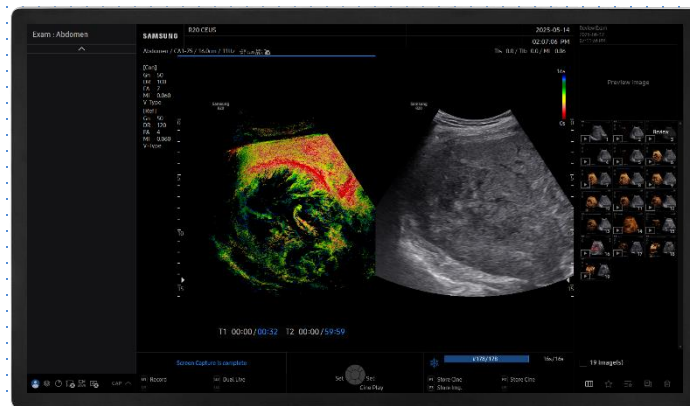


CEUS+

R20 Quick Guide

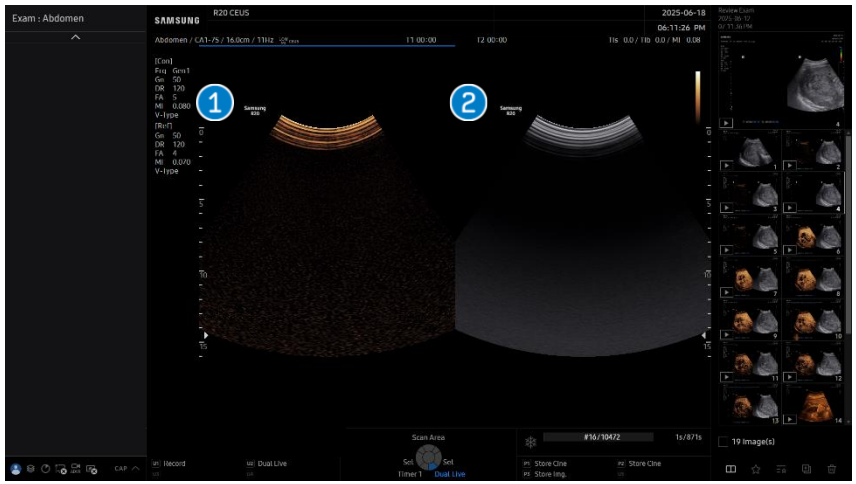


CEUS+

1. Start CEUS+



1 CEUS+ Tap the [CEUS+] on the touch screen. When entering the [CEUS+] mode, Dual mode is activated as a default.

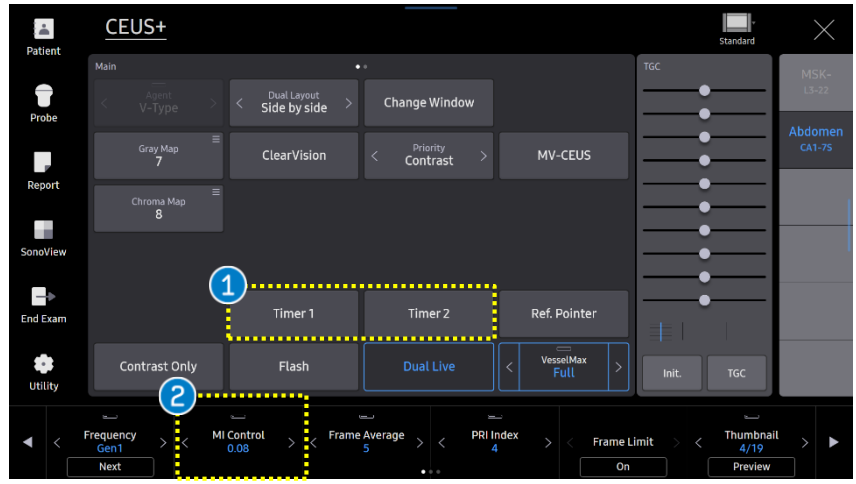


1 CEUS+ mode Contrast Enhanced Ultrasound image will be displayed on the left screen.

2 2D mode 2D image will be displayed on the right screen.

