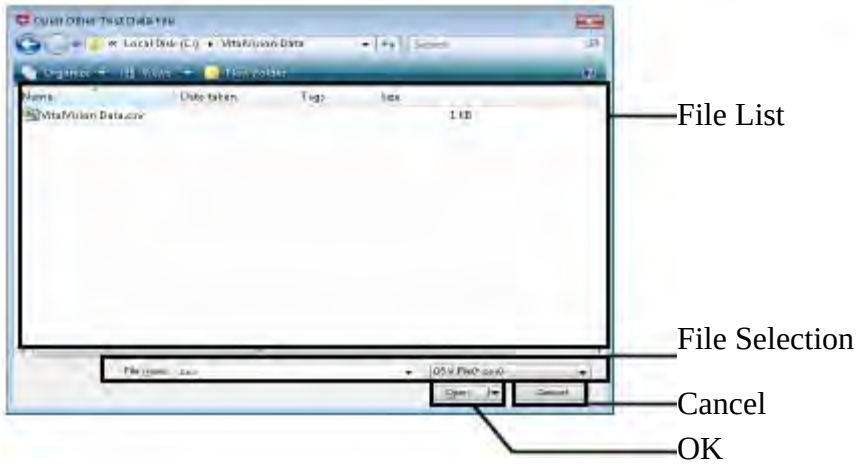


Figure151

Other Test Data File screen: field and button descriptions

Name of Display	Description
File List	Displays the CSV files that are to be imported
File Name	Type in the name of the file you wish to import
Open	Open the CSV file
Cancel	Forgo the selection and return to the Option Setting screen

Select Other Test Data File screen

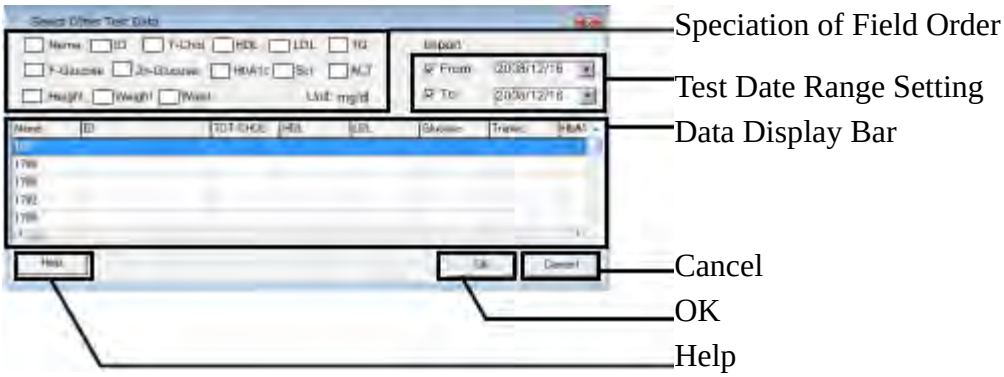


Figure152

Select Other Test Data File screen field and button descriptions

Name of Display	Description
Field Order Specification	Specify the field order of the CSV file to be imported The field order is saved so you can re-use it in subsequent import operations.
Test Date Range Setting	Specify the desired test date range of import
Data Display Box	Display the data to be imported
OK	Start the import
Cancel	Return to the Option Setting screen without saving your changes.

Importing other test data

Before you import a data file for a patient, make sure the patient is registered in the system. If the patient is not registered, the import operation will fail.

1. On the Option Setting screen, click Import Other Test Data button.
2. On the Open Other Test Data File window, select the data file to be imported.

   After the first data file selection, the directory which the data file was selected from is saved in the setting file. The directory becomes the default location that opens when you select files to import.
3. On the Select Other test data screen, select the fields to import, and then specify the field order.
4. In the Test Date Range Setting field, type the date range for the data you want to import.

02-4 Backing up and restoring your data

Use the Backup/Restore function to protect your data. You can only backup and restore data that is currently in use.

Backup/Restore screen

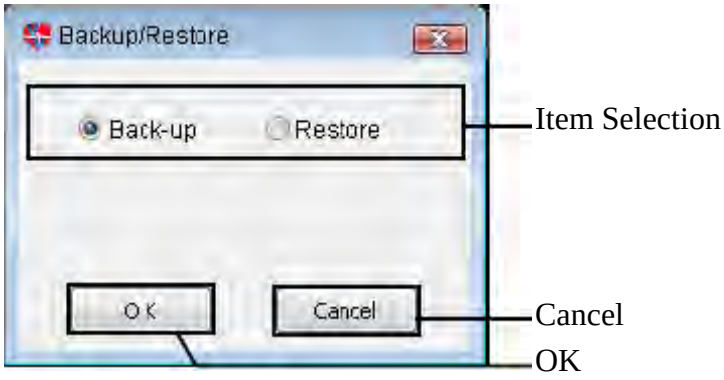


Figure153

Backup/Restore screen - field and button descriptions

Name of Display	Description
Selection of Task	Select the task to be carried out (Backup or Restore)
OK	Back-up: start the backup Restore: start to restore
Cancel	Forgo the selection and return to the Option Setting screen.

Backing up data

1. On the Option Setting screen, click Backup/Restore.
2. Click either the Backup or Restore option as required. Then, click OK.

Restoring Data

If the data is damaged during the combine and import process, use the Restore option to bring back the original data file.

1. On the Menu screen, click Restore.

Figure176

2. Click on the “Open TB” button to select the DB table you wish to restore.

Figure177

Figure178

3. Click OK to restore the selected data.

Note: If the restore job fails, save the data in the CSV format first, then contact your retailer.

02-5 Exporting data

Use the Export function to transfer the measurement data and patient information stored in the MS-2100 database to a CSV file that can be used in other applications. Before you can export data, you must agree to the conditions under which data can be exported. These conditions are presented to you during the Export process.

To process data efficiently and increase the chance of success, do not run any other tasks during the Export. The amount of time required to export the data depends on the amount of data being transferred.

Export window

Figure154

Exporting data in CSV format:

1. On the Option Setting window, click Export.
2. On the Caution screen, review the terms under which data can be exported.
   You cannot export data unless you agree to these terms.

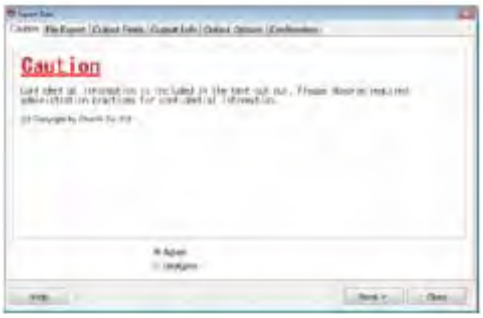


   Figure155

3. If you agree with the terms, click Agree. Then, click Next.
4. On the File Export page, specify the directory location and file name for the information you want to export. To change the directory or file, click the Open button next to each field to find the information.

Figure156

5. After selecting the directory, click Next.
6. On the Output Field one screen, choose the export data:
   - Select the table you want to export.
   - In the table, select the name of the patient and specify a date range to select the measurements for export.
     You can select more than one patient or all patients.
     To export all available measurement data, leave the date range field blank.

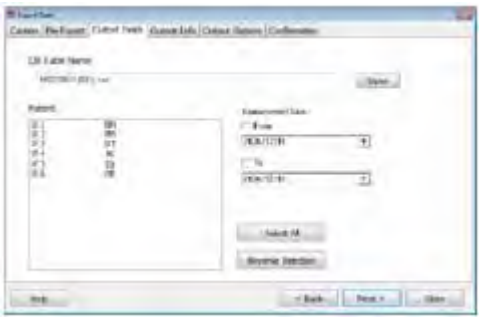


Figure157

7. After selecting the patient and the date interval, click Next.
8. On the Output Field 2 screen, check the box next to each item of patient information or measurement data you want to export. To remove a selection, click the check box again.

