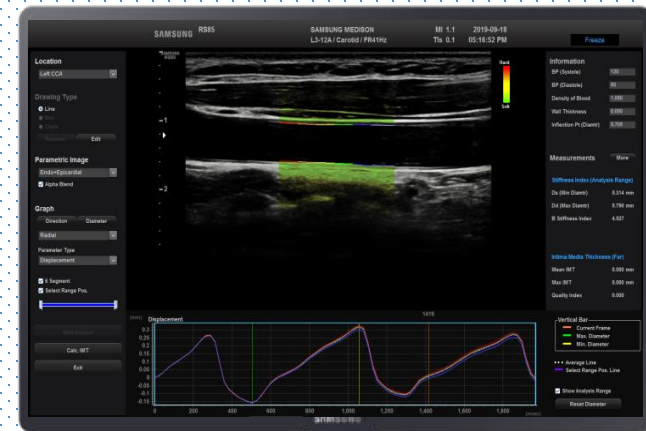
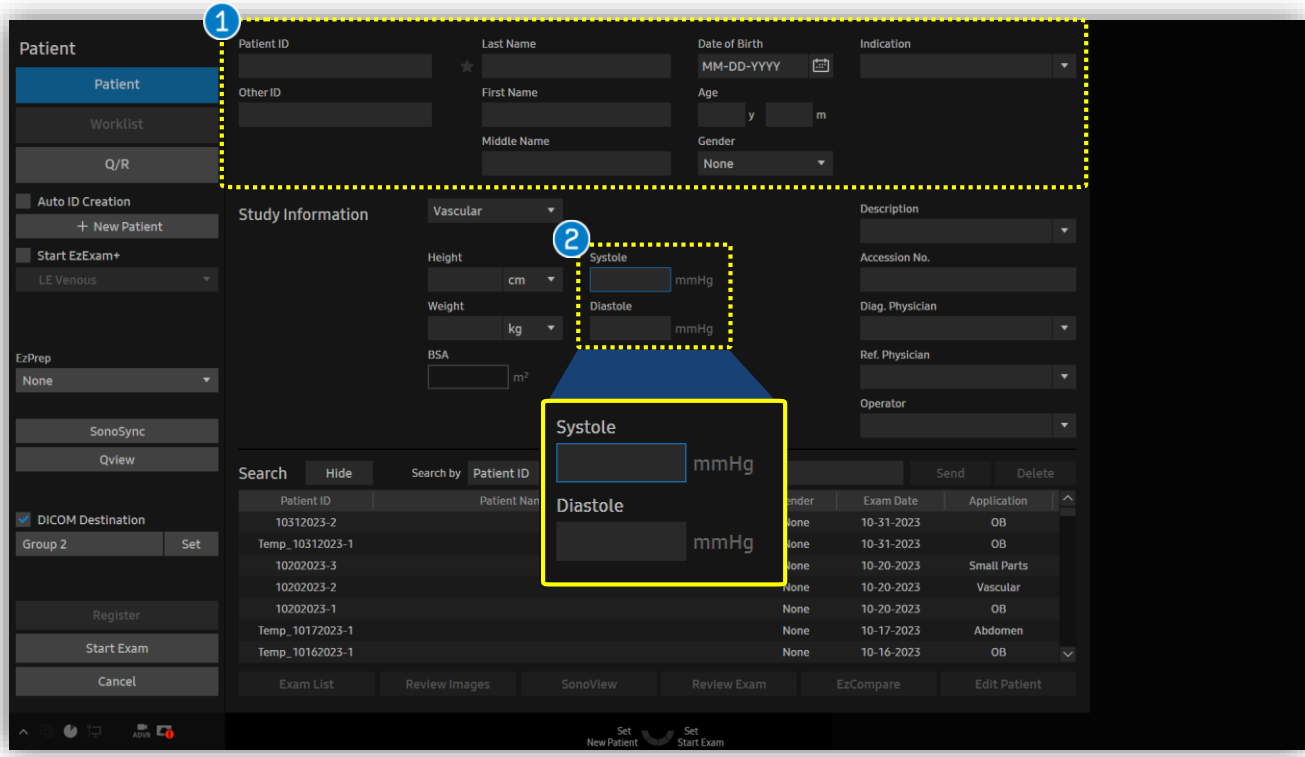


# Arterial Analysis™

## V series Quick Guide



# 1. Registration of patient data



- 1 Patient** Register the patient information.
- 2 Systole, Diastole** Enter [Systole], [Diastole] of the patient to display on Study Information page.

