Vitrea® 2

version 4.0

CT Coronary Artery Analysis

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Safety and Regulatory Considerations

PLEASE READ THIS SECTION CAREFULLY BEFORE USING VITREA.

The Safety and Regulatory Considerations section of the Basic Vitrea® User Guide contains information that is essential for the safe, effective use of the Vitrea CT Cardiac option. You must understand this information before using this application.

For general Vitrea Safety and Regulatory Considerations, refer to the Safety and Regulatory Considerations section of the Basic Vitrea® manual.

Caution Statements

• It is assumed that you have sufficient knowledge and training on coronary vessel anatomy and CT cardiac imaging. You are responsible for verifying the accuracy of automated vessel tracking and labeling, and making the necessary corrections.

• When using the lesion or plaque analysis tools, the stenosis point within an identified lesion is initialized to the minimum luminal diameter. You are responsible for reviewing and correcting the accuracy of the luminal and wall boundary contours, as well as the location of stenosis and reference points.

Intended Use

The separately-licensed CT Cardiac option provides a variety of tools and views for working with clinical CT images of the coronary arteries, heart, and surrounding tissue.

Coronary Artery Analysis

The separately-licensed CT Cardiac option includes CT Coronary Artery Analysis, which is intended for viewing the anatomy and pathology of coronary obstructive disease by providing a non-invasive survey of a patient’s coronary arteries. Clinicians can select any coronary artery to view the following anatomical references: the highlighted vessel in 3D, two rotatable curved MPR vessel views displayed at 90 degree angles to each other, and cross sections of the vessel. The clinician can semi-automatically determine contrasted lumen boundaries, stenosis measurements, and maximum and minimum lumen diameters. In addition, clinicians can edit lumen boundaries and examine Houndsfield unit statistics.

User Guide

This manual is intended to be used by customers who have purchased the separately-licensed Vitrea CT Cardiac option. It assumes a working knowledge of Vitrea and familiarity with the concepts covered in the Basic Vitrea® User Guide.
HIPAA Compliance

Vital Images’ products comply with the Health Insurance Portability and Accountability Act (HIPAA) of 1996.

It is your responsibility to comply with your organization’s HIPAA policies.

Licensing

To use the CT Cardiac software, you must be licensed for the CT Cardiac option. If you are not properly licensed, you will not see the Cardiac: Arteries CT protocol on the Gallery window.

In addition, you will be unable to restore snapshots created on a licensed workstation from the Study Directory or the Report window.

Contact Us

• For general, non-technical support questions, contact us through our Web site: www.vitalimages.com.
• For customer technical support, contact us using one of the following methods: In the U.S., call the Customer Support line at 1.800.208.3005.
  • Outside the U.S., contact your Vital Images distributor.
  • Go to http://support.vitalimages.com/requestinfo.aspx and perform the following steps:
    a In the Destination field, select Technical Questions and Support Issues.
    b Fill out the rest of the form.
    c Click Send.
  • Send an email to support@vitalimages.com.
• To provide feedback about this document or other Vital Images product documentation, send an email to feedback@vitalimages.com.
Overview

The separately-licensed CT Cardiac option for the Vitrea software provides you a variety of tools and views for working with clinical CT images of the coronary arteries, heart, and surrounding tissue.

The software supports CTA studies acquired by 4-slice and above MS-CT scanners. The software does not support MRA studies.

**NOTE** You activate the Vitrea CT Cardiac option by selecting the Cardiac: Arteries CT protocol on the Gallery Window. This protocol is only available on workstations licensed for the CT Cardiac option.

CT Cardiac includes the following features:

- Intended for use with CTA studies
- Automatic segmentation of the heart from the rest of the anatomy
- Ability to load multiple volumes for different cardiac phases simultaneously with up to a total of 3000 slices on the XP64 platform
- Zero-click coronary vessel tree segmentation and automatic labeling of main coronary arteries
- Selection of any coronary artery for viewing with the Vessel Probe tool with easy centerline review and editing
- Full Vessel Probe capabilities for coronary arteries including the Lesion Tool, Vessel Walk, and Cath View
- A fly-through preset configured for flying through the coronary vessels
- Unique Heart Mode to automatically orient oblique MPR views to show one short-axis view and two long-axis views
- Key findings classification during reading of the study for semi-automated structured report generation

Loading a Study and Selecting Presets

Loading a Coronary Artery CT Study

To load a coronary artery CT study:

1. From the Study Directory, open the folder for the study that contains the coronary artery CT series you want to view.
   - If it was entered during the scan, the phase percentage may be listed in the Description column.
2. Press and hold CTRL, then click each series needed for viewing.

   **NOTE** *Be sure the original scan contains contrast.*

Selecting a Protocol and Preset

To select a protocol and preset in the gallery:

1. On the Gallery window, select the Cardiac: Arteries CT protocol.
When you select the **Cardiac: Arteries CT** protocol to automatically sculpt 3D images of the heart to expose the epicardium, you will see a rough segmentation in the preset review windows and the segmentation progress indicated in the progress bar. After segmentation is complete, you will see the full segmentation in the preset review windows.

**FIGURE 1. Cardiac: Arteries CT Protocol and Presets**

2. Pick one of the following six presets:
   - **3D Gray**: Displays a gray scale, segmented view of the heart on the Analysis tab for quick access to the Vessel Probe tools.
   - **3D Cath View**: Displays 3D 1-up with CathView.
   - **Fly Through**: Displays 5-up format geared toward flying through the coronary vessels. Upper 3D viewer defaults to Reverse View mode. Lower 3D viewer defaults to Fly Through mode.
   - **3D Color I**: Displays the original Vitrea rendering.
   - **3D Color II**: Displays the original Vitrea rendering. (Preferred)
   - **3D Chambers**: Displays a hollow effect for areas with contrast and allows you to examine the interior of the heart chambers.
NOTES

- Any of these presets can be modified with customized settings. See Basic Vitrea for information on modifying gallery presets.
- You may come back to the Gallery window later to select a different preset without losing segmentation.

Restoring Multi-volume Snapshots from the Study Directory

You can restore a multi-volume snapshot from the Study Directory. However, you should be sure you select all of the associated volumes when restoring the snapshot.

NOTE Because the CT Cardiac protocols were renamed between versions of Vitrea (Coronary Artery CT is now Cardiac: Arteries CT), snapshots created before the protocols were renamed will not load properly from the Study Directory. You must load the volume into Vitrea using one of the renamed protocols, then go to the Report window, and restore the snapshot.