Figure158

9. Click Next to select the following Output Options:
   - Check Include Header Information to export the item name of the data.
   - Check ”*” *indicating patient data change* to display an “*” before the field column whenever the patient information being exported is changed.

   Select the options for text output.

Figure159

10. Click Next to verify the directory and output source terminal settings.

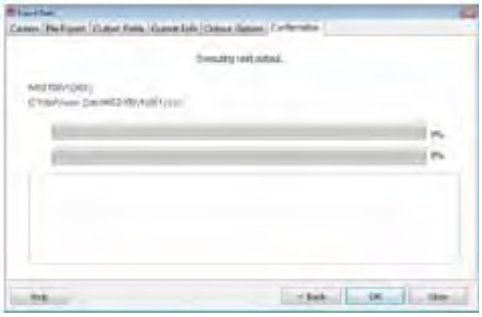


Figure160

11. Click OK to export the data.

    During the export process, the green status bar tracks the entire process; the blue bar tracks the status of the folder processing.

Figure161

If the export is completed successfully, a "Export Completed” message is displayed. Then, you can close the Export screen.

If the export did not complete successfully, verify the output destination and try to export the data again. The amount of time required to export the data depends on the amount of data being transferred. The output speed differs depending on the size of the output data.

Verifying the output data after export

The following table lists the export items that might display on the output terminal. Use these examples to verify the exported data.

Name of Display	Description
Date/Time	Exports the date and time of measurements
ID	Exports the ID number
Name	Exports the name
Gender	Exports the gender
Age	Exports the age
Height	Exports the height
Weight	Exports the weight
BMI	Exports the Body Mass Index
Waist	Exports the waist
Comment	Export the comment

Name of Display	Description
Data No.	Exports the Data No.
Date	Exports the date and time of measurements
Exercise	Exports the presence of exercise status
Measurement site	Exports the measurement site
Right ABI	Exports the right ABI
Left ABI	Exports the Left ABI
Pulse	Exports the pulse number
Memo	Exports the measurement memo
ASI	Exports the ASI of each measurement site.
SYS	Exports the systolic pressure of each measurement site.
DIA	Exports the diastolic pressure of each measurement site.
PP	Exports the pulse pressure value of each measurement site
Flag	Exports the flags that correspond to the data
!	IRRHB
*	Err205

02-6 Importing patient information

Use the Import function to transfer patient information (name, sex, date of birth, age, ID, height, weight, BMI, comment) from the CSV folder into the MS-2100 software database.

Before importing patient information, the data must be formatted so that it can be integrated into the existing MS-2100 database structure. You can use the Format export function to help prepare the data to be integrated into the application database. This function generates an import template in CSV format that can help tailor the patient information according to the output format so that it can be imported into the MS-2100 patient information records.

Note: When you import data, make sure that the ID value is at most 20 half-sized alphanumeric characters, or else proper import cannot be carried out.

To configure the import settings, click Import on the Option Setting screen to open the Import window.

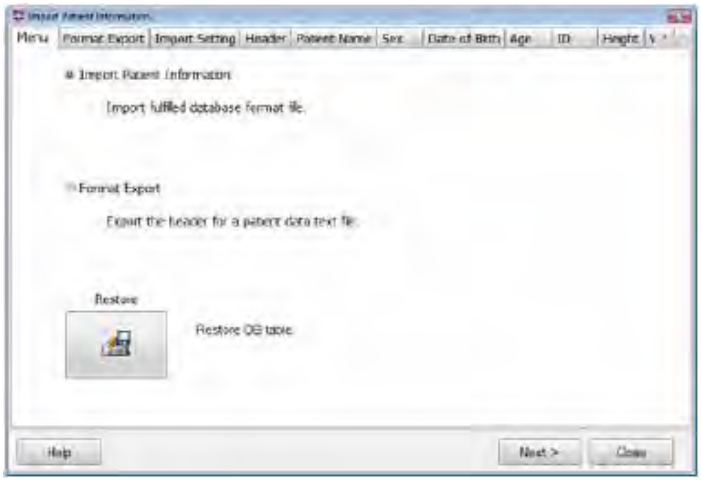


Figure162 Import window

Format Export

The template data (header information) can be exported, and patient information created by external programs can be imported into the MS-2100 database.

Exporting the header (creating the template of import data)

The Format export functions is used to export template data (header information) so it can be used to format patient information created by external programs which can then be imported into the MS-2100 database.

1. On the Format Export panel, select the option to format the export header for a patient data text file.

Figure163 Format Export panel

2. In the output destination and file name fields, type the destination location for the header file.

   The default output destination is the Data VitalVision Data folder. Click Open to select a different destination file.

   Figure164

3. Click OK to start the format export.

   A message is displayed when the format export completes.

4. Click OK to end the export task.

Note: Open the already saved CSV folder under the Format Export panel, then type in the patient information or cut and paste from other folders. Also, make sure that the items are correct when cutting and pasting information. If all items are correct, the overwriting or saving operations can be carried out to complete the data import.

Importing the data

Open the MS-2100 program compatible CSV folders that contain fulfilled database format files into the database.

Note: Limit the ID number to 20 half-sized alphanumeric characters, or else proper import cannot be carried out.

Name of Header	Text Entering Condition
Name (required)	Within 40 characters
Sex (required)	M(Half-width) or F(Half-width)
Date of Birth (required)	YYYY/MM/DD (Half-width)
Age (required)	Half-width numeric characters
Patient ID	Limit of 20 half-width alphanumeric characters (contains no dash and

	space)
Height (cm)	Half-width numeric characters
Weight (kg)	Half-width numeric characters
Memo	Limit of 120 characters

1. On the menu, click Import Patient Information option on the “Menu” panel (Figure 165). Then click Next button to display the Import Setting screen.

Figure165

2. Select a CSV folder:
   - On the Import Setting screen, create an import folder (directory) and a file name or specify an existing CSV folder and file.
   - Click Read to preview the CSV folder.
   - To change the CSV folder, click Open to specify the disk and the folder name.
3. On the Import Setting panel (Figure 166), click Next to open the Header screen.

Figure166

4. On the Header screen, specify Yes to import the header if desired.
   When you select this option, the headers are created after the line numbers are specified.
5. Click on Next to open the Name screen.

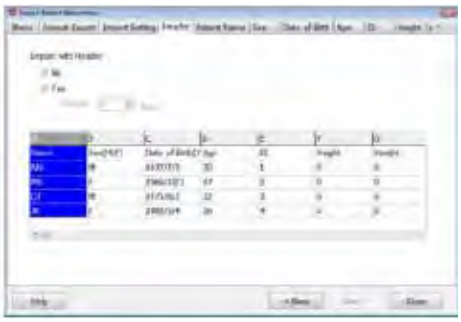


Figure167

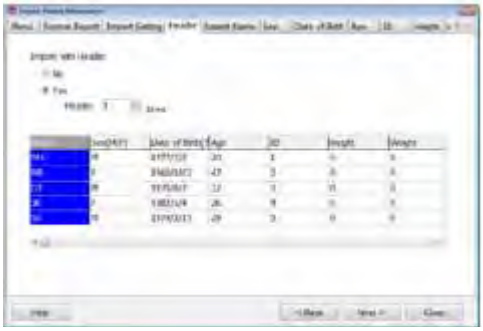


Figure168

6. Select the columns (rows) for the data.
   - Double click the names from the patient list to select them. Then, click Next.
   - On the Sex screen, specify the sex, date of birth, age, ID, height, weight, waist, comment and the table columns using the same method. To skip the ID, height, weight, BMI, waist and comments fields, click Skip.
   - After specifying the comments, click Next to display the DB Table screen.

