

Exercise 21 : Virtual Endoscopy Interactive Generation of Endoscopic Views

Virtual Endoscopy is an important visualization application that results from the ability to create 3-D visualizations from a viewpoint inside of the body. This exercise will familiarize you with the Virtual Endoscopy module, demonstrating basic functionality and various methods of controlling the view.

1. Load the **CT_Lungs.avw** data set from the `$(\BIR\images\TutorialData` directory.
2. Open the **Virtual Endoscopy** module (**Display > Virtual Endoscopy**).

Basic Controls

3. Position the cursor on the image display near the center of the trachea (the hole in the flat surface) and **click once**; this will be set as the new 'Look At' point and the 'Eye' position will advance (figure 1).
- tip | The 'Eye' position advances toward the selected point based on settings in the View Parameters window.
4. Position the cursor on the flat surface outside of the trachea and **click once**.
 5. The 'Back' PowerBar button can be used to reposition to previous locations; the 'Forward' PowerBar button will move to the next location if one has been defined. Press the **Back** button once.
 6. Position the cursor over the center of the trachea and click several times to navigate into the trachea. Then, press the **Back** button until you return to the starting location.

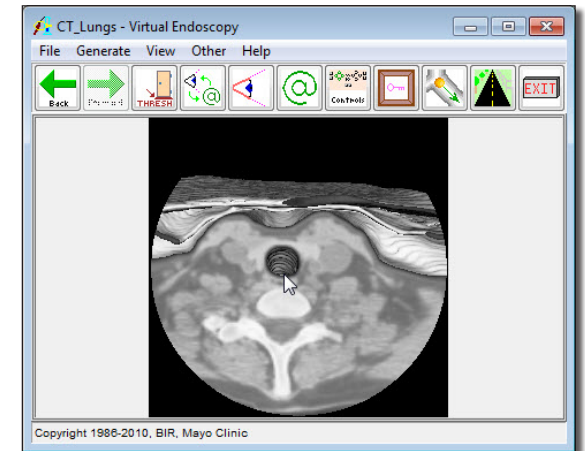


Figure 1

Advanced Controls



7. Open the **View Parameters** window (**Generate > View Parameters**).
8. Set the **Move Percent** to **50**. Now, click again on the image display near the center of the trachea; note the effect of increasing the Move Percent (figure 2).
9. The View Parameters window (figure 3) also allows you to specify a location by typing in coordinates. Set the following coordinates:
 - **Eye** **X: 128** **Y: 150** **Z: 181**
 - **Look At** **X: 125** **Y: 142** **Z: 120**
 - **Up** **X: 0** **Y: 1** **Z: 0**
10. Click **Render** in the View Parameters window to display the location of the coordinates (figure 4).