To restore a snapshot saved before the protocols were renamed:

1. Load the volume into Vitrea.
2. On the Gallery window, select the Cardiac: Arteries CT protocol and a preset.
3. In the Report window, click the snapshot and drag it to the Restore icon.

To restore a multi-volume snapshot from the Study Directory:

1. In the patient list select the study you want to load.
   Select Show Snapshots to display the snapshots in the preview pane.
2. In the preview pane, select the snapshot you want to restore.
3. Click Restore Snapshot.
   Vitrea loads all volumes associated with the snapshot (volumes that were loaded when the snapshot was saved) and restores the workflow.
   Or, if any of the associated volumes are no longer available on the workstation, the following warning dialog box displays. If you receive this dialog box, click OK to load the available volumes, or click Cancel to return to the Study Directory.

CAUTION It is possible to restore a snapshot associated with multiple volumes without loading all of the associated volumes. Doing so may yield different results.

FIGURE 2. Notification of Missing Volumes
To restore select volumes from a multi-volume snapshot:

1. In the patient list on the Study Directory, select the volume you want to load. All available snapshots for the selected volume display in the preview pane.
2. In the preview pane, select the snapshot you want to restore.
3. Click **Snapshot Volumes**....
   
   This dialog box displays:

   ![Volume Selection Notification](image)

   **FIGURE 3. Volume Selection Notification**

4. Select the volume(s) you want to load.

   **NOTE** *The volume you chose in step 1 will not be listed, but will be loaded by default.*

   **OR**

   Check **Select All** to select all the volumes listed.

5. Click **Restore**.
# Probing Vessels and Managing the Vessel List

**Automated Vessel Probe**  
When you load a Coronary Artery study, the three main coronary vessels (LAD, RCA, and LCX) will be automatically segmented and labeled in all loaded phases.

**Vessel Probe Tools**  
You use the Vessel Probe tools to perform automatic curved reformats, which trace the centerline of the vessel, and to closely examine and measure the coronary vessels. Using the tools contained in the Vessel Probe area of the Analysis tab, you can perform the following tasks:
TABLE 1. Vessel Probe Tools

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vessel Probe tools</td>
</tr>
<tr>
<td></td>
<td><strong>Clear</strong> - Click Clear to clear the selected vessel from the Vessel Management list.</td>
</tr>
<tr>
<td></td>
<td><strong>Select</strong> - To probe an additional vessel, click Select and then click the vessel. The vessel will be listed in the Vessel Management list.</td>
</tr>
<tr>
<td></td>
<td><strong>Extend</strong> - Click Extend and then click the vessel. The vessel will be listed in the Vessel Management list.</td>
</tr>
<tr>
<td></td>
<td><strong>Edit</strong> - Click Edit to examine and edit the vessel centerline.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Vessel Management box</strong> - Vessels, lesions, grafts, and stents display in this box.</td>
</tr>
<tr>
<td></td>
<td>• Probed vessels display with a checkbox.</td>
</tr>
<tr>
<td></td>
<td>• If a vessel is not probed, a check will not display.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Show All</strong> - To display all probed vessels, select Show All.</td>
</tr>
<tr>
<td></td>
<td><strong>Rename</strong> - Select Rename to label the pulmonary veins, or double-click the vessel in the Vessel Management that you want to rename.</td>
</tr>
<tr>
<td></td>
<td><strong>Delete</strong> - Select Delete to remove the selected vessel from the list.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Add dropdown box</strong> - Select the Add dropdown to add vessels, grafts, or stents to the Vessel Management list. You can also enter a name in the Add box.</td>
</tr>
</tbody>
</table>

To select or probe a vessel:
The main vessels are automatically probed for you when you select the protocol and preset.

1. Verify the Show Vessel box is selected.
2. Select and highlight the vessel you want to view in the Vessel Management box, or
   - If the vessel you want to view is not already probed for you, located the vessel you want to probe in the 3D or MPR viewer.
     a. On the Analysis tab, click **Select**.
        - The cursor changes to a pointed finger.
     b. Click the vessel.
        - Two CPR views and one cross-sectional view (or multiple 1mm cross-sectional views, if you are in 1-up format) display in the 3D view.
NOTE Multiple cross-sectional views will only display if you switch to the 1-up Viewer Window format.

Optional Press Ctrl + Z to Undo if you want to try again, then repeat step 3.

Optional To probe another vessel, repeat this procedure. Vitrea adds subsequently probed vessel segments to the Vessel Management list as Vessel 2, Vessel 3, Vessel 4, and so on.

To extend a probed vessel:

1. If the vessel you want to extend is not the currently selected vessel in the Vessel Management list, click the vessel name to select it.
2. Orient the image to display the desired area of the vessel.
3. Click Extend.
NOTE The Extend tool remains active until another tool is selected.

4 Click a point farther along the already selected vessel in the 3D or MPR view. If the vessel probe can extend the vessel, it adds to the current vessel indicator line. If the vessel probe cannot extend the vessel, the status line displays the message Failed to find vessel.

NOTE The probe can only follow one branch of a bifurcated vessel. You must probe the branches separately.

Optional Click Undo to try again, then select a different point along the vessel.

To select or probe vessels in multiple loaded volumes:

1 Press NEXT [F10] to display the next volume or press PREVIOUS [F9] to display the previous volume, then repeat the probe vessel procedure.

2 Repeat step 1 for other volumes.

NOTES

• If the vessels have the same name in the different phases, they are registered together, and it will maintain focus when you change phases.

• If you save a snapshot of a multi-volume workflow with vessels probed in more than one volume, all probed vessels and the volumes they correspond to will restore from snapshot.

To select a different vessel:

• Click a vessel name in the Vessel Management list.

FIGURE 6. Vessel Management List

The views update to display the new active vessel.
With the Select, Extend, or Lesion button activated, press the SPACEBAR to scroll through vessels in the Vessel Management list.

To rename a vessel:

1. Select the vessel and click Rename. The rename dialog box displays.

2. In the New name field, enter the name for the vessel. **EXAMPLE** LCX, LM

3. Click OK.

**NOTE** Vessels cannot have duplicate names.
To delete a vessel from the Vessel Management list:
1. Select the vessel in the Vessel Segment column.
2. Click Delete.

Clearing Vessel Probe Indicators and Rulers

You can delete one or all rulers you have placed. Also, you can clear one or multiple or all previously probed vessels, as well as all other views or measurements associated with them.