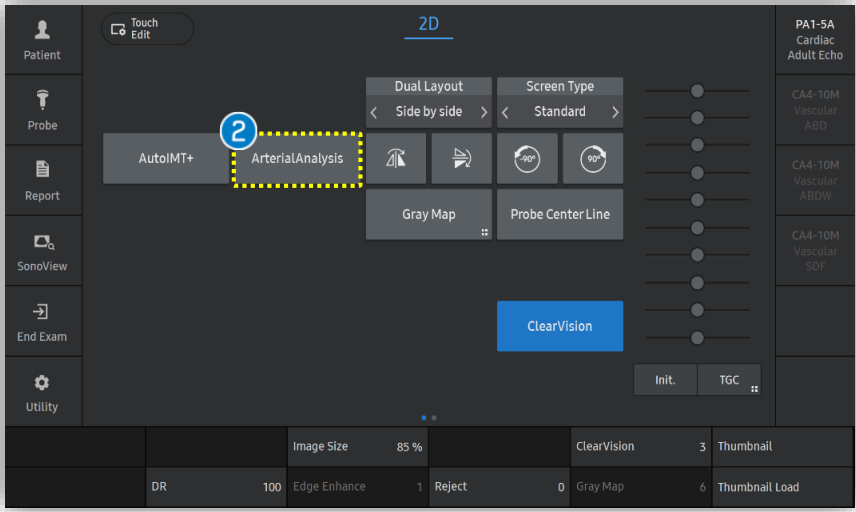
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# 2. Acquire the image



**1 Image Acquisition** Acquire the Common Carotid Artery and press the [Freeze] button.

- ★Tips
- Both near and far IMT need to be detected clearly.
  - Try to avoid any plaques.
  - 0.5cm ~ 1cm from the bulb is recommended segment to measure.
  - Acquire longer than 1cm segment of CCA.



**2 Arterial Analysis** Tap [Arterial Analysis] button to start.

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# 3. Set Location and Draw the ROI



**1 Location**

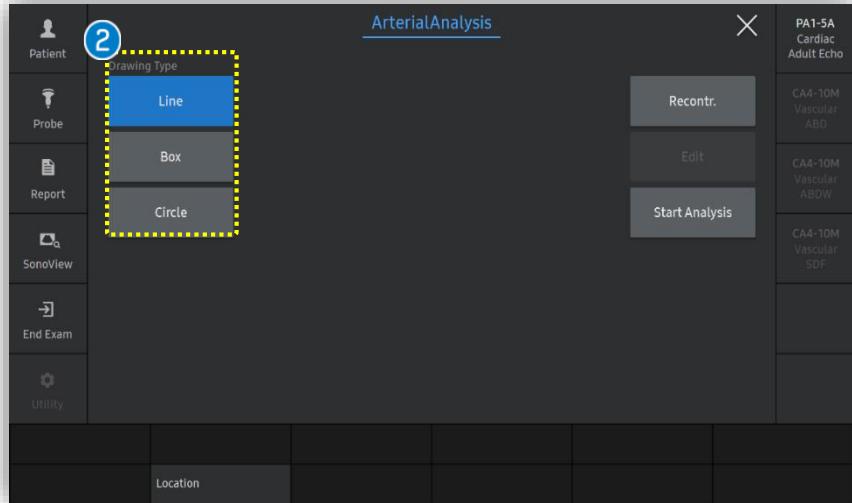
Select the location among the options below.

Left : Left CCA, Left Distal CCA, Left Mid CCA, Left Proximal CCA.  
 Right : Right CCA, Right Distal CCA, Right Mid CCA, Right Proximal CCA.

**2 Drawing Type**

Select a Drawing Type of Line, Box and Circle.

▪ **Line Type (Recommended)**



**a** Draw a contour of the near wall using [Set] button.  
 To finish contouring, double click [Set] button.

**b** Follow the same procedure to select the far wall. (The length and location of the line must be same on both near and far wall.)

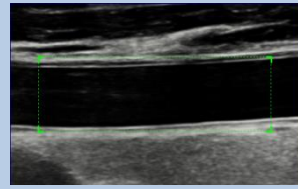
**c** To edit the contour, get close the arrow to the white dot along the line. When the dot turns to green, press [Set] to designate.

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# 4. Draw the ROI and Start Analysis

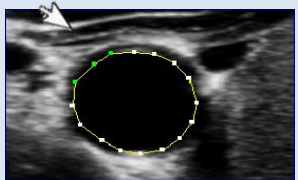
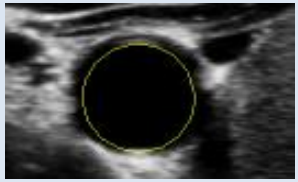


### Box Type



- a** Draw a box contour along the CCA. Place the start point of the box on the near wall and press [Set] button.
- b** Place the end point of the box on the far wall and press [Set] button. (Needs to include both near and far wall.)