CEUS+

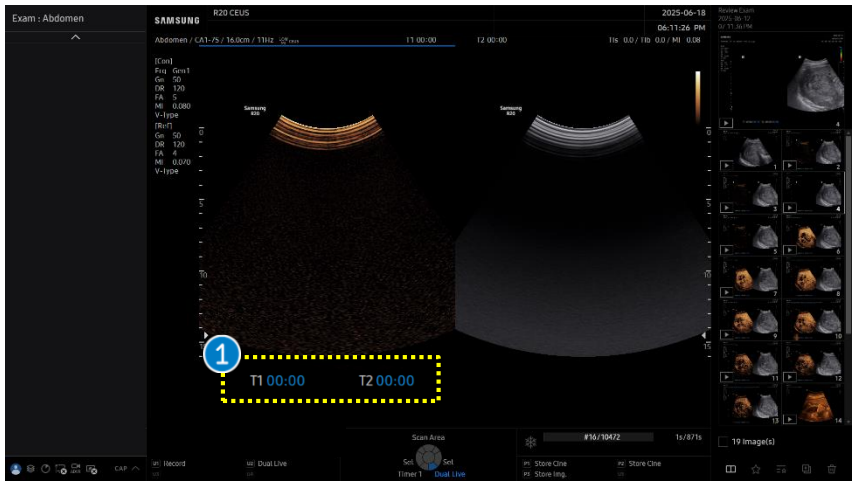
2. Select a Agent Type and Timer



- 1 Timer

Tap the [Timer1] or [Timer2] button on the touch screen to start the timer. When the button is pressed again, the timer resets.
- 2 MI Control

Define the Mechanical Index of the Ultrasound beam.

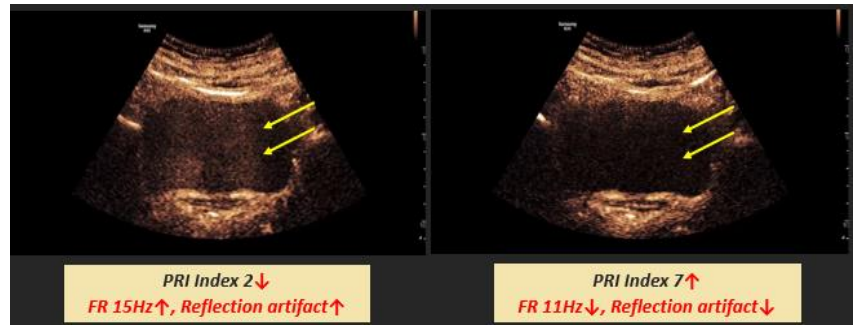
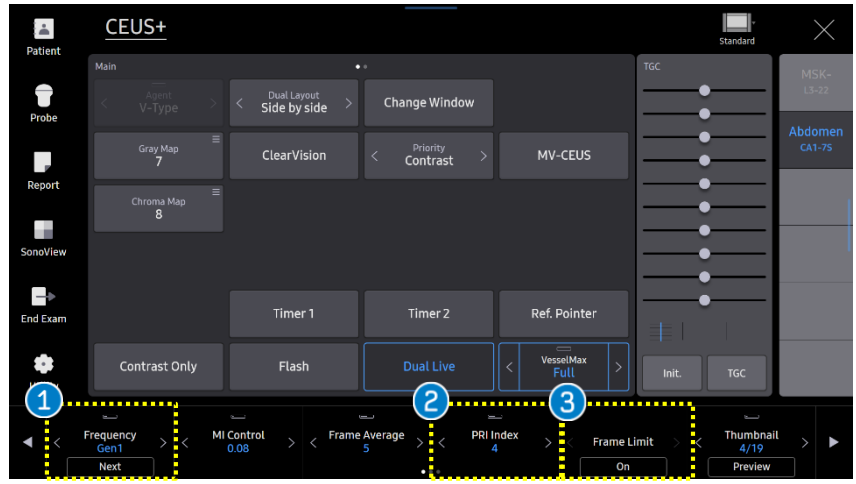


★ Tips

Only V-Type is supported in R20 V1.01. Z-Type will be applied. (TBD)

CEUS+

3. Adjust parameters(1)

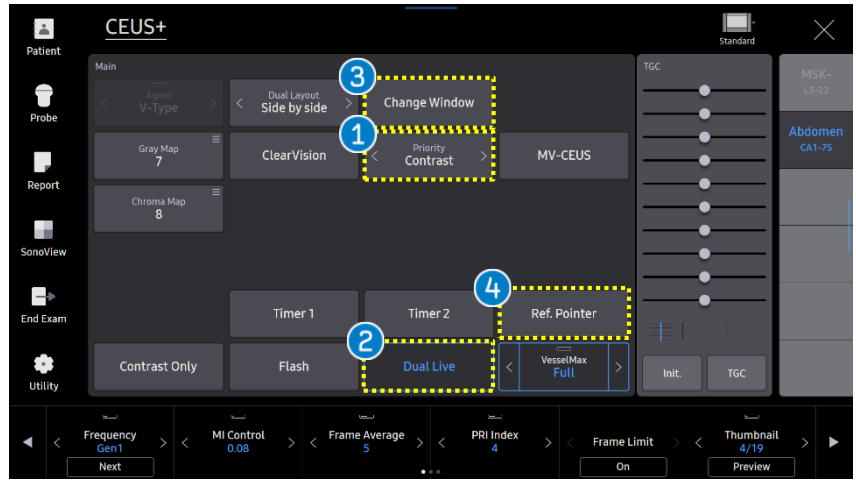


[PRI index]