To delete rulers:
1. Click the measurement associated with each ruler to select it.
   Once selected, the ruler and measurement color changes to magenta.
2. Press DELETE.
   All magenta rulers are deleted.

To delete vessel indicators and measurements for a specific vessel:
1. Be sure the vessel you want to delete is the active vessel.

   **NOTE** The active vessel displays in the current CPR and cross-sectional views, is denoted by the vessel indicator line in the 3D view, and is selected (highlighted) in the Vessel Management list on the Analysis tab.

   Optional If the vessel you want to delete is not the active vessel, click the vessel name in the Vessel Management list to make it active.
2. Press DELETE.

To clear all vessels:
• Click Clear.

   **NOTE** Other items not associated with the Vessel Probe option remain, including arrows, annotations, and rulers drawn directly on 3D and MPR images.
Visualizing Vessels and Editing

Vessel Probe Tools

Using the tools contained in the Vessel Probe area of the Analysis tab, you can perform the following tasks:

**FIGURE 7. Vessel Probe Tools**

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Show Vessel box - Displays the probed vessel in the 3D viewport with CPR insets.</td>
</tr>
<tr>
<td>2</td>
<td>Show Seg on MPR box</td>
</tr>
</tbody>
</table>

**TABLE 2. Vessel Probe Tools**
**Viewing the Phase Navigation Bar**

The Phase Navigation Bar displays when more than one series is loaded. As the cardiac study is loading, the Phase Navigation Bar provides a visual indication of which phases are loaded, which phases are segmented, and, if necessary, which phases failed to auto segment.

The current phase will have a yellow border. The phase can be changed by clicking the desired phase button.

![Phase Navigation Bar](image)

Each button below the phase navigation curve represents a single phase/volume.

- Buttons display in orange when automatic vessel detection is in progress.
- Buttons display in green when vessels are segmented in this phase.
- Buttons display in red for loaded phases that could not detect vessels.

If you have loaded multiple volumes, use the phase bar to see which phase gives the best review of each major coronary vessel.

**Optional** You may use PREVIOUS [F9] and NEXT [F10] to navigate through the phases.

---

**Changing Viewer Layout**

To change the layout of the reformatted views:

A mode button displays in the lower left corner of the one up format. The mode button allows you to toggle between three layouts of the reformatted views.

**Montage Layout** - This is the default layout in the 1 Up format. This view displays several cross-sectional views of the vessel.
Large Cross-sectional Layout - By default, the center cross-sectional inset displays the plane of the intersection with the middle of the curved view.

- If you are in single reference mode, there will only be two large cross-sections, the point of greatest stenosis in the middle, and the reference plane above or below the stenosis cross-section depending on where it displays in the curved image.

- If you are in average reference mode, the display will be the stenosis plane in the middle and the proximal and distal ends of the lesion on the top and bottom.

- In the dual reference mode, the display will be the stenosis in the middle and the proximal and distal reference planes will be above and below the stenosis cross-section.
You can perform the following operations on the reformatted views:

- To view the data value (HU for CT, SI for MR) at a point, drag on the image using the Crshair tool.
- To jump to a desired point of interest (POI) on the centerline, click on the curved view using the Vessel Probe tool.
- Make measurements using the Free ROI tool.
- Make measurements using the Lesion tool.
- Rotate the curved reformatted views about the axis of the vessel.

The cross-section corresponding to the point-of-interest will also contain:

- Horizontal and vertical markers indicating the orientation of the left and right curved views.
- Measurements for the area within the lumen boundary, the minimum diameter of the vessel, and the maximum diameter of the vessel.
When a vessel is probed, Vitrea plots the centerline of the vessel and displays one (or more) cross-sectional views and two CPR vessel views.

In 1-up format, multiple cross-sectional views display.

**FIGURE 8. 4-up 3D - Single Cross-sectional View and Two CPR Views**
TABLE 3. 4-up 3D - Single Cross-sectional View and Two CPR Views

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To maximize or minimize cross-sectional views:</td>
</tr>
<tr>
<td></td>
<td>• Click or . When you reach the maximum or minimum, the button disappears.</td>
</tr>
<tr>
<td>2</td>
<td>The blue lines indicate the crosshair position, which also corresponds to the current cross-sectional view.</td>
</tr>
<tr>
<td>3</td>
<td>To move along the vessel:</td>
</tr>
<tr>
<td></td>
<td>• Slide the scrollbar. OR, click in the vessel in the CPR view. OR, roll the mouse wheel.</td>
</tr>
<tr>
<td>4</td>
<td>To trim the centerline:</td>
</tr>
<tr>
<td></td>
<td>• Click &amp; drag the trim line up or down.</td>
</tr>
<tr>
<td></td>
<td>• Located on the top and bottom. Portions of the vessel outside the trim line will turn gray.</td>
</tr>
<tr>
<td>5</td>
<td>CPR view 1 - rotated the 3D volume.</td>
</tr>
<tr>
<td>6</td>
<td>CPR view 2 - 90 degrees from the first CPR view.</td>
</tr>
</tbody>
</table>

To show and hide vessels:
The Vessel Overlay box is selected by default.

FIGURE 9. Show Vessel Box

- Clear the Show Vessel box to hide the probed vessels. The cross-sectional and CPR views are hidden from view.
- To redisplay them, check the Show Vessel box.

Using the Point of Interest (POI) Cube

You can use the POI cube as an aid in the visualization of coronary vessels. The 3D POI cube allows you to zoom in on a specific area or vessel in 3D.

To use the POI cube:
1. Switch to the 5-up Viewer window format.
2. Click Crshair (if not already active), then click the Point of interest.
The crosshairs in MPR views and the POI cube center on the point on which you clicked.

3 In POI viewer, use the mouse to perform any of the following actions:

<table>
<thead>
<tr>
<th>Action</th>
<th>Mouse Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add/remove anatomy from around the POI</td>
<td>Right-click &amp; drag</td>
</tr>
<tr>
<td>Rotate</td>
<td>Left-click &amp; drag</td>
</tr>
<tr>
<td>Maximize/minimize</td>
<td>Left + middle-click &amp; drag</td>
</tr>
<tr>
<td>Pan</td>
<td>Middle-click &amp; drag</td>
</tr>
</tbody>
</table>

**Working with Crosshair Position Indicators**

After you probe a vessel in 3D or MPR, the intersection of the crosshairs in the MPR views is indicated in the following ways, depending on the view you are using:

- In the 3D viewer, a blue dot along the vessel indicator line represents the crosshair position.
- The CPR views are centered on the crosshair position. The current crosshair position is indicated by a blue line in the middle of the ruler in the CPR views.
- In multiple-viewer Viewer window formats, with two CPR views and only one cross-sectional view displayed, the cross-sectional view corresponds to the current crosshair position.
- In 1-up Viewer window format, with two CPR views and multiple cross-sectional views displayed, the current crosshair position is located at 0 mm, and is highlighted with a blue border. The surrounding cross sections are +1, +2, +3, -1, -2, -3, and so on.