### Circle Type (To analyze transverse view)



- a** Draw a circle contour along the CCA. Locate the cursor on the near wall and press the [Set] button to start, finish it on intima of far wall by [Set] button.
- b** To edit the contour, get close the arrow to the white dot along the line. When the dot turns to green, press [Set] to designate.

### 3 Reconr.

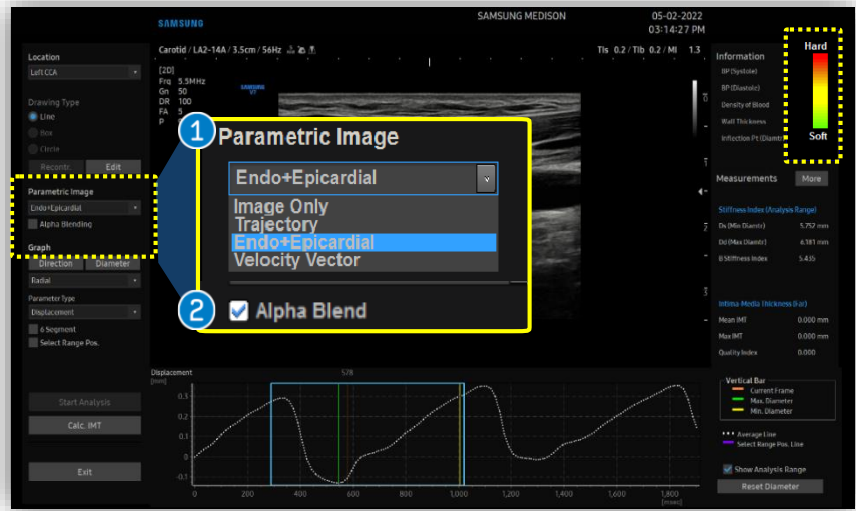
It deletes the ROI to re-contour the ROI.

### 4 Start Analysis

When drawing the ROI is completed, tap [Start Analysis].

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# 5. Select parametric type



1 Parametric Image

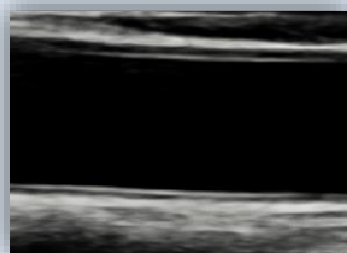
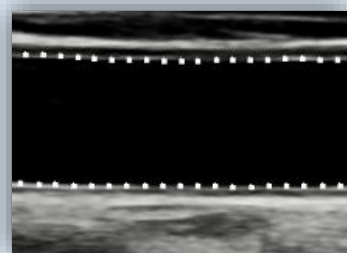
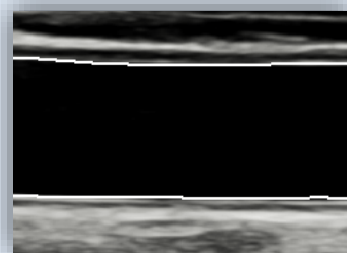
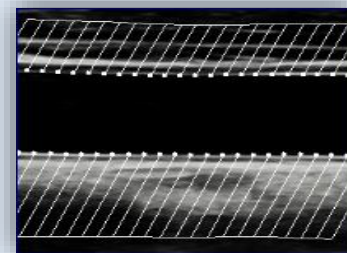
Select the display type among the 4 parameters.  
(Please refer to the images below.)

2 Alpha Blend

It indicates stiffness of vessel wall by color.

※ Alpha Blend is available **only in longitudinal view.**

※ Parametric Image

<ul style="list-style-type: none"> <li>Image Only</li> </ul>	<ul style="list-style-type: none"> <li>Trajectory</li> </ul>	<ul style="list-style-type: none"> <li>Endo + Epicardial</li> </ul>	<ul style="list-style-type: none"> <li>Velocity Vector</li> </ul>
<p>Only 2D image will be shown.</p> 	<p>The vessel wall will be shown as a dotted line.</p> 	<p>The vessel wall will be shown as a solid line.</p> 	<p>The vessel wall will be shown with vector information.</p> 