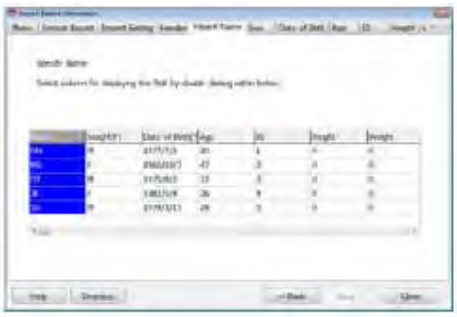


Figure 169

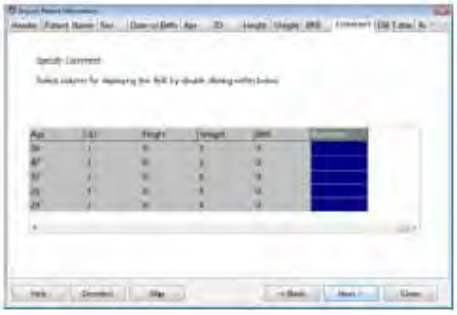


Figure170

Note: If the specified location is incorrect, click Deselect to undo the selection, and then double click on the correct location.

7. To select the table for import, click the Open TB button to select an existing table, or create and save a new table.

Figure 171

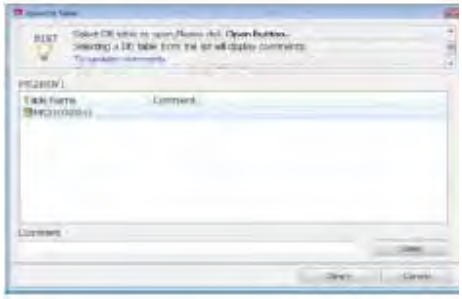


Figure172

8. To specify the import conditions, select an existing DB table. Then, select the settings to manage data when a table already exists.

   - Configure settings to manage data when the DB table already exists.

     Select the “Delete the DB table with the same DB table name, and create new DB table” option to delete the existing DB table and create a new DB table.

     If you select the “add the data to the DB table with the same DB table name” option, data is added to the DB table with the same folder name. If you decide to add to an existing table, set the option to check for duplicate IDs to prevent overwriting of patient data.
   - Configure settings to manage data when a name matches a name already in the database.

     When Identical ID, name, and sex is existed.

     After selecting “ Confirmed ID and Name” , the patient information that has the identical name, sex, and date of birth won't be registered into the database.

9. After configuring the import settings, click Next to go to the Confirmation panel (Figure 173).

10. Click OK to import the data. Do not run any other tasks during the process.

    During the import process, a status bar displays to track the process.

Figure 173

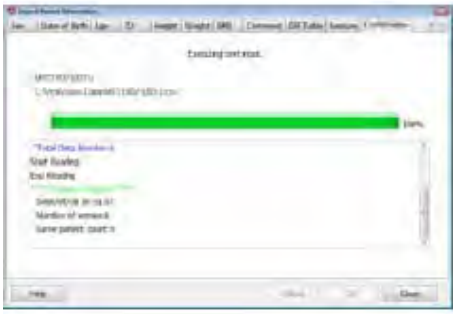


Figure174

11. When the process is completed, a confirmation message displays. Click OK to end the task.

Reviewing imported data

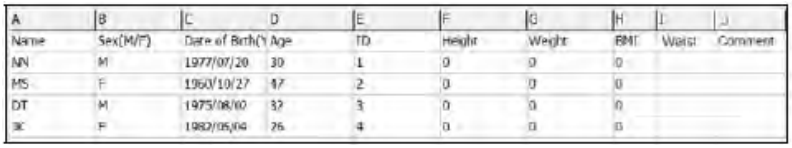
The import log data provides the following types of information about the import job.

- Number of errors.
- Number of data with their required field left empty or in incorrect format.
- Number of entries.
- Amount of readable data.
- Same patient
- Number of unreadable data due to the selection of identical ID's or identical names.

If the import process is not successful, verify the following items in the import data files before trying to run the process again:

- ☐ Data is formatted in CSV text format.
- ☐ The following required fields all contain a value: `name`, `sex`, `date of birth` and `age`.
- ☐ Each item uses the correct selection order.
- ☐ All field values are entered correctly.
- ☐ Values for the Gender field are entered as `M` or `F`.
- ☐ The date of birth is specified in `YYYY/MM/DD` format.

The following example shows an arrangement of imported data in the database.



A	B	C	D	E	F	G	H	I	J
Name	Sex(M/F)	Date of Birth(Y	Age	TD	Height	Weight	BMI	Waist	Comment
MN	M	1977/07/20	30	1	0	0	0		
MS	F	1960/10/27	47	2	0	0	0		
DT	M	1975/08/10	32	3	0	0	0		
JC	F	1982/05/04	26	4	0	0	0		

Figure175

Note: Don't proceed other performance while in restoring data.

Do ID number under Half-width Alphanumeric, Font size: 20.

02-7 Restoring Data

If the data is damaged during the combine and import process, use the Restore option to bring back the original data file.

1. On the Menu screen, click Restore.

Figure176

2. Click Open TB to select the DB table you wish to restore.

Figure177

Figure178

3. Click OK to restore the selected data.

Note: If the restore job fails, save the data in the CSV format first, then contact your retailer.

02-8 Managing DB Tables

After the MS-2100 software is installed, the DB table is created automatically.

However, you can view, edit and create a DB table if necessary. For details, see the following procedures.

- Opening the DB table on page 140.
- Creating a new DB table on page 141.

Note: The VitalVision Data folder is automatically created on the C drive when the MS-2100 software is installed. All the patient information and measurement data created and used by the MS-2100 software program is saved in the VitalVision Data folder . To change the location where data is saved, follow the configuration process documented for the Windows ODBC setting screen.

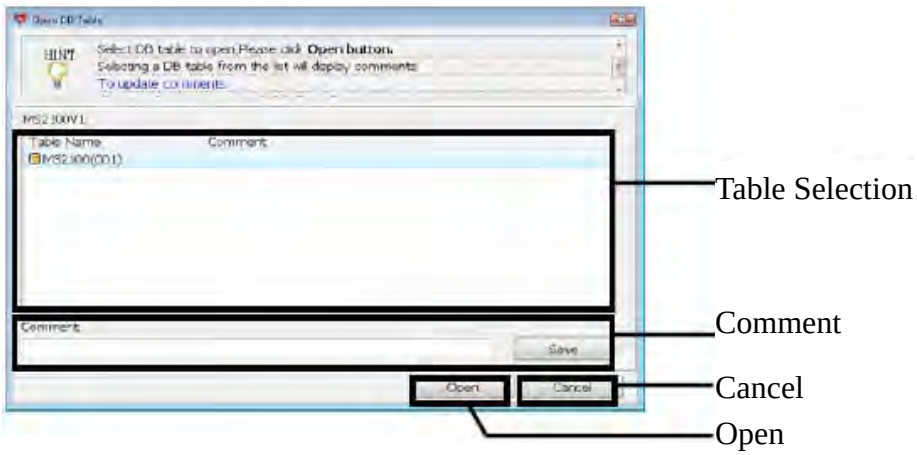


Figure181 Open DB Table screen

Open DB Table field and button descriptions

Name of Display	Description
DB Table list	Displays the registered DB tables.
Comment	Type in the comments and click on the “Save” button to save.
Open	Switches the DB table. Once this button is clicked, the “Restart the program” message will be displayed
Cancel	Forgo the selections and return to the Option Setting screen

Opening the DB table

1. On the Option Setting screen, click the Database Table button.
2. In the DB table list, highlight name of the DB table you want to open and click to select it.