1 Frequency	Select the [Frequency] for CEUS.	
	Pen	Penetration ↑
	Gen1	Default frequency
	Gen2	Same freq. as Gen1, with reduced background noise for clearer agent-tissue distinction.
	Res1	Sensitivity ↑, Near zone enhancement ↑
	Res2	S-Harmonic mode, Resolution ↑
2 PRI Index (Pulse Repetition Interval Index)	Reflection artifacts can be reduced by adjusting the PRI interval.	
	<ul style="list-style-type: none"> • Lower index : FR ↑, Reflection artifact ↑ • Higher index : FR ↓, Reflection artifact ↓ 	
3 Frame Limit	The [Frame Limit] controls the limitation of the frame rate.	
	Select a frame limit ranging from 'Off' to the maximum value. The maximum frame limit depends on the current scan conditions.	
	<ul style="list-style-type: none"> • Off(Default) : No frame rate limit. The FR varies with scan conditions. • On : Frame rate limit setting. Adjusting image parameters does not affect the FR, which remains at the set value. 	

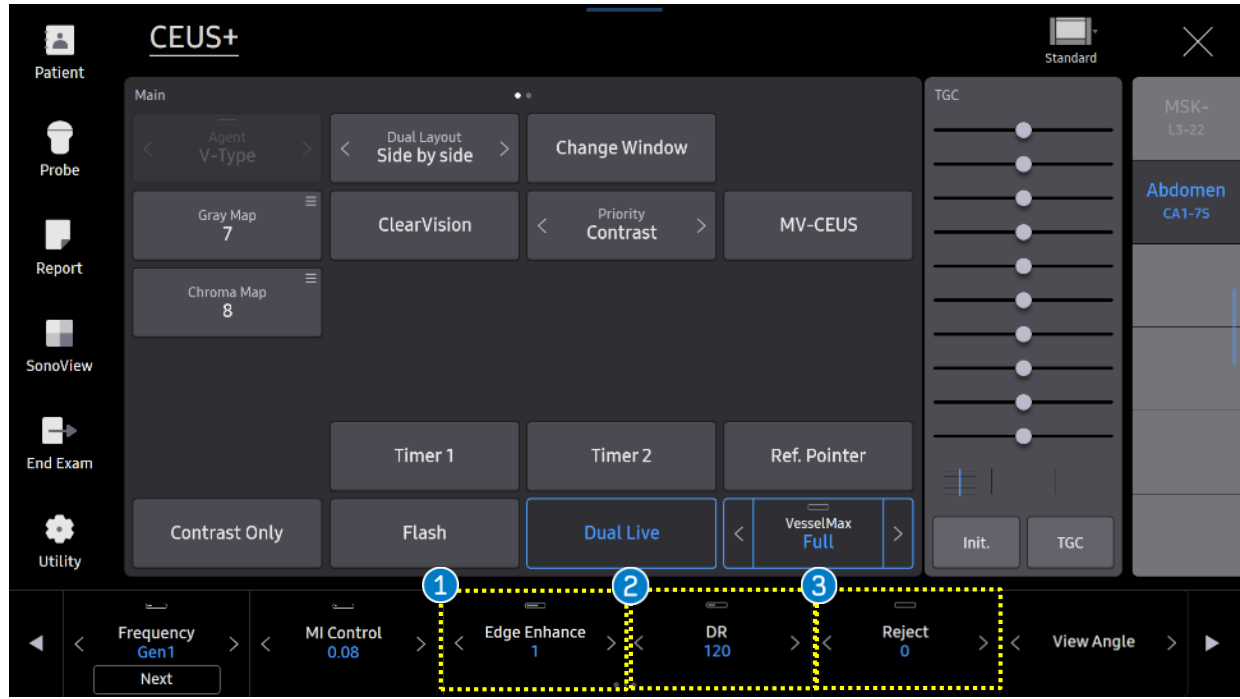
CEUS+

3. Adjust parameters(2)



<p>1 Priority</p>	<p>Tap the [Priority] button on the touch screen to adjust parameters of the selected Priority setting.</p> <ul style="list-style-type: none"> ▪ Contrast: CEUS image ▪ Reference: 2D image
<p>2 Dual Live</p>	<p>Tap the [Dual Live] button to select image format dual or single.</p> <ul style="list-style-type: none"> ▪ Dual: Display the Reference and contrast enhanced US image. ▪ Single: Display the CEUS or reference as full screen depends on the priority.
<p>3 Change Window</p>	<p>Tap [Change window] button on the touch screen to change image position. (ex, 2D/CEUS or CEUS/2D)</p>
<p>4 Ref. Pointer</p>	<p>Ref. Pointer can be used as a synchronizing tool in Dual Live mode. It can help to check the location of the lesion on both windows.</p>