**NOTE** The cross-sectional views are always 1 mm apart, regardless of the image acquisition thickness.

**Oblique MPR Viewing**

The coronary vessels lend themselves especially well to visualization in oblique planes. When using oblique MPR mode, you can obtain oblique views of the vessels using either of the following methods:

- Rotate the crosshairs manually in one, two or all three MPR views.
- Use the oblique angle orientation tool to rotate the MPR image in multiple planes. This tool allows fast oblique orientation of vessels in multiple series and interactive roaming of the volume in oblique planes.
- Place the crosshair at the center of the cross section of a vessel in the “active” view and rotate around it to interactively update the “passive views”.

**To rotate the crosshairs to obtain oblique cross-sectional views:**

1 In the lower right corner of an MPR view, click the down arrow and select Oblique.
FIGURE 10. **MPR Mode Menu**

<table>
<thead>
<tr>
<th>MPR Mode Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset MPR</td>
</tr>
<tr>
<td>Orthogonal</td>
</tr>
<tr>
<td>Oblique</td>
</tr>
<tr>
<td>Heart Oblique</td>
</tr>
<tr>
<td>Curved Reference</td>
</tr>
</tbody>
</table>

2. Click **Crshair** (if not already active). The center of the crosshairs acts as the fulcrum.

3. Float the cursor over the end of one crosshair until it changes into double arrows.

4. Rotate the crosshairs to see an oblique cross-sectional view in one MPR view.

**NOTE** *The plane of the oblique image propagates through all series.*

5. Repeat steps 2 and 3 in one or both of the other MPR views to generate a double or triple oblique view.

**Optional** To reset the axes, select **Reset MPR** from the MPR mode dropdown menu.

**To use the oblique angle orientation tool to obtain oblique cross-sectional views:**

1. In oblique MPR mode, in an MPR view, press and hold CTRL. The cursor changes to the oblique angle orientation tool.

2. Click and drag to rotate the image.

**Optional** Apply a slab thickness.

**NOTE** *The plane of the image displayed using the oblique angle orientation tool propagates through all series.*

**Optional** To reset the axes, select **Reset MPR** from the MPR mode dropdown menu.

**To use the oblique auto-align locks**

1. Use the MPR mode dropdown menu (click the down arrow button) to select **Oblique**. A lock will display to the right of the orientation degree. The mode is defaulted to unlocked when **Oblique** is selected. Changes will only apply to the current Vitrea session. Changes will not be saved in snapshots or consecutive Vitrea re-starts.
Rotating the 3D view will update the oblique view to show the cut plane parallel to the screen through the crosshair. Rotating the MPR view will not update the 3D view.

2 If you want to unlock the lock, click on the lock. It will change to the unlock mode.

The MPR oblique plane will snap to align to the 3D view when switching from unlocked to locked mode.

**TABLE 4. Oblique Auto-align lock buttons**

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="lock.png" alt="Lock" /></td>
<td>The rotation of the 3D updates the oblique MPR plane.</td>
</tr>
<tr>
<td><img src="unlock.png" alt="Unlock" /></td>
<td>The orientation of the 3D view and oblique plane are independent.</td>
</tr>
<tr>
<td><img src="active_button.png" alt="Active Button" /></td>
<td>When the cursor passes over the button, the border will become active showing it is a button.</td>
</tr>
</tbody>
</table>

**Performing Automatic Oblique Reformats**

Using Oblique MPR mode, you can display MPR views of a feature that lies in a plane other than the sagittal, coronal, or axial planes, as do many arteries.

In manual Oblique MPR mode, you change the orientation of the MPR views by rotating the crosshairs in one or more of the MPR views, or by using the oblique angle orientation tool.

With the Vessel Probe tools, you can perform automatic oblique reformats. After you probe the vessel, the MPR views automatically update to display an oblique view of the vessel as you scroll along the vessel centerline in the CPR views.
To perform an automatic oblique reformat:

1. Orient the 3D image to display the desired view of the vessel.
2. Select a vessel from the Vessel Management box or probe the vessel.
3. Use the MPR mode dropdown menu to switch any of the MPR views to **Oblique** mode.

Vitrea displays oblique images in all three MPR viewers. The MPR view that is normally the Axial view is in the oblique plane that best displays the vessel.

**Optional** In the Oblique mode, click and drag the **Thickness** slider to be sure you can see as much of the vessel as possible.

**NOTE** For best results, set the thickness slider to the vessel diameter.

In the MPR Options menu, **MIP** is automatically selected.

4. In the CPR views, move along the vessel.
   
   The crosshair position automatically adjusts, and the oblique views rotate so the view that is normally the Axial view is in the oblique plane that gives the best view of the vessel.
Viewing Curved MPRs

In performing curved reformats, you choose one view, called the *Curved Reference* view, to define the curve. By selecting the *Curved Reference* view, you change one of the crosshairs to follow along the curve of the vessel.

Using the Vessel Probe tools to perform an automatic curved reformat, you probe the vessel, then select the *Curved Reference* view. Vitrea automatically makes all of the same adjustments as in the manual curved reformat, and plots the centerline for you.

For detailed information about performing manual curved reformats, see *Editing the Vessel Centerline*.

**To perform an automatic curved reformat:**

1. Select a vessel from the Vessel Management box, or probe the vessel in a 3D or MPR view.
2. Choose a *Curved Reference* MPR view by switching it from Orthogonal MPR to *Curved Reference* mode.

   **NOTE** The view you choose for the Reference view should be roughly along the length of the vessel, or parallel to it.

In the *Curved MPR* view, Vitrea plots the *Centerline* and displays its length (mm).

- If necessary, adjust the centerline. In the Reference or Transverse MPR views, click and drag to move any of the automatically plotted points to more closely trace the centerline.
- Use any of the methods described in *Working with Crosshair Position Indicators* to reposition the crosshairs.