After you select, the DB table is displayed blue. After the table is attached with descriptions,

you can view the content in the Comment box. If you want to change a comment, click Edit Comment.

3. Click Open button to open the DB table.
4. Click Cancel to return to the Option Setting screen without opening the database.

Creating a new DB table

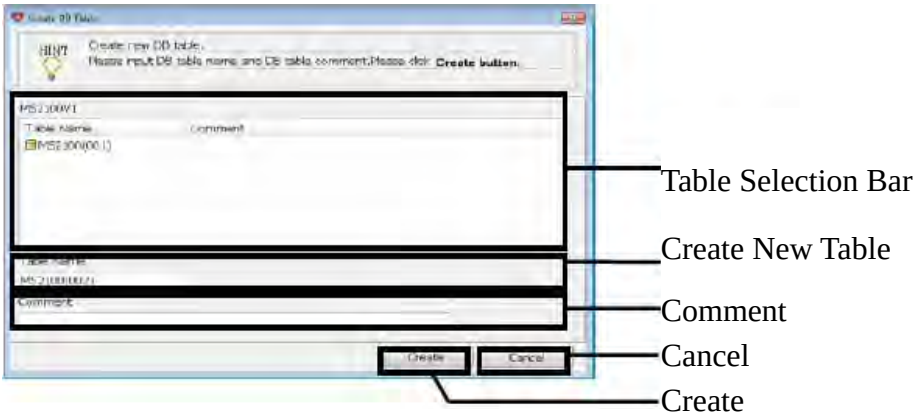


Figure182 Create DB Table

Create DB Table - field and button descriptions

Name of Display	Description
DB Table list	Displays the registered DB tables
Create New Table	Input the new DB table name and click on the “Create” button to create the new DB table.
Create	Creates new DB table. Once this button is clicked, the “Restart the program” message will be displayed
Cancel	Forgo the selections and return to the Option Setting screen

Creating a new DB table

1. On the Option Setting screen, press and hold the Shift key on the keyboard and click on the Database Table button.
2. In the DB table list, highlight name of the DB table you want to open and click to select it.
3. In the Table Name field, type a name for the new DB table.
   The DB table name is limited to 50 half-sized alphanumeric characters.
4. Optionally, type any necessary comments to the DB table in the Comment box. The value must be less than 40 characters. (To edit comments, see the comments in the comment box can be verified and edited from the “Open DB Table” window.
5. Click on the “Create” button to create DB table.
   Once the “Cancel” button is clicked, the inputted information will be cancelled and the system will return to the previous screen display.

02-9 Setting Print options

Use Print setting to select the type of data to print and configure the print style.

Each line of the Facility information section can contain up to 30 bytes

To specify the print options, click Print Setting on the Option Setting screen to open the Print style setting screen.

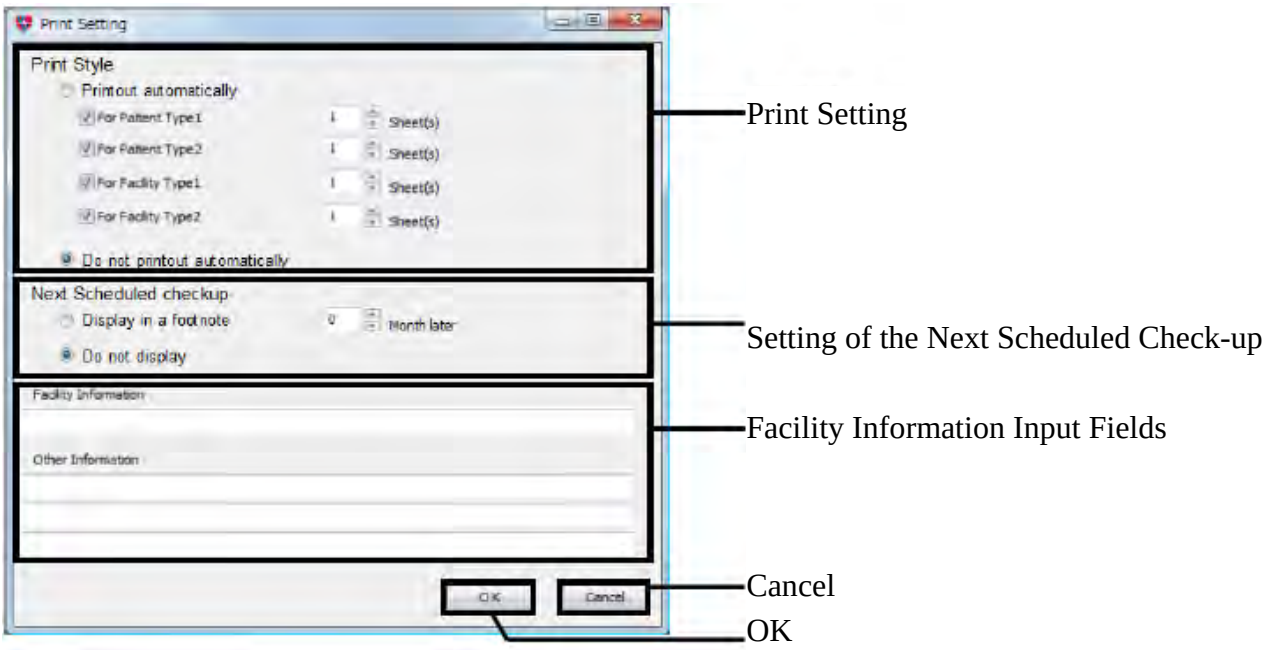


Figure183 Print Setting screen

Print Setting - field and button descriptions

Name of Display	Description
Print Style	Configures the print style and automatically based on the following option settings: - Print automatically. Automatically prints reports after the measurement is complete. You can also configure the report type and copy numbers. - Do not print automatically. Do not print the report automatically when measurement completes.
Next Scheduled checkup	Select whether to print appointment information for the next scheduled check up. - Print (Display) Display the next scheduled checkup on the report for patient The next scheduled checkup can be adjusted in the unit of months - Do not print or Do not display) Do not display the next scheduled checkup on the report for patient.

Facility Information Box	Input the Facility information here to include it on the reports.
Cancel	Close the Settings screen without saving the configuration changes and return to the Option Setting screen.
OK	Carry out the configuration and return to the Option Setting screen.

3 Setting up the Printer

Select a printer that is connected to Windows (online).