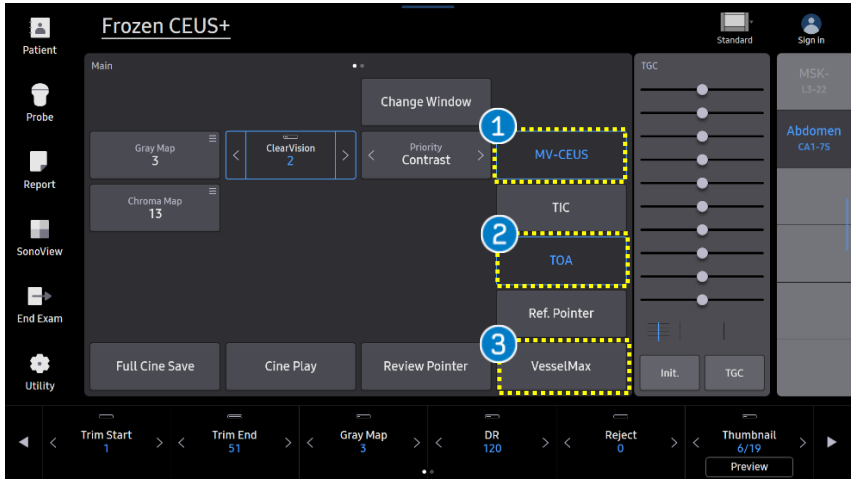
3. Adjust parameters(3)



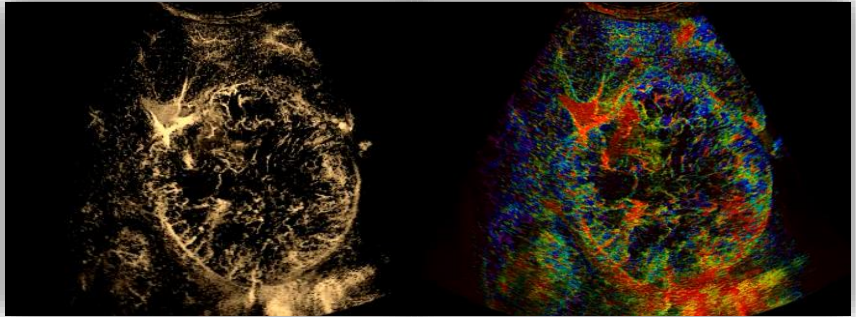
<p>1 Edge Enhance</p>	<p>Define the Mechanical Index of the Ultrasound beam.</p>
<p>2 DR</p>	<p>Adjust the dynamic range on contrast mode or 2D mode (depends on the selected Priority).</p>
<p>3 Reject</p>	<ul style="list-style-type: none"> ▪ Remove low signals on contrast mode or 2D mode, depending on the selected Priority. ▪ As reject level is increased both tissue and contrast signals will be rejected.

CEUS+

3. Adjust parameters(4)



<p>1 MV-CEUS</p>	<p>Tap the [MV-CEUS] button to activate it. It accumulates contrast image frames over time to provide a visualization of small vessels clearly.</p>
<p>2 TOA (Time of Arrival)</p>	<ul style="list-style-type: none"> - Press [Freeze] button. - Trim wash-in period from the entire cine data, since it reflects the wash-in phase. - Tap the [TOA] button to visualize wash in pattern by encoding contrast arrival times in colors.
<p>3 VesselMax</p>	<p>Tap the [VesselMax] button to activate it and adjust the time duration.</p>

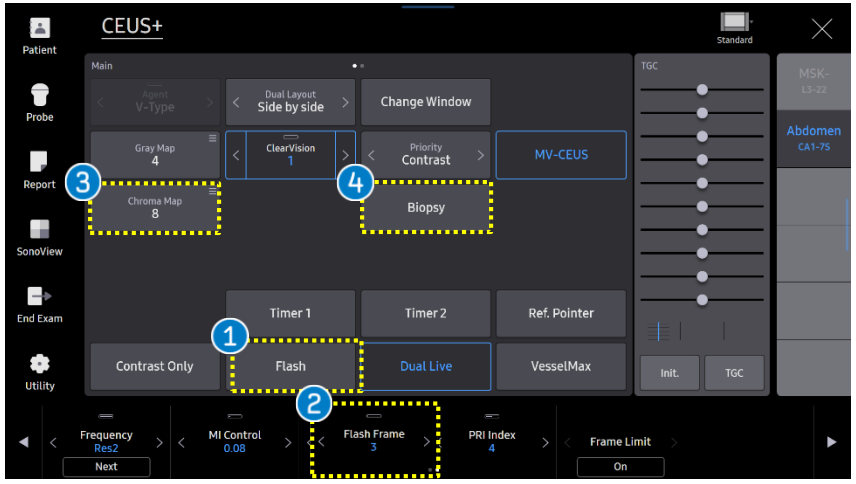


[MV-CEUS]