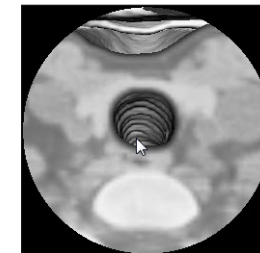


Figure 2

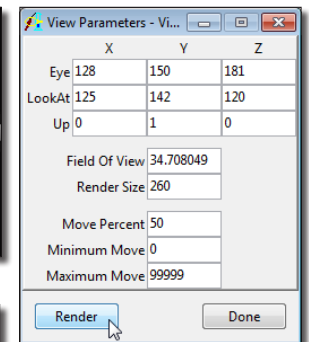


Figure 3



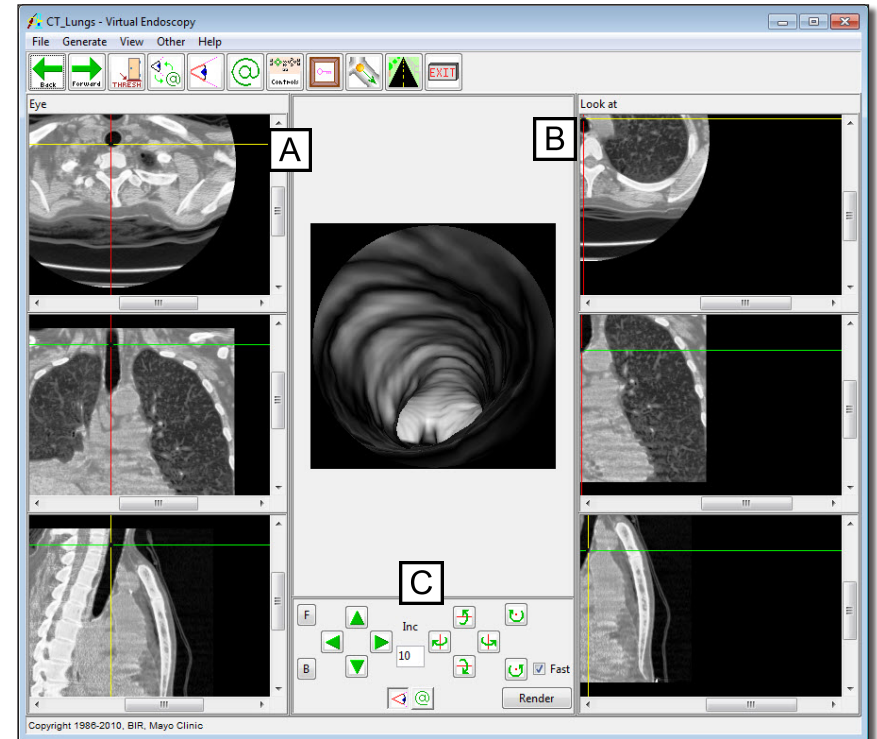
Figure 4

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- Reset **Move Percent** to **20** in the View Parameters window and click **Done** to dismiss the window.
- Many times when an obvious entry location is not available, the 'Orthogonal Eye' and 'Look At' views are very useful. To enable these views, press the **Eye** and **Look At** PowerBar buttons or choose **View > Eye** and **View > Look At**. When enabled, three interactive panes become available (figure 5) on either side of the module window, displaying the transverse, coronal, and sagittal sections that intersect with the current 'Eye' position [A] or 'Look At' point [B]. A new 'Eye' position or 'Look At' point can be set by clicking in any of the orthogonal section panes.



tip | The 'Eye' position advances toward the selected point based on settings in the View Parameters window (Generate > View Parameters).



- Press the **Manual Controls** PowerBar button or choose **Generate > Manual Controls**. The Manual Controls will appear in the main module window [C], allowing you to select the translation or rotation actions, the increment, and point(s) to manipulate. To apply a manual action, click the **Render** button at the bottom of the main module window.
- Use the interactive Orthogonal Eye/Look At panes and the Manual Control buttons to navigate down into the trachea until you reach the bifurcation of the airway.
- Press the **Show Object** PowerBar button or choose **Generate > Show Object**. The Show Object window allows the 'Eye' position and 'Look At' direction to be manipulated on an exterior rendering. The rendering shows a circle indicating the 'Eye' position and an arrow for the 'Look At' direction (figure 6).



note | Since the visualization is created by thresholding, you must be "inside" the object in order for it to be rendered.

- Close all Virtual Endoscopy windows before proceeding to the next exercise.

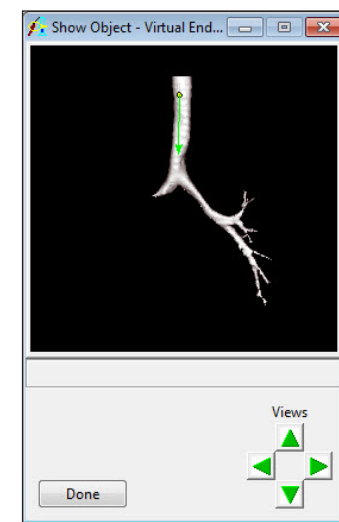


Figure 5

Figure 6