Note: This window differs depending on different OS types/versions

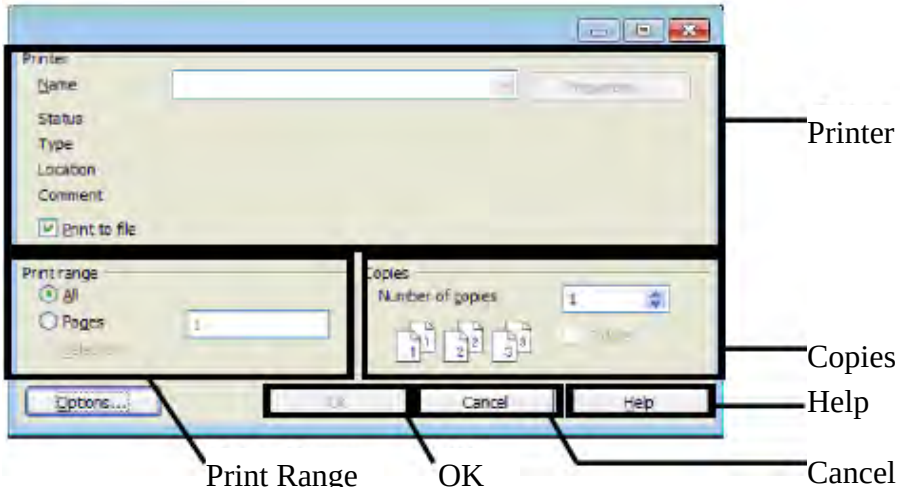


Figure184 Printer Setup screen

Print Setting - field and button descriptions

Name of Display	Description
Printer	Select a printer that is connected to Windows (online) After you specify the number of copies, you are can configure more advanced options such as print quality.
Print range	Configures the range of pages to print, for example, pages 5-8. This option setting is not reflected on the print setting.
Copies	Configures the number of copies to print.
OK	Enable the configuration and close the window.
Cancel	Close the window without saving the configuration changes.
Help	Open online help.

4 Configuring the start up screen

Use the Help About function to configure the startup screen display. You can also use this function to check the device label and software version.

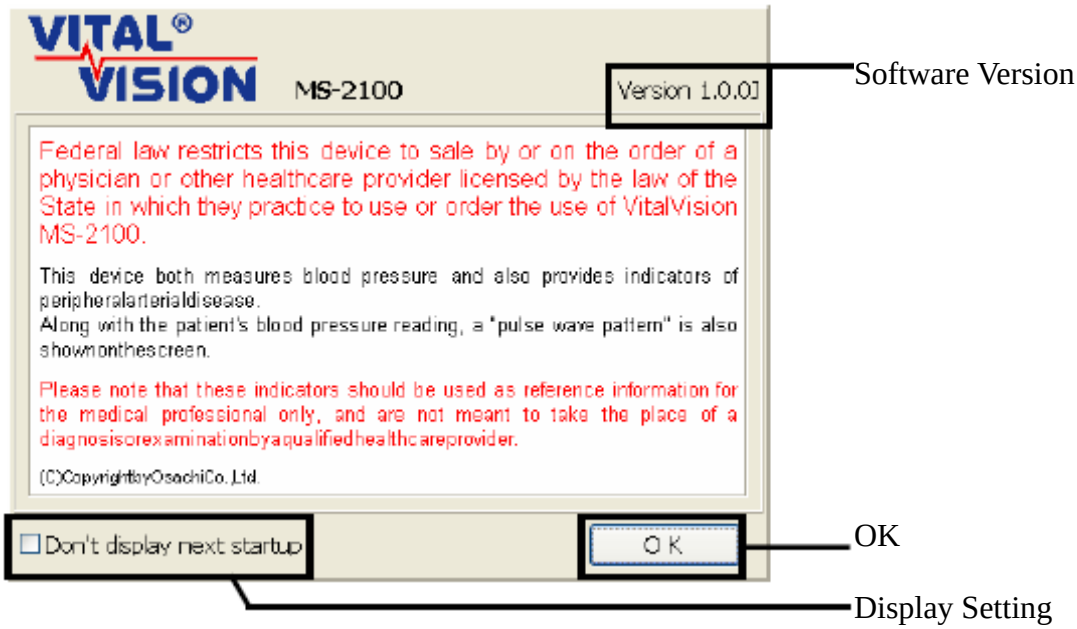


Figure185 Startup Screen

1. On the Measuring screen, click Help About.
2. On the Startup screen, use the Don't display next startup check box to configure the start up behavior:
   - Check the box to display the Startup screen the next time the MS-2100 device is activated.
   - If you do not want this screen to display at device activation, remove any selection from the "Don't display next startup" selection field.
3. Click OK to save your changes.

Appendices

01 Error Messages

Error messages can occur because of machine-related problems (device, software, communication) or because of inaccurate measurements. Use the information in this section to troubleshoot any error messages you encounter while operating the MS-2100 software or blood pressure cuff.

Errors related to the Microsoft Windows operation

Errors can occur because of problems related to the Microsoft Windows operating system. If you encounter these types of errors, close the Windows application being affected. Then, try the following actions in this order:

- Re-run the task that was running when the error occurred.
- Close and restart the VitalVision MS-2100 software.
- Restart the computer.

MS-2100 Error messages

The MS-2100 error messages are classified into the following categories based on message number. For details on specific message types numbers, see the detailed message descriptions

Error Message Types

Message numbers	Error Type	For details, see...
1-11	Device	page 147
100 and 101- 108	Communication – software & device	page 148
100 - 150	Software	page 149
180 - 181	Measurement	page 149
200 - 206	ASI (Arterial Stiffness Index)	page 154
300 - 302	ABI (Arterial Brachial Index)	page 153

Device Error Messages

Error No.	Error Name	Solution
Error002	Insufficient pressure	Please make sure that the blood pressure cuff is properly wrapped and applied, then measure again.

Error003	Mixed interference	When measurements are taken in the sitting position, please have the patient's feet step on the floor and wait till he/she reaches a stable condition to measure again. When measuring the limbs, please make sure that the patient is lying down, and a stable condition is reached before re-measurements.
Error004	Air-release rate error	Please re-apply the cuff and measure again
Error005	Pulse waveform undetectable	Please make sure that the cuff is applied properly

Communication Errors - Software and Device

Error No.	**Error Name**	**Solution**
Error100	Please check the power source and the connection of the device	Please make sure that the power source of the device is under a printable status. Please also make sure that the MS-2100 device is properly connected to the computer. The connecting cable may experience damages, if this is the case, please replace it with a new cable. Please make sure that the USB port on the computer is usable. Please restart the computer.
Error104	Check if the device is ready	Please turn off the device power temporarily, then reconnect it and start the measurements again. Please restart the computer
Error105	The device is currently under the measuring status	The device is currently in measuring or calculation mode, please wait for the run to end. If the run does not end, please turn off the device power temporarily, then turn on the power and measure again. Please restart the computer
Error106	Error encountered during measurements	Please turn off the device power temporarily, then reconnect it and start the measurements again. If error messages continue to appear, the device may require repair. Please restart the computer.
Error108	The total pulse waveform amplitude wasn't obtained successfully	Please measure again Please restart the computer
Error151	Error occurred during ASI calculations	Close unnecessary programs and restart the computer Please make sure that the cuff is applied properly.
Error152	Error occurred when during ASI calculations. The High/Low blood pressure doesn't exist.	Please restart the computer Please make sure that the cuff is applied properly

Error153	Error occurred when during ASI calculations. The pulse waveform amplitude did not reach the value required for ASI calculations.	Please restart the computer Please make sure that the cuff is applied properly
Error155	The pressure data exceeds the range of saving	Please restart the computer Please make sure that the cuff is applied properly
Error156	The pulse waveform amplitude exceeds the range of saving	Please restart the computer Please re-apply the cuff and measure again

Measurement Errors

Error No.	Error Name	Solution
Error180	Air-discharge rate too slow XXXmmHg	Please re-apply the cuff and measure again Please restart the computer
Error181	Air-discharge rate too fast XXXmmHg	Please re-apply the cuff and measure again Please restart the computer

ASI Errors

Error No.	Error Name	Solution
Error200	Displayed when shaking or irregular pulse wave intervals occur during measurements. The measurement results may be inaccurate. Recommended to measure again.	Recommended to measure a few times to verify the measurement results. Please do not speak during measurements. Please make sure that the cuff is applied properly and that the patient is positioned properly during measurements.
Error201	The ASI value may be inaccurate when the pulse pressure (High blood pressure - Low blood pressure)	
Error202	The ASI value may be inaccurate when the low blood pressure is lower than 50mmHg.	
Error203	The ASI value may be inaccurate when the pulse number is lower than 50 beats per minute	
Error204	The measuring cannot be carried out accurately if the pulse waveform signal reaches the upper limit of the display screen during measurements	
Error205	The measurement results may be in accurate. Recommended to measure again	
Error206	Displayed when shaking or irregular pulse wave intervals occur during measurements. The measurement results may be inaccurate. Recommended to measure again.	