[TOA]

CEUS+

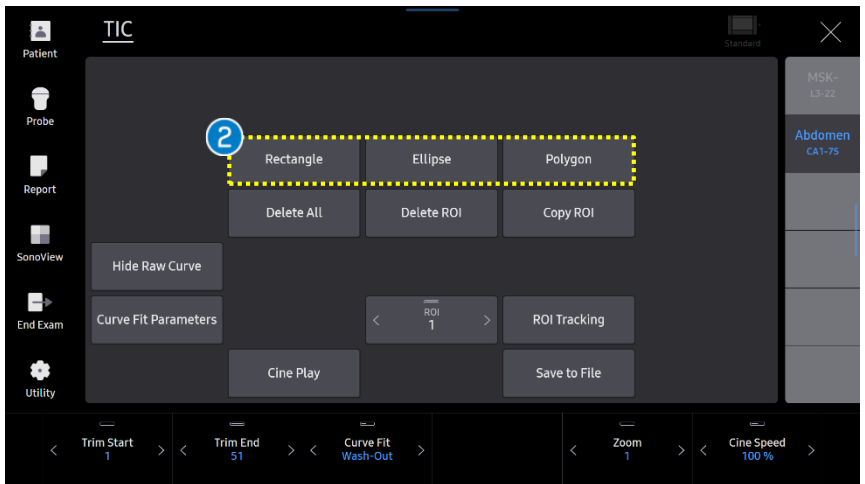
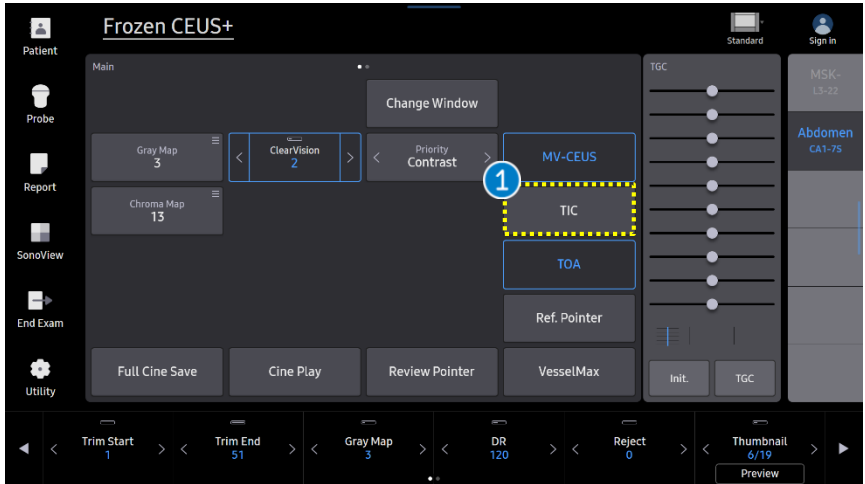
3. Adjust parameters(5)



1 Flash	Burst the micro-bubbles of contrast agent by generating a high MI pulse.
2 Flash Frame	Select a flash duration. It bursts the bubbles for a selected frame (duration).
3 Chroma Map	Tap the [Chroma Map] button to adjust the color-map of the CEUS image or 2D image.
4 Biopsy	Tap the [Biopsy On/Off] button to display the biopsy guideline.

CEUS+

4. Time Intensity Curve(1)



1 TIC

Tap the [TIC] button on the touch screen in the freeze status.