# 6. Select graph type : Longitudinal view

The image shows three sequential screenshots of the Arterial Analysis software interface. The first screenshot shows the 'Parametric Image' menu with 'Velocity Vector' selected and 'Alpha Blend' checked. The 'Graph' section is highlighted with a yellow dashed box and a circled '1', showing 'Direction' set to 'Radial' and 'Diameter' set to 'pAI'. The second screenshot shows the 'Parametric Image' menu with 'Endo+Epicardial' selected and 'Alpha Blend' checked. The 'Graph' section is highlighted with a yellow dashed box and a circled '2', showing 'Direction' set to 'Radial' and 'Diameter' set to 'pAI'. The third screenshot shows the main analysis screen with a B-mode ultrasound image of a carotid artery. The 'Graph' section is highlighted with a yellow dashed box, showing 'Direction' set to 'Radial' and 'Diameter' set to 'pAI'. Below the ultrasound image is a graph showing 'Displacement (mm)' on the Y-axis and 'Time (ms)' on the X-axis. The graph displays a blue box representing the ROI region, a vertical yellow line at 578 ms, and a red line representing the current frame. The graph also shows a dotted line for the average line and a solid line for the select range position. The right side of the screen displays various measurements and information, including BP (Systole), BP (Diastole), Density of Blood, Wall Thickness, Infection PI (Diamtr), Stiffness Index (Analysis Range), Ds (Min Diamtr), Dd (Max Diamtr), B Stiffness Index, Intima-Media Thickness (Far), Mean IMT, Max IMT, and Quality Index. A legend for the Vertical Bar shows Current Frame (red), Max. Diameter (green), and Min. Diameter (blue). The 'Show Analysis Range' checkbox is checked, and the 'Reset Diameter' button is visible.

## ※ Graph

### 1 Direction

The change of diameter between near wall and far wall which was specified by ROI region will be calculated depends on your selection.

- Radial: You can select parameter type which is represented in Y-axis of the graph  
→ Displacement(mm), Strain(%), Strain rate(1/s) or Velocity(mm/s)
- Area: Y-axis of the graph will be represented with mm<sup>2</sup>

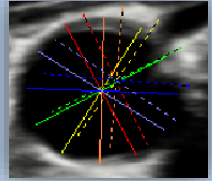
### 2 Diameter

The Augmentation Index of [cAI] or [pAI] will be calculated depends on your selection.

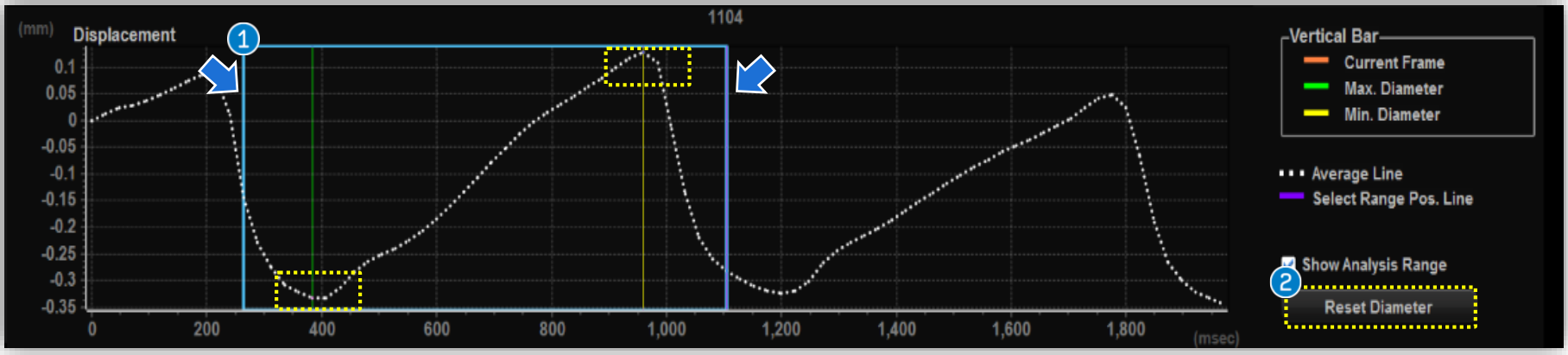
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# 7. Select graph type : Axial view

### ❖ Parametric Image and Graph

<p>1 Angle</p>	<p>Select to display trajectory of targeted area.          ❖ It is only available in <b>CCA transvers view</b>.</p> 
<p>2 Direction</p>	<p>In transvers CCA analysis, one more type of direction option is selectable compare to longitudinal CCA analysis.</p> <ul style="list-style-type: none"> <li>▪ Circumferential: The change of circumference will be displayed on Y-axis.</li> </ul>