ABI Error Messages

Error300	The estimated ankle blood pressure is extremely low and is estimated to be less than XXmmHg.	Recommended to measure a few times to verify the measurement results. Please do not speak during measurements. Please make sure that the cuff is applied properly and that the patient is positioned properly during measurements.
Error301	Measurements cannot be taken because the pulse is too weak, or the pulse number is too small.	
Error302	The blood vessels at the ankle may be blocked, thus measurements cannot be taken	
Error	Another error has occurred Error Code = xxx	

In situations where even the above solutions do not solve the problem, turn off the power to the device and contact your retailer.

02 Oscillometric Method

When the pressure cuff is wrapped around the arm and pressed against the artery for blood pressure measurements, the arterial pulse below the cuff causes tiny oscillations that are the basis for the oscillometric method. The oscillometric method is the same as the ausculatory method in that the pressure cuff is applied around the brachium so the cuff pressure exceeds the systolic pressure. The pressure of the cuff is then slowly released (decreased). When the cuff pressure is higher than the systolic pressure, the artery is stressed or compressed and the pulse is interrupted. After the cuff pressure lowers and becomes similar to the systolic pressure, the arterial pulse under the cuff starts again. At this point, this action of the blood vessel wall is directed towards the body and directed towards the cuff with extremely little change on the vessel volume. Because there is enough air presented within the cuff, this extremely tiny change of volume can be treated as the volume change within the cuff. After the cuff pressure becomes lower than the systolic pressure, this tiny pressure change appears in stratifications. If you continue to lower the cuff pressure, the pressure change amplitude increases slowly. When the average blood pressure equals the cuff pressure, the pulse waveform amplitude is at its highest. From that point on, the pulse wave amplitude slowly attenuates during the period where the cuff pressure lowers to approach the diastolic pressure. The arterial pulse won't start until the cuff pressure reaches the systolic pressure, thus, this change of pulse waveform amplitude is used to interpret the average blood pressure and the diastolic pressure.

Figure 1-1 shows the critical points in pulse waveform amplitude used to determine blood pressure:

- The systolic pressure is determined at the starting point of the pulse waveform increase
- The average blood pressure is determined at the point where the pulse waveform amplitude is at its greatest
- The diastolic pressure is determined at the starting point of rapid decrease is determined to be the diastolic pressure. (Figure1-1)

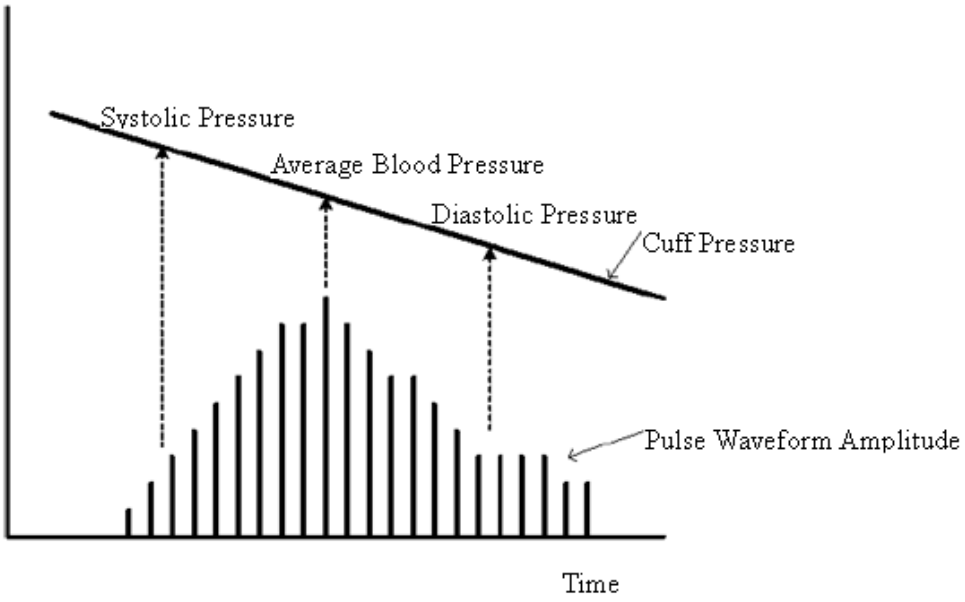


Figure1-1 The relationship between the cuff pressure and the pulse waveform amplitude.

03 Ankle Brachial Index (ABI)

The value derived by dividing the higher brachial systolic pressure by the left/right ankle systolic pressure.

ABI is the abbreviation of Ankle Brachial Index (the blood pressure ratio between the ankle and the brachium) and is used as a marker for the evaluation of arterial stenosis at the ankle portion.

$$\text{Right ABI} = \frac{\text{Right Ankle Systolic}}{\text{Higher Brachial Systolic}}$$

$$\text{Left ABI} = \frac{\text{Left Ankle Systolic}}{\text{Higher Brachial Systolic}}$$

ABI values and descriptions

The graph analysis screen and the print memo is displayed according to: N Engl J Med. Vol 344, No21, Page 1608-1621

ABI Value	Description
> 1.30	Noncompressible
0.91-1.30	Normal
0.41-0.90	Suggests mild-to-moderate peripheral arterial disease
< 0.41	Suggests severe peripheral vascular disease

04 Arterial Stiffness Index (ASI)

The ASI (Arterial Stiffness Index) Calculation Principles and Measurements

The Oscillometric method is a way of indirectly measuring blood pressure. In this method, external pressure is applied to the artery and measurements are made by monitoring the blood vessel volume change. During the process where the cuff pressure decreases, the blood vessel volume change which corresponds to the Pt (transmural pressure = the pressure difference between the blood pressure and the cuff pressure) is detected as oscillations in the cuff. If the blood pressure remains unchanged during the blood pressure measurement, then the detected pulsation differences will be used to reflect the vessel elasticity. The correlation between the vessel pressure and the vessel volume is not linear. Instead, it is a complex display of the softer mechanic property of the tunica medial and the stiffer mechanic property of the tunica adventitia. The arterial atherosclerosis is demonstrated according to the thickening and the hardening of this tunica media. Thus, if the pulse waveform pattern derived from the Oscillometric method can elucidate the relation between the pattern and the mechanical characteristics of the tunica media, a new marker for understanding atherosclerosis can be obtained.