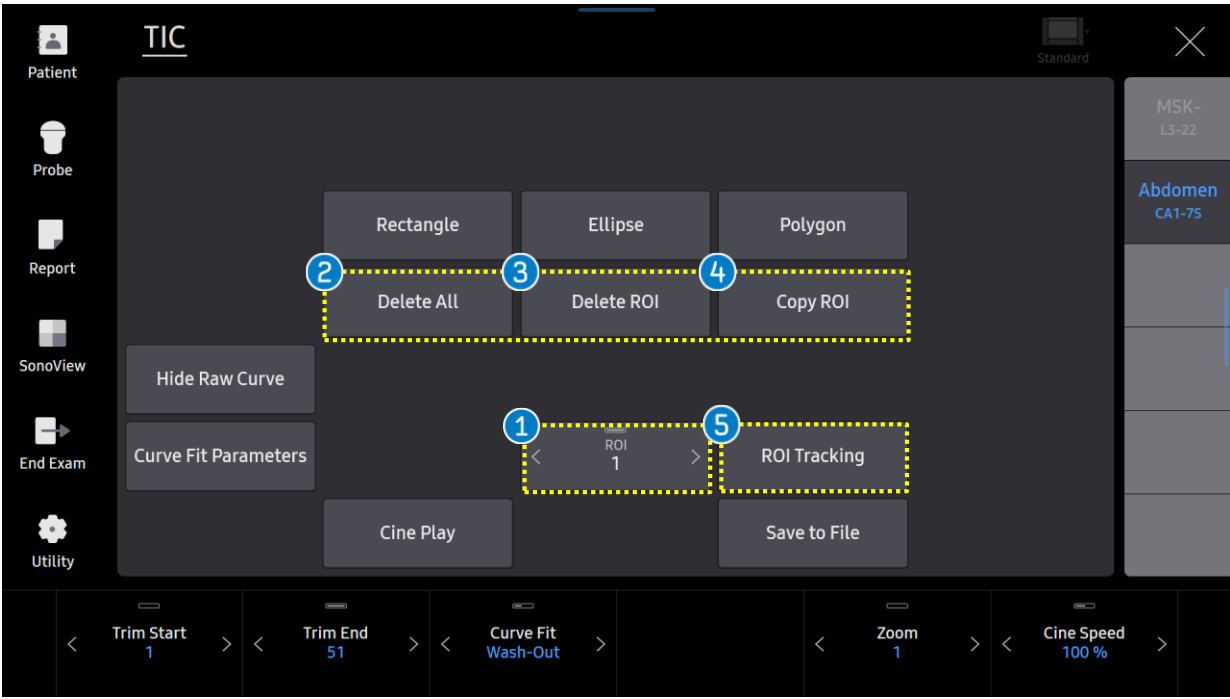
- TIC(Time Intensity Curve) is a curve that represents the change of the average intensity within ROI over time.

Select the ROI type on the touch screen.

2 ROI Type

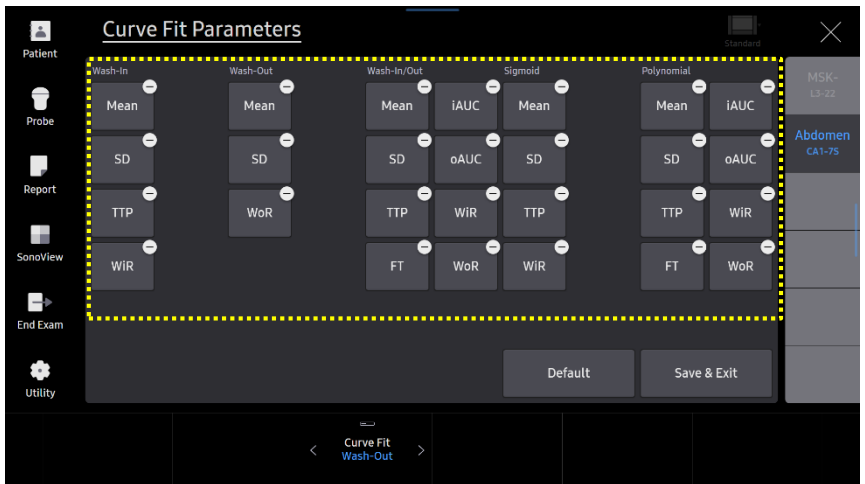
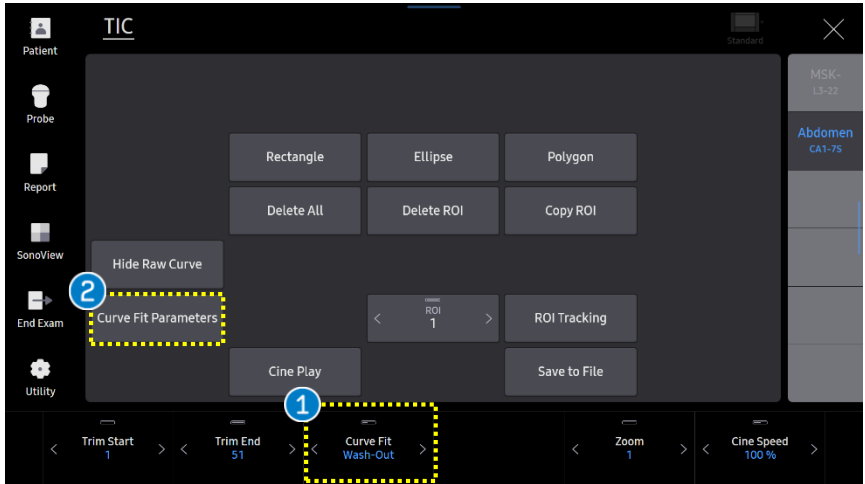
- Rectangle and Ellipse
Press the [Set] button to put the start point of ROI. Then adjust the size of ROI using trackball. Press the [Set] button again to complete ROI.
- Polygon
Press the [Set] button on the start point and every angular point of the lesion.
To fix the ROI, press the [Done] button on the control panel.