As you move the crosshair position indicator, the system updates the intersection of the Transverse line and Centerline in the Curved MPR view.

- To examine the Curved MPR view more closely, click **Maximize**.
- To change from 1-up format back to the original Viewer format, click **Minimize**.
- To measure a distance between two points, such as between bifurcations or the length of a stenosis, perform the following tasks:
  - Probe the vessel.
  - Scroll to the point where you want to start the measurement.
  - Switch to Curved MPR. (If you were already in Curved MPR, switch to Orthogonal mode, and then back to Curved MPR.) Selecting Curved MPR automatically sets the *Transverse* line and the *Measuring* line to the current crosshair position.
  - Scroll to the point where you want to end the measurement. This automatically moves the *Measuring* line to the current crosshair position. The Curved view now displays the distance between these two points.
**Resetting MPR Viewers**

Use the MPR mode dropdown menu (click the down arrow button) to select **Reset MPR**.

*FIGURE 11. MPR Mode Dropdown Menu*

<table>
<thead>
<tr>
<th>Reset MPR</th>
<th>Orthogonal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oblique</td>
<td>Heart Oblique</td>
</tr>
<tr>
<td>Curved Reference</td>
<td></td>
</tr>
</tbody>
</table>

**Reset MPR:**
- The Reset option will be unavailable in the orthogonal MPR mode.

In auto curved MPR the entire vessel will be deleted.

**Editing the Vessel Centerline**

Use the following settings for centerline editing mode:
- 4-up viewer layout
- Curved view mode
- Choose the best view as the reference view
- Verify **Crosshair** is selected
- Verify **Show Vessel** is selected
- Vessel centerline is showing in inset images

**To enter and exit centerline editing mode:**

From the Vessel Probe panel on the Analysis tab, click **Edit** to turn on centerline editing.

- When you click **Edit** to enter the Edit mode, the current status will be saved and the editing mode settings will be automatically applied.
- When you click **Edit** to exit the Edit mode, the previous saved pre-edit status will be recovered and automatically applied.
- If you make manual changes while in Edit mode, Edit mode will automatically close. The pre-edit status will be removed and can not be recovered.
The following data will be recalculated after you edit the centerline:

- centerline data (point, normal) driving the reformatted views
- segmentation of the vessel corresponding to the new centerline
- approximate diameter of the vessel at the modified centerline points
- boundary contours, cross-sectional area and diameter measurements at the modified centerline points
- lesion measurements

To show and hide centerline:
Right-click on the vessel and select **Show Centerline** to show the vessel and **Hide Centerline** to hide the vessel.
In Curved MPR mode, you use one of the MPR views to define a curve, so the curved images display in one of the other MPR views. This is useful if you want to create an MPR image of a curved vessel. In Curved MPR mode, you use each of the three MPR views for a unique purpose.

- Use the Reference view to define the curve. In this view, you change one of the crosshairs to follow along a curve.
- Use the Curved view to display the curved images.
- Use the Transverse view, perpendicular to the Curved view, to display cross-sectional views with an X at the point where the curve intersects the view.

If you defined a vessel with Vessel Probe and you switch the MPR views to Curved MPR, they automatically display curved images along the centerline.

**In one of the MPR views:**

1. Click the MPR mode menu and select **Curved Reference**.

The Curved MPR view automatically displays the vessel. The Transverse MPR view shows the same cross-section of the vessel that displays in the cross-sectional view in the volume view.
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**VPMC-8144B Visualizing Vessels and Editing**

**Editing the Lumen Boundaries**

You can edit the lumen boundary contour lines for the current vessel (in the current volume).

**To edit the lumen boundary contour lines:**

1. Click **Free**.
2. In the cross-sectional view, click on a boundary contour line, drag it where you want to place it, then release.

During editing, cross-sectional measurements are hidden. Vessel segmentation and cross-sectional and lesion measurements are recalculated after every contour edit.

**Showing Segmentation in MPR Views**

You use the Show Seg (Show Segmentation) box on the Visual tab to make the MPR views reflect the results of any segmentation done in the volume view. Also, you check the Show Seg box if you want the Object Visibility options to apply to the MPR views. Visibility options on the Analysis tab of the Viewer window enable you to control how images display region segmentation.

When the Show Seg on MPR box is checked, MPR views show the results of any segmentation done in the volume view. If the Show Seg on MPR box is cleared, the MPR views continue to display whole MPR images, even if parts of the volume have been segmented. The default setting of the Show Seg on MPR box depends on the preset you selected on the Gallery window.

**To show segmentation in MPR views:**

- On the Analysis tab, check the **Show Seg on MPR** box to display cardiac segmentation.

**FIGURE 14. Show Seg on MPR Box**

- If you select **Show Seg on MPR**, and you have excluded a region in the volume view, that region is not displayed in the MPR views.

**Using Object Visibility Options**

After you probe one vessel, the Vessels tab is available in the Object Visibility area. On the Vessels tab, you can choose from several visibility options.
If you select Semi-Transparent Background, even when Show Seg on MPR is selected, the MPR views do not show the background as semi-transparent.

To select visibility options:

- Select one of these options on the Vessels tab in the Object Visibility area:
  - To remove everything except the probed vessel(s) from view, select Vessels Only.
  - Vitrea will attempt to display the aortic trunk in the Vessels Only view.

- To display the background dark, the vessels bright, and the sculpted regions semi-transparent, select Inverse Angio Emulation.
Analysis and Measurements

Lesion Analysis Tools   Using the tools contained in the Vessel Probe area of the Analysis tab, you can perform the following tasks:

![Lesion Analysis Tools](image)

TABLE 5. Vessel Probe Tools

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lesion Analysis (Plaque tools only display if you are licensed for Vitrea® 2 SUREPlaque™).</td>
</tr>
</tbody>
</table>

Intensity Statistics   When the Free tool is active, you can perform intensity measurements on the vessel to characterize the type of plaque. You perform intensity measurements by creating ROIs in either of the CPR views.

Each ROI will display the Average and Std. Dev. of the intensity of voxels within the ROI.
NOTE The ROIs on CPR views are deleted automatically if you rotate the view or navigate along the vessel.

**Automated Cross-sectional Measurements**

When a vessel is probed, the lumen boundary (inner wall) is automatically traced along its centerline points. Cross-sectional measurements are displayed in the upper right corner of the cross-sectional view corresponding to the current point of interest.