Figure1-2　Conceptual graph of the comparison between the vessel pressure - volume property of sclerotic blood vessels and that of normal blood vessels. Sclerosis of the tunica media causes the slope of the pressure-volume line to increase within the lower arterial pressure range. This causes the whole arterial pressure - volume property curve to be shifted upwards.　In blood vessels with their cuff pressure increasing, the Y-axis of the graph can be considered to represent the blood pressure - cuff pressure values. Thus, under certain conditions, as the cuff pressure decrease, a pattern change is observed just by monitoring the pulse waveform amplitude. As demonstrated by the graph, blood vessels with normal tunica media elasticity exhibit a mountain-shape pulse waveform pattern, and vessels with stiffer tunica media exhibit a trapezoid pulse waveform pattern. The width of the trapezoid’s top base equals the width of the section where the transmural pressure intersects the pressure that corresponds to the tunica media line during the process of cuff pressure decrease. This width represents time in the pulse waveform graph derived from the actual measurement. Therefore, in the measured pattern, the observed width changes according to the cuff pressure decreasing speed. If the top base of the trapezoid pattern is not considered to be time, but instead, the cuff pressure change which correspond to this width is thought as the range of the flat section, then the flat section information that does not depend on the cuff pressure decreasing speed can be accurately expressed. This width holds a pressure unit and at the same time, it corresponds to the vessel pressure - volume property line section that is displayed depending on the tunica medial elasticity. Thus, the softer the tunica media, the smaller the pressure margin which correspond to the line section. If the tunica medial pressure - volume property can be treated as a straight line, then the pressure width and the elasticity rate exhibit a proportional relationship.

After the cuff pressure corresponding to the top base of the trapezoid blood waveform pattern is detected, the width of this pressure is shown to exhibit a proportional relationship with the arterial tunica media level elasticity. This pressure value is derived as the marker for arterial stiffness determinations. The value is used to determine the arterial stiffness level as described below:

ASI＝The cuff pressure range that correspond to the trapezoid pulse waveform pattern × 10

Here, the pressure margin is set to be 10 times because the value derived is in the mmHg level and is very small. When it is multiplied by 10, it can be displayed as a whole number. Another reason is that when the ASI value becomes large, it will demonstrate and give out a “stiff” impression.

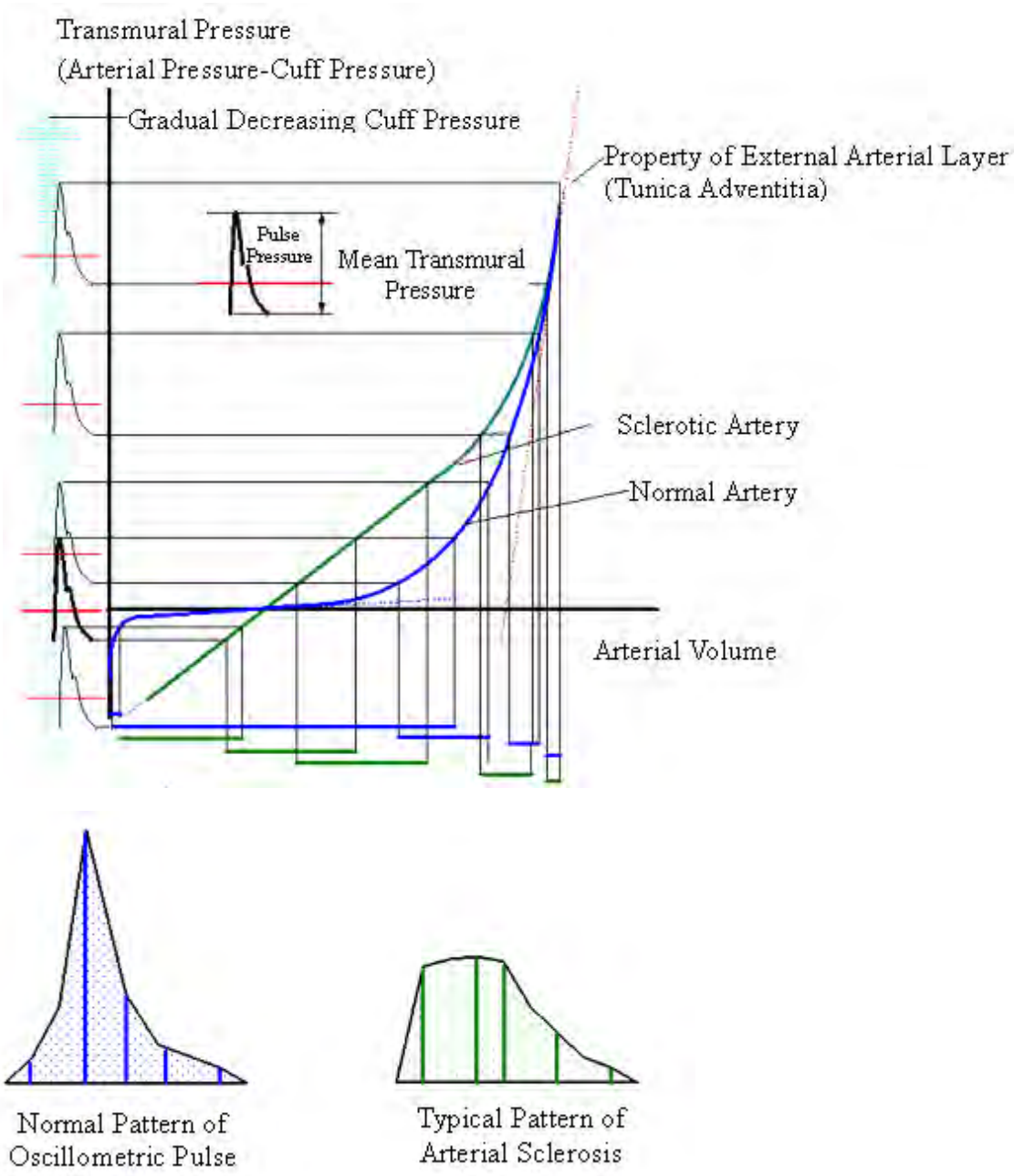


Figure1-2 The pulse waveform pattern change corresponding to the arterial stiffness

Figure1~3 is the graph describing the principle of ASI calculations. The upper part of the graph demonstrates the vessel pressure - volume property, and the lower part of the graph demonstrates the relationship between the pulse pattern and the cuff pressure corresponding to the actual blood pressure measurements. By the demonstration of this graph, we know that regarding the arterial vessel wall elasticity, ASI exhibits a proportional relationship with the tunica media elasticity.

After the actual measurements, it was seen that the pulse wave graphs mostly displayed a somehow flat arch shape instead of a perfect trapezoid. This is due to the compound properties of the tunica media and the tunica adventitia layers, as well as the inability of the tunica media properties shown here to provide us a perfect straight line. Therefore, once the trapezoidal part of the pulse waveform is calculated, treat the highest value of the pattern as 100% and treat the range between that and the point where the waveform amplitude decrease to it's 80% as the "flat section allowing range", then carefully derive the flat section from this range. Fill in hypothetical pulse waves between the pulse waves, after smoothening using the average mobility calculations, and processed to eliminate noise, the pulse amplitude change within the range of 5% is derived and treated as the flat section range. Also, putting into consideration that physiological variations such as blood pressure changes can be caused by activities such as breathing, the ASI value reliability is raised by using the average from many measurements