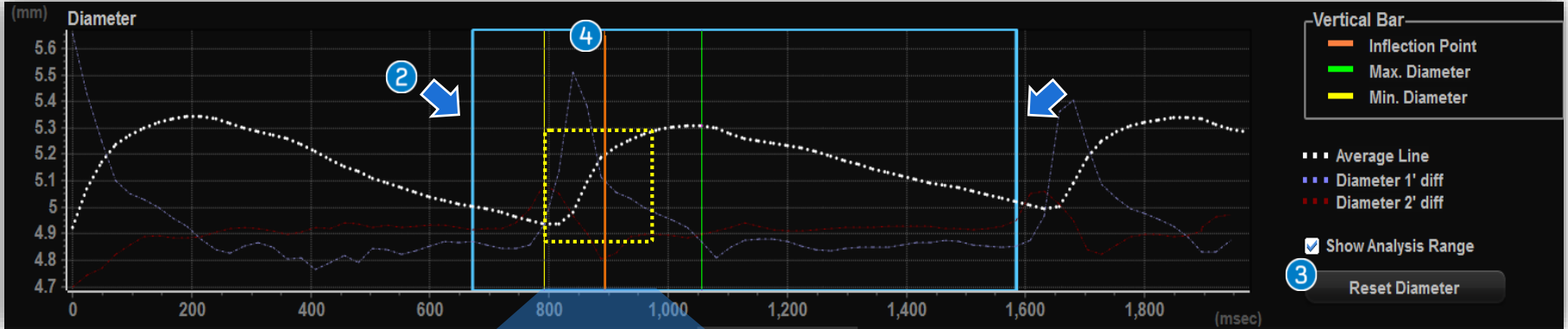
# 8. Graph Adjustment : Direction



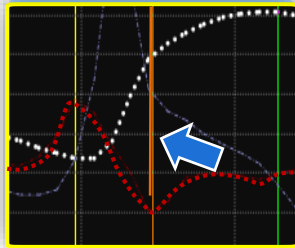
### ※ Graph : Direction

<p>① Designate the range</p>	<p>If unreliable data is included within the graph, designate the analysis range manually. Click and move the start vertical bar to include the lowest point and end vertical bar to include the highest point.</p>								
<p>② Reset Diameter</p>	<p>Click [Reset Diameter] button, then Max. Diameter(Green bar) and Min. Diameter(Yellow bar) will be automatically updated on the graph and result value(Stiffness Index) will be calculated accordingly.</p>								
<p>③ Result</p>	<table border="1"> <thead> <tr> <th colspan="2">Stiffness Index (Analysis Range)</th> </tr> </thead> <tbody> <tr> <td>Ds (Min Diamtr)</td> <td>5.123 mm</td> </tr> <tr> <td>Dd (Max Diamtr)</td> <td>5.586 mm</td> </tr> <tr> <td>B Stiffness Index</td> <td>4.490</td> </tr> </tbody> </table>	Stiffness Index (Analysis Range)		Ds (Min Diamtr)	5.123 mm	Dd (Max Diamtr)	5.586 mm	B Stiffness Index	4.490
Stiffness Index (Analysis Range)									
Ds (Min Diamtr)	5.123 mm								
Dd (Max Diamtr)	5.586 mm								
B Stiffness Index	4.490								

# 9. Graph Adjustment : Diameter cAI



The inset panel shows the 'Graph' control interface. It has a 'Direction' dropdown set to 'Diameter' (marked with a circled 1) and a 'cAI' dropdown menu (marked with a circled 5). Below these, it displays 'Augmentation Index' with a value of 42.798.



★Tips

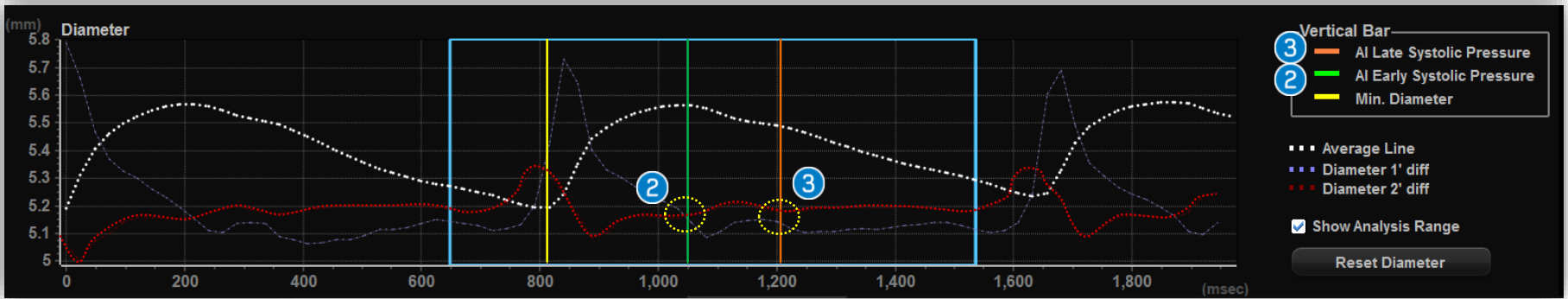
$$\text{Augmentation Index(cAI)} = \frac{\text{Max. Diameter} - \text{Diameter at Inflection point}}{\text{Max. Diameter} - \text{Min. Diameter}} \times 100$$