4. Time Intensity Curve(2)



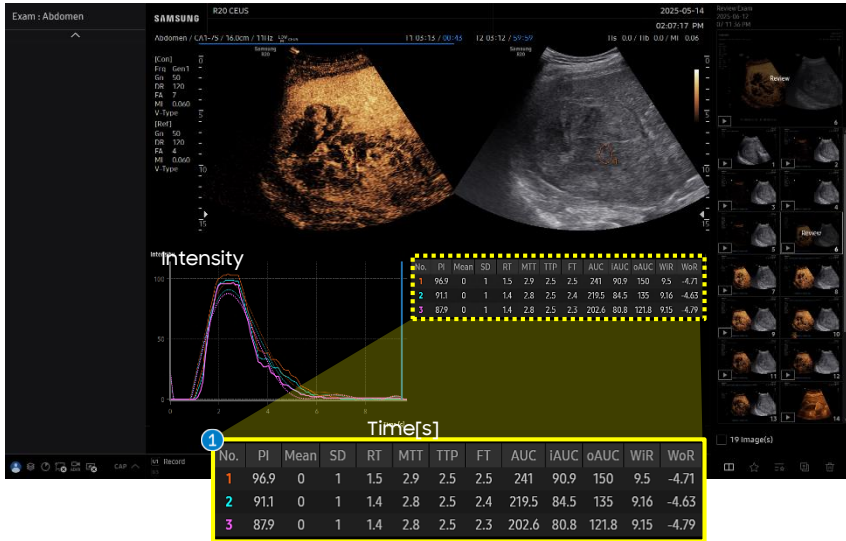
1 ROI	To copy or delete ROI, select the ROI index.
2 Delete All	Tap the [Delete All] to delete all ROIs.
3 Delete ROI	Select the ROI and tap the [Delete ROI].
4 Copy ROI	Select the ROI and tap the [Copy ROI] to copy the selected ROI.
5 ROI Tracking	Update the ROI location automatically by tracking the tissue movement.

4. Time Intensity Curve(3)



<p>1 Curve Fit</p>	<p>Provide suitable curve shape to measure blood flow parameters accurately and consistently.</p>										
	<table border="1"> <tr> <td>Wash-in</td> <td>Fit the TIC as an increasing curve.</td> </tr> <tr> <td>Wash-out</td> <td>Fit the TIC as a decreasing curve.</td> </tr> <tr> <td>Wash-in/out</td> <td>Fit the TIC as a curve that shows both increase and decrease.</td> </tr> <tr> <td>Sigmoid</td> <td>Fit the TIC in a S-shaped curve.</td> </tr> <tr> <td>Polynomial</td> <td>Suitable for local wash-in and wash-out rate estimation during bolus injection. You can adjust the degree of polynomial from 1 to 10. As the degree increases, the curve will be closer to TIC.</td> </tr> </table>	Wash-in	Fit the TIC as an increasing curve.	Wash-out	Fit the TIC as a decreasing curve.	Wash-in/out	Fit the TIC as a curve that shows both increase and decrease.	Sigmoid	Fit the TIC in a S-shaped curve.	Polynomial	Suitable for local wash-in and wash-out rate estimation during bolus injection. You can adjust the degree of polynomial from 1 to 10. As the degree increases, the curve will be closer to TIC.
	Wash-in	Fit the TIC as an increasing curve.									
	Wash-out	Fit the TIC as a decreasing curve.									
	Wash-in/out	Fit the TIC as a curve that shows both increase and decrease.									
Sigmoid	Fit the TIC in a S-shaped curve.										
Polynomial	Suitable for local wash-in and wash-out rate estimation during bolus injection. You can adjust the degree of polynomial from 1 to 10. As the degree increases, the curve will be closer to TIC.										
<p>2 Curve Fit Parameters</p>	<p>Select the TIC parameters to display on the screen.</p>										