The following cross-sectional measurements are extracted at 0.5 mm intervals along the centerline:

- Lumen area (mm$^2$)
- Minimum lumen diameter (mm)
- Maximum lumen diameter (mm)

**FIGURE 18. Cross-sectional View**

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.9mm$^2$ = Area in mm$^2$</td>
</tr>
<tr>
<td></td>
<td>3.3mm = Maximum diameter</td>
</tr>
<tr>
<td></td>
<td>2.6 mm = Minimum diameter</td>
</tr>
<tr>
<td>2</td>
<td>Manual ruler</td>
</tr>
<tr>
<td>3</td>
<td>Left and right CPR view indicators</td>
</tr>
</tbody>
</table>

Cross-sectional views will contain:

- Lumen boundary contours
- Automated measurements text at the top-right corner
- Manual measurements text at the bottom-right corner
Lesions

You can quantify obstructive disease in a vessel by defining a lesion. Each lesion is characterized by four key points along the centerline:

- Normal/Reference lumen (when the Single method is used, the Reference lumen is initialized to a centerline point outside the lesion, and 10 mm from its start. When the Averaged method is used Vitrea does not use a reference point)
- Start of the lesion
- Point of maximum narrowing
- End of lesion

You identify the start and end of the lesion. Vitrea identifies the narrowest point. If you are using a Single method preset, Vitrea also identifies a reference point.

Defining a Lesion

When the Lesion tool is active, you can define a lesion in the vessel in either of the curved reformatted views.

1. Click the Lesion dropdown and select the appropriate lesion tool (Single, Average, or Dual).

   ![Lesion Analysis Diagram]

   The cursor changes to the selected Lesion Measurement shape.

2. Click near the start of the lesion and drag to the end.

   Vitrea identifies the following key positions by analyzing the cross-sections along the centerline:
   
   - Point of maximum narrowing - the point on the centerline between the start and end points where the cross-sectional area is the smallest.
   - Reference lumen (Single method only) - point outside the lesion, along the centerline, 10 mm from the end of the lesion.

   **NOTE** You cannot create overlapping lesions.
Stenosis Calculation Methods

Depending on the preset you select, Vitrea uses one of the following methods for stenosis calculation:

- **Single method:** The stenosis is calculated by comparing the narrowest point with a reference point that you will need to adjust.

  When you draw a lesion using the Single method, Vitrea automatically identifies a point as the reference point. Vitrea displays the minimum diameter at the narrowest point and at the reference point.

- **Averaged method:** The stenosis is calculated by comparing the narrowest point with the average values of the start and end points.

  When you draw a lesion using the Averaged method, Vitrea does not need a reference point, so it does not display a point marked in green. Vitrea displays the minimum diameter at the narrowest point and both end points.

  The **Cardiac: Arteries CT** protocol uses the Single method for all presets except the one located in the lower right on the Gallery window. That preset will have “Averaged” in the name, as shown.

  **NOTE** To use the Averaged method for additional presets, contact your System Administrator or Technical Support.

- **Dual method:** The dual reference allows average reference measurements and separate length measurements. The top and bottom green cross sections as reference. The red cross section is the minimum diameter. The blue line represents the length measurement.

Lesion Measurements

Each lesion object has the following measurements:

- Minimum lumen diameter at each of the above points
- Length of the lesion in mm
- Percentage *Area* Stenosis

  The percentage area stenosis is calculated using the formula:

  \[
  \% \text{ area stenosis} = (1 - \frac{\text{Stenosed lumen area}}{\text{Reference lumen area}}) \times 100\%
  \]

- Percentage *Diameter* Stenosis

  The percentage diameter stenosis is calculated using the formula:

  \[
  \% \text{ diameter stenosis} = (1 - \frac{\text{Stenosed min lumen diameter}}{\text{Reference min lumen diameter}}) \times 100\%
  \]

Visualizing Lesions

Selected lesion key points and measurements are displayed on the CPR views in the following figures.
Figure 19. Lesions - Single Method

Table 7. Lesions - Single Method

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green line indicates reference point</td>
</tr>
<tr>
<td>2</td>
<td>Cyan lines indicate start and end points of lesion</td>
</tr>
<tr>
<td>3</td>
<td>Red arrows indicate stenosis point</td>
</tr>
<tr>
<td>4</td>
<td>Minimum lumen diameter at the stenosis point</td>
</tr>
<tr>
<td>5</td>
<td>Stenosis measurements</td>
</tr>
</tbody>
</table>
FIGURE 20. Lesions - Averaged Method

![Lesions - Averaged Method](image)

**TABLE 8. Lesions - Averaged Method**

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Averages diameter/area (top and bottom line) as the reference measurement</td>
</tr>
<tr>
<td>2</td>
<td>Minimum lumen diameter at the stenosis point</td>
</tr>
</tbody>
</table>
Lesion Management

To select or deselect a lesion when multiple lesions are selected:

- Click one of its key points.
  The currently selected lesion is bright. Deselected lesions are semi-transparent.

  OR

- With the Lesion tool selected, press SPACEBAR to scroll through lesions in the selected vessel.

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Top and bottom green cross sections as reference</td>
</tr>
<tr>
<td>2</td>
<td>Red cross section is the minimum diameter</td>
</tr>
<tr>
<td>3</td>
<td>Blue line represents length measurement</td>
</tr>
</tbody>
</table>
The measurements in CPR and cross-sectional views and the curved MPR view are updated.

To delete a lesion:
1. Be sure the lesion you want to delete is the active lesion.
2. Press DELETE.

To edit a lesion:
You can edit lesions by modifying the location of key points in one of the curved reformatted views.
- Click Lesion, then click one of the key points of a lesion, and drag it to the desired location along the centerline.
  A lesion is automatically selected when you click one of its key points.
  As you drag the key point:
    - Lesion measurements (% area stenosis, % diameter stenosis, length) are updated.

If you are dragging a point for which the minimum diameter is displayed, the minimum diameter is displayed at the new location of the key point.

**NOTE** Minimum diameter is displayed for the current location of the stenosis point. The location of the stenosis point can be manually adjusted. If a reference point is displayed, minimum diameter is shown for it (Single method). If a reference point is not displayed, then minimum diameter is shown for start and end (Averaged method).

**CAUTION** The stenosis point within an identified lesion is initialized to the minimum luminal area and not the minimum luminal diameter of the overall identified lesion.