※ Graph : Diameter, cAI

<p>1 Select the standard</p>	<p>Click the [Diameter] on left side of the monitor screen and select [cAI].</p>
<p>2 Designate the range</p>	<p>It is recommended to designate the analysis range for one cardiac cycle. Adjust the start and end vertical bar with [Set] button.</p>
<p>3 Reset Diameter</p>	<p>When pressing [Reset Diameter], Max. and Min. Diameter positions are automatically detected with lines.</p>
<p>4 Inflection point</p>	<p>Place the orange bar at the inflection point of the average graph(white dotted line) refer to the lowest negative peak of 2' diff curve between Min. and Max. Diameter bars.</p>
<p>5 Result</p>	<p>You can check the Augmentation Index of cAI.</p>

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# 10. Graph Adjustment : Diameter pAI



**Graph**

Direction 1 Diameter

cAI

Augmentation Index 42.798

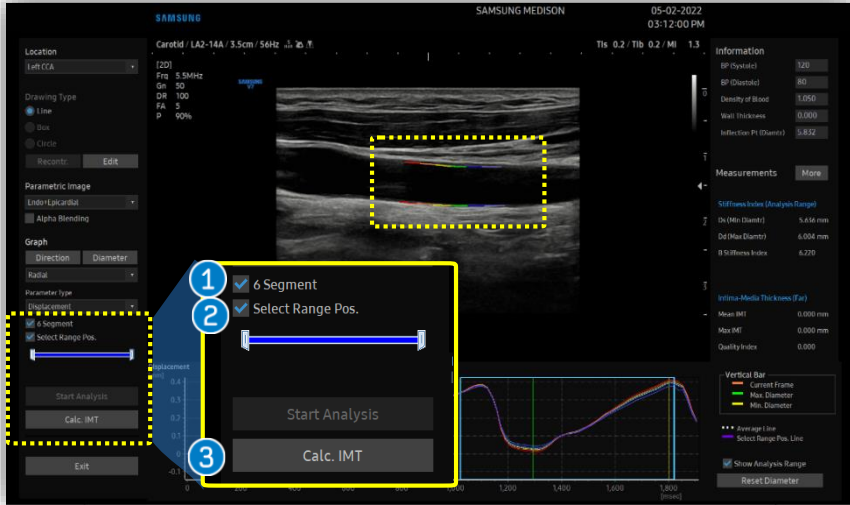
★Tips

$$\text{Augmentation Index(pAI)} = \frac{\text{LateSystolicPressure.Diameter} - \text{Min. Diameter}}{\text{EarlySystolicPressure.Diameter} - \text{Min. Diameter}} \times 100$$

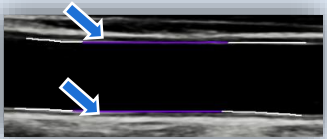
※ Graph : Diameter, pAI

<p>① Select the standard</p>	<p>Select the Graph → Diameter → pAI. The value of pAI and graph will be updated. It is necessary to set Early systolic pressure and Late systolic pressure.</p>
<p>② Locate AI Early Systolic Pressure bar</p>	<p>Locate the AI Early Systolic Pressure bar refer to the crossed point of the 1' diff and 2' diff curve using [Set] button.</p>
<p>③ Locate AI Late Systolic Pressure bar</p>	<p>Locate the AI Late Systolic Pressure bar refer to the first negative peak of the 2' diff curve just after the AI Early Systolic phase.</p>
<p>④ Result</p>	<p>You can check the Augmentation Index of pAI.</p>

# 11. Calc. IMT

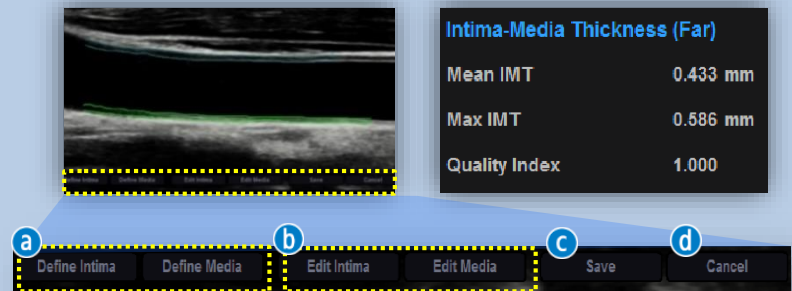


※ Graph

<p>1 6 Segment</p>	<p>ROI and graph are divided into 6 segments and displayed with different color.</p>
<p>2 Select Range Pos.</p>	<p>Available to select a ROI range with [Set] button and selected region (purple area) will be analyzed.</p> 