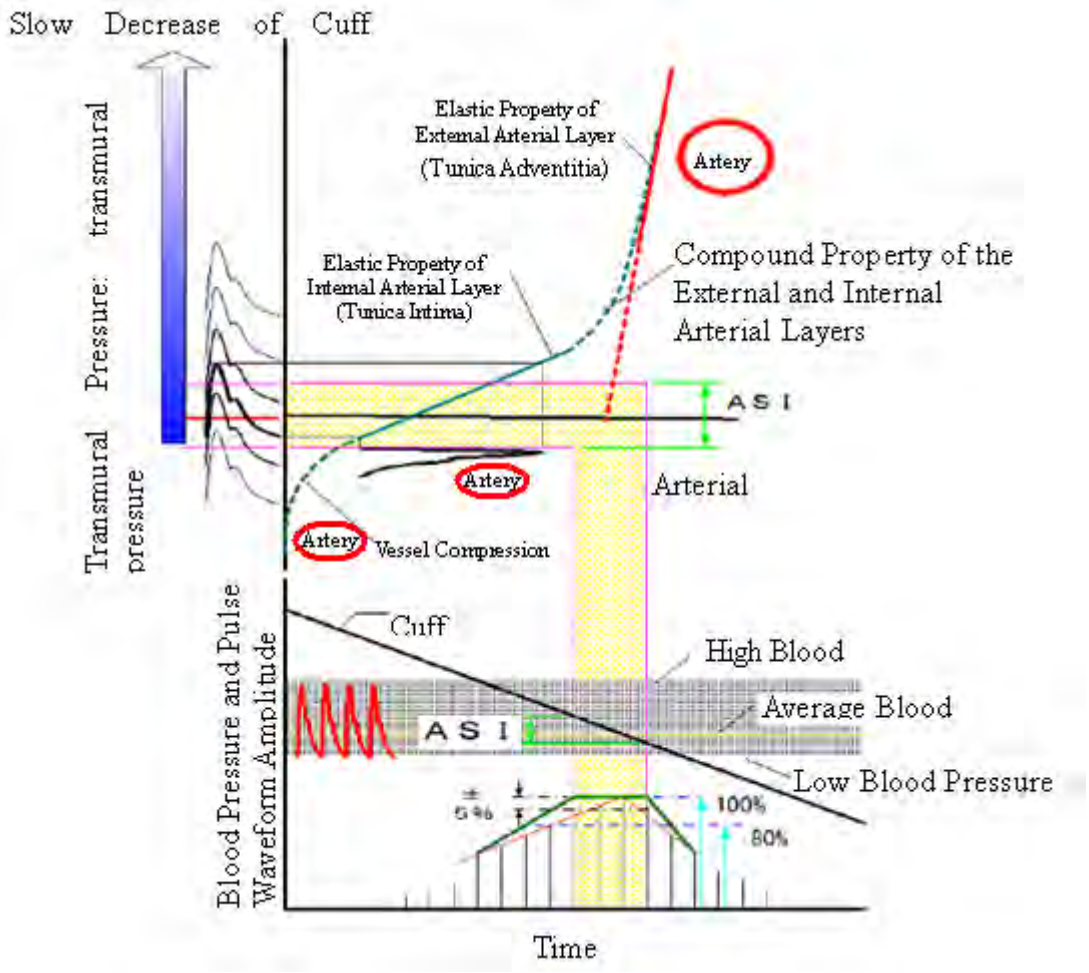


Figure1-3 The relationship between the ASI principles and the vessel pressure volume properties.

The analysis screen and the print comment are displayed according to the following standards

ASI Range

ASI Range	ASI Cardiovascular Risk	ASI	ASI bp
Type 3	Low	<71	<130
	Moderate	71-179	130-159
	High	180+	160+
Type 2	Low	<81	<135
	Moderate	81-209	135-164
	High	210+	165+

ASI bp

The ASI logarithm value

05 Other Derivatives

%MAP(Percentage Mean Artery Pressure)

The quotient derived from dividing the pulse waveform amplitude by the average pulse waveform area, demonstrated in percentage. The value is calculated from the pulse waveform summation average.

UT(Upstroke Time)

Displays the time duration between the minimal (diastolic period) and the maximal (systolic period) pulse waveform amplitude.

Estimated Arterial Age

The age that fits the ASI age association graph

Framingham Risk

The so called Framingham Risk is the arterial risk value proposed by Framingham of Massachusetts, United States. Framingham's proposal was based on the health survey he conducted on his local residents for more than 50 years, and the Framingham Risk is calculated using a score sheet.

Metabolic Syndrome

The diagnosis standard of Metabolic Syndrome

The Japanese Society of Internal Medicine

In addition to the required qualification, if the patient condition fits 2 out of the 3 factors described, he/she is defined as Metabolic Syndrome (April 2005, The Japanese Society of Internal Medicine)

In addition to the required qualification, if the patient condition fits 1 out of the 3 factors described, he/she is defined as Metabolic Syndrome (The 2004 National Health and Nutrition Examination Surveys)

Required Qualification	**Diagnosis Standard**
Waist	≧85cm in males, ≧90cm in females

Test Item	**Diagnosis Standard**
Fasting Plasma Glucose	FPG≧100mg/dL
Blood Pressure	Systolic≧130mmHg or Diastolic≧85mmHg
TG Level/ HDL Cholesterol	TG≧150mg/dL or HDL Chol.＜40mg/dL

IDF(2005)

In addition to the required qualification, if the patient condition fits 2 out of the 4 factors described, he/she is defined as Metabolic Syndrome

Required Qualification	**Diagnosis Standard**
Waist (differs btw race)	≧94cm in males, ≧80cm in females (for Europids) ≧90cm in males, ≧80cm in females (for all people)

Test Item	**Diagnosis Standard**
Fasting Plasma Glucose	FPG≧100mg/dL
Blood Pressure	Systolic≧130mmHg or Diastolic≧85mmHg
TG Level	TG≧150mg/dL
HDL Cholesterol	＜40mg/dL in males, ＜50mg/dL in females

(USA National Cholesterol Education Program – The 3rd Revision of the Adult Treatment)＞＞
(NIH publication No.01－3670, May 2001)

When the patient qualifies for 3 of the factors described, he/she is defined as Metabolic Syndrome

Test Item	**Diagnosis Standard**
Waist	＞102cm in males, ＞88cm in females

TG Level	＞150mg/dL (1.7 mmol/L)
HDL Cholesterol	＜40mg/dL (1.03 mmol/L) in males ＜50mg/dL(1.29 mmol/L) in females
Blood Pressure	Systolic ≧130mmHG or/and Diastolic≧85mmHg
Fasting Plasma Glucose	＞110mg/dL (6.1 mmol/L)

e-GFR(estimated GFR)

e-GFR is the abbreviation of estimated GFR(estimated Glomerular Filtration Rate) and is used as the evaluation marker for the kidney function.

The level of severity is evaluated according to the CKD stage

GFR is the abbreviation of Glomerular Filtration Rate

The e-GFR Calculating Equation

CKD Treatment Guide from The Japanese Society of Nephrology

Gender	Equation
Male	$GFR=194*(Scr)^{-1.094}*(Age)^{-0.287}$
Female	GFR= (Male)GFR*0.739

The Modification of Diet in Renal Disease (MDRD) Study equation

Unit	Equation
Conventional Unit (mg/dL)	GFR (mL/min/1.73 m^2) = 186 x $(Scr)^{-1.154}$ x $(Age)^{-0.203}$ x (0.742 if female) x (1.210 if African-American) (conventional units)

CKD Stage

Stage	GFR	Description
At Increased risk	More than 90	Risk factors for kidney disease (e.g. Diabetes, High blood pressure, family history, older age, ethnic group)
1	More than 90	Kidney damage (protein in urine) and Normal GFR
2	60 to 89	Kidney damage and mild decrease in GFR
3	30 to 59	Moderate decrease in GFR
4	15 to 29	Severe decrease in GFR
5	Less than 15	Kidney failure (dialysis or kidney transplant needed)