To name the lesions:
The lesion is named L1 by default. If you define another lesion, it will be named L2.
Optional

Select L2 in the Vessel Management box and click Rename to rename the lesion and select OK. For example, rename L2 to Lesion 2.

![Rename dialog box](image)

The new lesion name appears in the Vessel Management box.

Performing Measurements

You can perform the following measurements with the vessel probe:

- Diameter of normal and stenosed portions of a vessel, which the system uses to calculate the percentage of stenosis
- Length of stenosis or distance to bifurcation, which is particularly useful in stent and surgery planning

To measure vessel diameter and calculate percentage of stenosis manually, without defining a lesion:

1. Probe the vessel.
2. Scroll in the CPR views to display a point before the stenosis.
3. Click and drag across the width of the lumen, then release the mouse button to end the ruler.

   The ruler and the measurement (in millimeters) display in the cross-sectional and CPR views.

   **NOTE** You can draw rulers and measure in any cross-sectional view. You can place only one ruler per cross section, but you can redraw the ruler as many times as needed.

4. Adjust the crosshair position to display a point inside the stenosis.
5. Repeat step 3.
Vitrea displays the current maximum and minimum diameter measurements in green and red, respectively, in the curved reformat views. Any other measurements are displayed in cyan (light blue).

Vitrea calculates the percentage of stenosis by comparing the maximum (normal) and minimum (stenosed) measurements. The percentage and the formula used to calculate it are displayed at the bottom of the right CPR view.

6 Repeat this procedure to draw as many rulers as necessary. The maximum diameter, minimum diameter, and percentage stenosis update with each ruler you draw.

**To measure the length of a stenosis or distance to a bifurcation:**

- To measure a distance between two points, such as between bifurcations or the length of a stenosis, perform the following tasks:
  - Select the vessel.
  - Scroll to the point where you want to start the measurement.
  - Switch to Curved MPR. (If you were already in Curved MPR, switch to Orthogonal mode, and then back to Curved MPR.) Selecting Curved MPR automatically sets the Transverse line and the Measuring line to the current crosshair position.
  - Scroll to the point where you want to end the measurement. This automatically moves the Measuring line to the current crosshair position. The Curved view now displays the distance between these two points.

**To draw rulers directly on the vessel in a CPR view:**

1 Adjust the CPR views to display the part of the vessel you want to measure.

Optional To more closely examine the vessel, switch to 1-up Viewer format.

2 In one of the CPR views, click and drag to draw the ruler.
   The system draws the ruler and adjusts the length (mm) as you move the mouse.

3 When you want to end the measurement, release the mouse button.
   The system ends the ruler and displays its length (mm).

**NOTE** You can only draw one ruler in each cross-sectional view or CPR view, but you can redraw it as many times as necessary.

Optional To delete a ruler from a CPR view, scroll or change the magnification.

**NOTE** Scrolling or changing the magnification does not delete rulers from the cross-sectional views. Rulers drawn in the cross-sectional views will remain in the CPR views. Rulers drawn on CPR views are deleted automatically if you rotate the CPR views, modify the vessel boundaries, navigate along the vessel, or change magnification.

**To view the diameter and area in graph format:**

You can utilize the following views when choosing the reference position or the stenosis position:
1. Select the icon located in the lower right corner of the CPR view.

The area graph displays the area measurements along the probed vessel.
2  Select the icon again to display the minimum diameter along the probed vessel.
Report Findings

Vitrea® 2 version 4.0 CT Coronary Artery Analysis User Guide

Vitrea saves snapshots, batches, and movies you create to the Report window. On the Report window, you can create, export, print, or post reports containing up to 24 patient images per page. You can use protocol-specific templates with editable text fields. Reports can also contain image batches and digital movies. You can add arrows, annotations, and comments to the report. Use snapshots to restore a previous workflow to the Viewer window.

When you display the Report window, you will find:

- a Findings list which allows you to filter the whole list of snapshots to review and select based upon workflow,
- a set of protocol-specific report templates including text pages with selectable and editable text fields,
- tools for selecting snapshots, working with snapshots, adding pages to the report, and working with reports.
Report Findings Tools

Using the tools contained in the Vessel Probe area of the Analysis tab, you can perform the following tasks:

FIGURE 22. Report Findings Tools

TABLE 10. Report Findings Tools

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Report Findings - Use this reporting tool to report on lesions, vessels, stents, and grafts.</td>
</tr>
</tbody>
</table>
To report findings for vessels, grafts, and stents:

**FIGURE 23. Report Findings for Vessels**

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
</table>
| **1**          | Use the links (Proximal, Mid, and Distal) to select the different segments of the vessel.  
  • The segment being reported on will display in black bold font.  
  • Segments you can navigate to and report on are indicated by blue underlined text.  
  • Segments with report findings will display in purple.  
  • Segments that have not been reported on will display in blue. |
| **2**          | Select All Segments to report on the entire vessel.  
  **NOTE** *All Segments will only display if a vessel with segments is active.* |
| **3**          | The options below are only available for vessels and grafts.  
  **Normal** - When Normal is selected, the dropdown and comments section will be disabled. Normal will display in the report.  
  **Unreadable** - When Unreadable is selected, the dropdown and comments section will be disabled. Unreadable will display in the report.  
  **Other** - Other is the default. You can identify your findings by selecting the dropdown boxes and reporting on Stenosis, Plaque Type, and Plaque Morphology. Select the Comments button to make additional comments. Your selections and comments will display in the report. |
<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td><strong>Stenosis</strong> - Select the dropdown and select the type of stenosis (No Stenosis, Mild, Mild/Moderate, Moderate, Severe, Occluded). <strong>Plaque Type</strong> - Select the dropdown and select the plaque type (Non-calcified, Mixed, Calcified). <strong>Plaque Morphology</strong> - Select the dropdown and select the plaque morphology (Focal, Diffuse).</td>
</tr>
<tr>
<td>5</td>
<td><strong>Comments...</strong> - Select the Comments button to enter any comments</td>
</tr>
</tbody>
</table>
The options below are only available for vessels and grafts.

- **Normal** - When Normal is selected, the dropdown and comments section will be disabled. Normal will display in the report.

- **Unreadable** - When Unreadable is selected, the dropdown and comments section will be disabled. Unreadable will display in the report.

- **Other** - Other is the default. You can identify your findings by selecting the dropdown boxes and reporting on Stenosis, Plaque Type, and Plaque Morphology. Select the Comments button to make additional comments. Your selections and comments will display in the report.

- **Proximal Insertion** - Select the dropdown and select the appropriate proximal insertion.