### 3 Calc. IMT

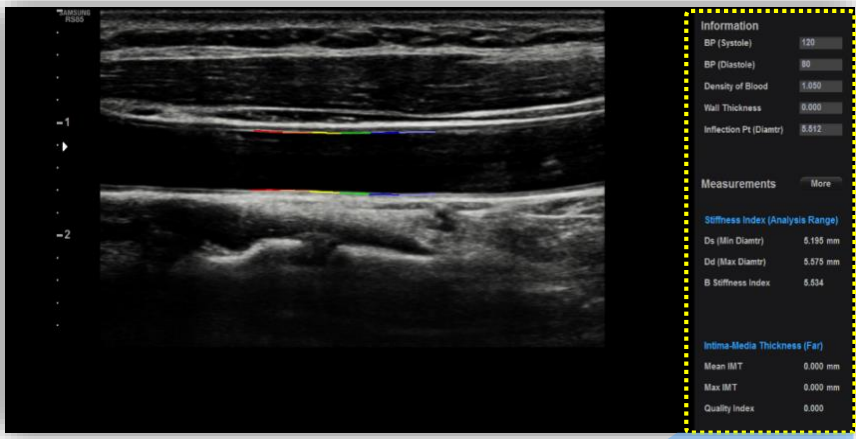
The IMT of the current image will be measured automatically.



<p>a Define Intima /Define Media</p>	<p>Detected far intima/media line will be deleted. Draw a new intima/media line with a trackball and [Set] button.</p>
<p>b Edit Intima /Edit Media</p>	<p>To modify the far Intima/media line, place the arrow on desired location and re-draw with a trackball and [Set] button.</p>
<p>c Save</p>	<p>It saves the result and turns off IMT mode.</p>
<p>d Cancel</p>	<p>It does not save the result and turns off IMT mode.</p>

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# 12. Information and Measurement



**1 Information**

BP (Systole) 120

BP (Diastole) 80

Density of Blood 1.050

Wall Thickness 0.000

Inflection Pt (Diamtr) 5.298

**2 Measurements** More

**Stiffness Index (Analysis Range)**

Ds (Min Diamtr) 5.246 mm

Dd (Max Diamtr) 5.355 mm

B Stiffness Index 19.535

**Intima-Media Thickness (Far)**

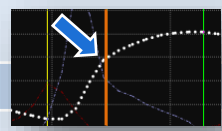
Mean IMT 0.433 mm

Max IMT 0.586 mm

**a Quality Index** 1.000

### 1 Information

BP(Systole), BP(Diastole)	Shows pre-entered information and is available for manual re-entering.
Density of Blood	Default value is 1.05.
Wall Thickness	Will be updated after saving the IMT result.
Inflection Pt(Diamtr)	Indicates the vessel's diameter at inflection point(orange line).



### 2 Measurement

- Stiffness Index(Analysis Range)

Ds(Min Diamtr)	Diameter in systole.
Dd(Max Diamtr)	Diameter in diastole.
B Stiffness Index	Will be automatically calculated when you press [Start Analysis].

- Intima-Media Thickness (Far) :

Will be displayed after pressing [Calc. IMT] button.

- a** Quality Index: The distance ratio of the measured rang in — selected range.

## 13. Check Measure Table

**Information**

BP (Systole) 120

BP (Diastole) 80

Density of Blood 1.050

Wall Thickness 0.000

Inflection Pt (Diamtr) 5.298

**Measurements** 1 More

**Stiffness Index (Analysis Range)**

Ds (Min Diamtr) 5.246 mm

Dd (Max Diamtr) 5.365 mm

B Stiffness Index 19.535

**Intima-Media Thickness (Far)**

Mean IMT 0.433 mm

Max IMT 0.586 mm

Quality Index 1.000

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**2 Measure Table**

Location Left CCA

**a**

**b**

**c**

**d**

Report Items

- Intima-Media Thickness
  - Far  Near
- Stiffness
- Peak Values
- Time to Peak Values

Assign to Report

Close

Exit

**Intima-Media Thickness (Far)**

Mean IMT	0.485 mm
Max IMT	0.649 mm
Quality Index	0.894

**Stiffness**

**Stiffness Index (Beat)**

Ds (Min Diamtr)	5.636 mm
Dd (Max Diamtr)	6.126 mm
B Stiffness Index	4.664

**Stiffness Index (Analysis Range)**

Ds (Min Diamtr)	5.636 mm
Dd (Max Diamtr)	6.004 mm
B Stiffness Index	6.220

Arterial Compliance 0.630 mm/kPa

Distensibility 0.012 1/kPa

Elastic Modulus 81.813 kPa

Pulse Wave Velocity (B) 5.621 m/s

Augment Index (C) 46.778 %

Augment Index (P) 53.222 %

**Peak Values**

Radial		Circumferential	
Displacement	0.395 mm	Displacement	0.000 mm
Strain	6.549 %	Strain	0.000 %
Strain Rate	1.238 1/s	Strain Rate	0.000 1/s
Velocity	0.197 mm/s	Velocity	0.000 mm/s