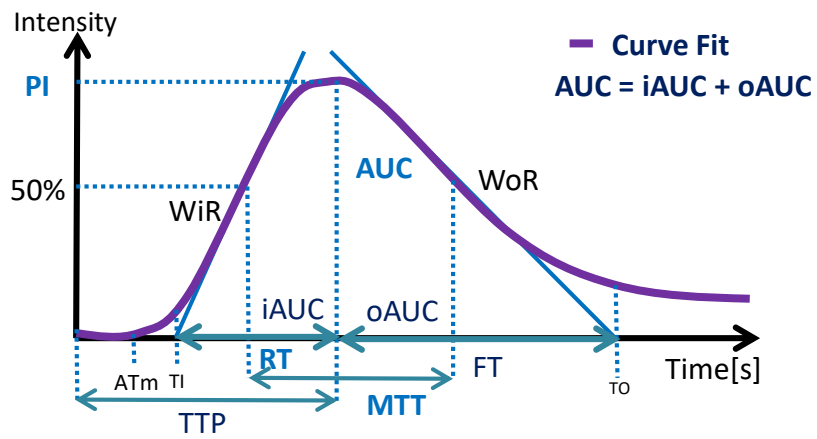
4. Time Intensity Curve(4)



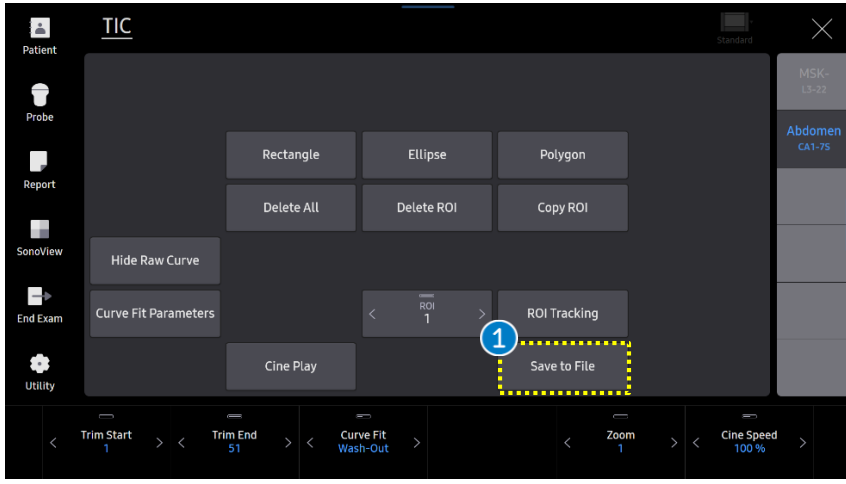
1 TIC Parameter

The TIC parameters are displayed differently depending on the curve you have selected.

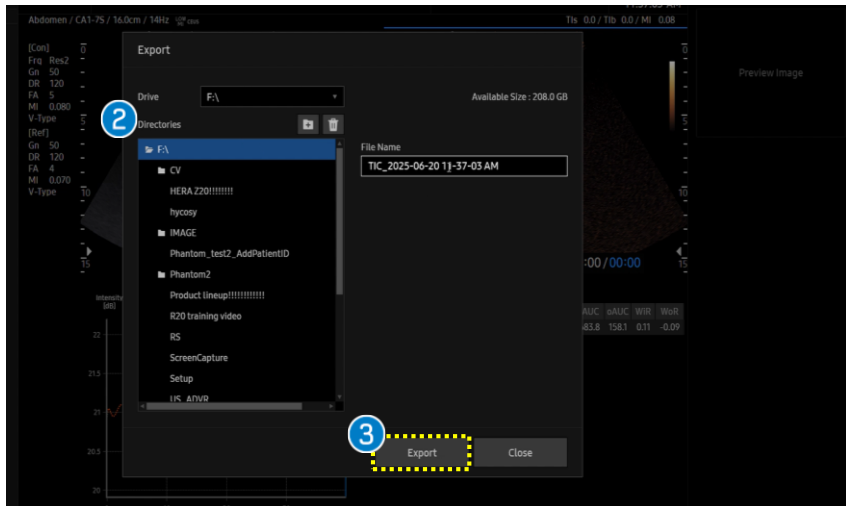
PI	Peak Intensity
Mean	Mean Intensity
SD	Standard deviation
RT	Rise Time
MTT	Mean Transit Time
TTP	Time To Peak
FT	Fall Time
AUC	Area Under the Curve
iAUC	Wash in Area Under the Curve
oAUC	Wash out Area Under the Curve
WiR	Wash in Rate (maximum slope)
WoR	Wash out Rate (minimum slope)



4. Time Intensity Curve(5)



- 1 Save to File** Insert an external memory device into the system before saving the file. Tap the [Save to File] button. TIC is saved in ".csv" file.
- 2 Directory & Name** Choose directory and name of the file.
- 3 Export** Click the [Export] button to complete export.



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