- **Distal Anastomosis** - Select the dropdown and select the appropriate distal anastomosis.

- **Patency** - Select the dropdown and select the appropriate patency.

- **Comments...** - Select the Comments button to enter any comments.
Vitrea® 2 version 4.0 CT Coronary Artery Analysis User Guide

FIGURE 25. Report Findings for Stents

<table>
<thead>
<tr>
<th>Callout Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select the Prox, Mid, or Dist box to report on stent findings.</td>
</tr>
</tbody>
</table>
| 2              | **Patency** - Select the dropdown and select the type of patency (Patent, Mild, Mild/Moderate, Moderate, Severe, Occluded).  
**Plaque Type** - Select the dropdown and select the plaque type (Non-calcified, Mixed, Calcified).  
**Comments...** - Select the Comments button to enter any comments |

**Saving Snapshots**

You save snapshots the same way you would for any other workflow in Vitrea. For more information, see the *Basic Vitrea User Guide*.

**Workflow Overview**

After you have generated desired images, such as cross-sectional and curved vessel views of the coronary arteries or other desired views such as the images of the heart chambers, centerlines through a curved MPR view, and so on, you can create a report in Vitrea.

**NOTE:** You can restore workflows from snapshots saved for the currently loaded volume only. If you try to restore a snapshot from a volume not currently loaded, you will be prompted to load the volume first.

1. On the Viewer window, take snapshots, create movies, and make batches to include in your report.
2. Select the **Report** tab.
3. Review the snapshots, movies, and batches in the Findings tray.
4. Select the Full Cardiac or Coronaries template.
   - Full Cardiac template - contains a comprehensive report of CA Score, CFA, and Coronary Artery.
   - Coronaries template - contains a report specific to Coronaries.
NOTE If only images are needed in the report (without a table, graph, or text), you can select any image template in the top row.

5 Click New Report.

The report has configurable patient information including cardiac risk factors.

NOTE For detailed information on configuring the report to suit your needs, contact your System Administrator or Technical Support.
6 You can add additional pages to the report by choosing the appropriate template and selecting Insert Before or Append Page.

7 Drag snapshots, movies, or batches to the image areas of the report.

8 Complete the text sections.

Optional If you are interrupted while creating the report, click Save.

- To return to the saved report, restore the latest snapshot for the study from the Study Directory.

NOTE Restoring the latest snapshot for the study will ensure that auto-populated entries from the Viewer window will match the state of the original report.

Optional If the study has multiple series that are processed using different protocols (such as a cardiac study with calcium scoring, function, and coronary review), click Save to save the report before switching protocols.

9 If you want to create a Microsoft Word document, click Word Report. The Word report, similar to the one shown below, displays.

NOTE The Word reports are no longer supported within Vitrea. You may save, print, or manage the Word reports to fit your needs.

10 When you have completed the report, you can print using the Print button or you can post it using the Intranet Post button.

11 Click Record CD to save the Full Cardiac or Coronaries report to CD.

Recording to CD may be done from the Report window as described above or from the Study Directory window, Archive to CD button.

NOTE For information about customized templates or help with changing the format or content of the templates, contact your System Administrator or Technical Support.
Using the Help Window

The Help window gives you instant access to What’s New release information and Vitrea 2 User Guides in electronic (.pdf) format.

To display the Help window:
• Select the Help tab from any window.

To display What’s New information for this release:
• Click the What’s New in Vitrea2? link.

To display the Adobe Acrobat (.pdf) version of any Vitrea user guide:
• Click the link for the manual you want to display.

To return to Vitrea:
• Select any other tab.
Keyboard Shortcuts

With the CT Cardiac option, you can use special function keys as shortcuts for common tasks.

TABLE 14. 3D Cardiac Quick Views:

<table>
<thead>
<tr>
<th>Press...</th>
<th>To rotate the volume...</th>
<th>Press...</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHIFT-F2</td>
<td>Right 25 degrees, caudal 20 degrees</td>
<td>CX and LAD</td>
</tr>
<tr>
<td>SHIFT-F3</td>
<td>Right 30 degrees, cranial 25 degrees</td>
<td>CX</td>
</tr>
<tr>
<td>SHIFT-F4</td>
<td>35 degrees cranial</td>
<td>LAD</td>
</tr>
<tr>
<td>SHIFT-F5</td>
<td>Left 45 degrees, caudal 20 degrees</td>
<td>Left Main (SpiderView)</td>
</tr>
<tr>
<td>SHIFT-F6</td>
<td>Right 10 degrees, cranial 30 degrees</td>
<td>LAD</td>
</tr>
<tr>
<td>SHIFT-F7</td>
<td>Right 30 degrees</td>
<td>RM</td>
</tr>
<tr>
<td>SHIFT-F8</td>
<td>Rotate left 30 degrees</td>
<td>Ostium of RCA and PDA/PLA</td>
</tr>
</tbody>
</table>

To switch the Viewer window to display the...

<table>
<thead>
<tr>
<th>Press...</th>
<th>To rotate the volume...</th>
</tr>
</thead>
<tbody>
<tr>
<td>F9</td>
<td>Previous loaded volume</td>
</tr>
<tr>
<td>F10</td>
<td>Next loaded volume</td>
</tr>
</tbody>
</table>

TABLE 15. Function Keys:

<table>
<thead>
<tr>
<th>Press...</th>
<th>To rotate the volume...</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2</td>
<td>S-I Superior to Inferior</td>
</tr>
<tr>
<td>F3</td>
<td>I-S Rotate Inferior to Superior</td>
</tr>
<tr>
<td>F4</td>
<td>A-P Rotate Anterior to Posterior</td>
</tr>
<tr>
<td>F5</td>
<td>P-A Rotate Posterior to Anterior</td>
</tr>
<tr>
<td>F6</td>
<td>L-R Rotate Left to Right</td>
</tr>
<tr>
<td>F7</td>
<td>R-L Rotate Right to Left</td>
</tr>
<tr>
<td>F8</td>
<td>OBLIQUE Rotate to oblique orientation: 40° Azimuth, 30° Elevation, 0° Twist</td>
</tr>
<tr>
<td>Ctrl + Z</td>
<td>UNDO Undo last action in Viewer window. Click more than once to undo multiple actions.</td>
</tr>
<tr>
<td>Ctrl + Y</td>
<td>REDO Redo last “Undo” in Viewer window.</td>
</tr>
</tbody>
</table>