**Time to Peak Values**

Radial		Circumferential	
Displacement	782 msec	Displacement	0 msec
Strain	782 msec	Strain	0 msec
Strain Rate	136 msec	Strain Rate	0 msec
Velocity	136 msec	Velocity	0 msec

## 1 Check Measure Table

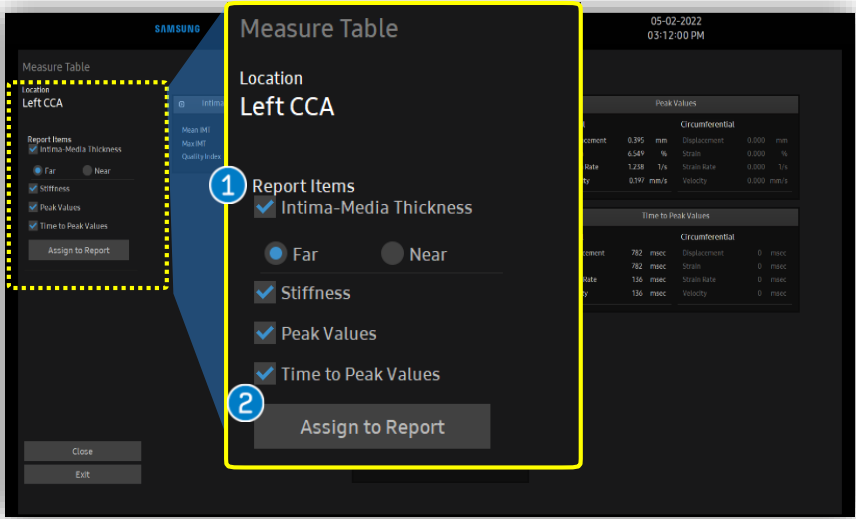
To check Measure Table, Click [More] button of Measurement in the Information field.

## 2 Measure Table

- a** Report Items
- b** Intima media thickness : It displays morphological analysis results.
- c** Stiffness : It displays functional analysis results.
- d** Peak Values, Time to Peak Values : Calculated index based on displacement for research purpose.

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# 14. Apply to the Report Table



- 1 Report Items      Check [Report Items] that you want to apply to the Report.
- 2 Assign to Report      Click [Send to Report] to send the results to the Report.
- 3 Report page      All results will be displayed on the Report page.

The screenshot shows the 'Ultrasound Report' for 'Arterial ANL' on '2015-03-10'. The report is titled '[ Carotid ]' and contains a table of results. A blue box with a '3' highlights the report title.

Name	ID	ARTERIAL ANL	Exam. Date	2015-03-10
<b>[ Carotid ]</b>				
<b>Art. Analysis-Stiffness(CCA)</b>				
	Rt.	Lt.		Ratio
Ds (Beat)		5.787	mm	
Dd (Beat)		6.331	mm	
Index (Beat)		4.313		
Ds (Selected Range)		5.787	mm	
Dd (Selected)		6.331	mm	
Index (Selected)		4.313		
Arterial Compliance		0.102		
Dilatibility		0.018		
Elastic Modulus		56.721		
Young's elastic modulus		130.506		
Pulse wave Vel. (B)		4.690	mm/s	
Aug. Index (C)		60.730		
Aug. Index (P)		1.094		
<b>Art. Analysis-IMT Far(CCA)</b>				
	Rt.	Lt.		Ratio
Mean		0.432	mm	
Max		0.480	mm	
Quality Index		1.000		
<b>Art. Analysis-Peak(CCA)</b>				
	Rt.	Lt.		Ratio
Disp. (Longitude-Near)		0.000	mm	
Strain (Longitude-Near)		0.000	%	
Strain Rate (Longitude-Near)		0.000	1/s	
Vel. (Longitude-Near)		0.000	mm/s	
Disp. (Longitude-Far)		0.000	mm	
Strain (Longitude-Far)		0.000	%	
Strain Rate (Longitude-Far)		0.000	1/s	
Vel. (Longitude-Far)		0.000	mm/s	
Disp. (Radial-Near)		-0.669	mm	
Strain (Radial-Near)		12.137	%	
Strain Rate (Radial-Near)		1.387	1/s	
Vel. (Radial-Near)		-2.506	mm/s	

- The features, options may not be commercially available in some countries.
- Sales and shipments are effective only after the approval by the regulatory affairs. Please contact your local sales representative for further details.
- This Quick guide does not include all of the details of instruction, for more detail, please refer to HERA W10 User Manual.
- Do not distribute this document to customers unless relevant regulatory and legal affairs officers approve such distribution.
- This User Quick Guide is based on V Series V1.05.
- Disclaimer: Some Images in this content were obtained from other system.

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