Virtual Endoscopy

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.

Figure 1

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.

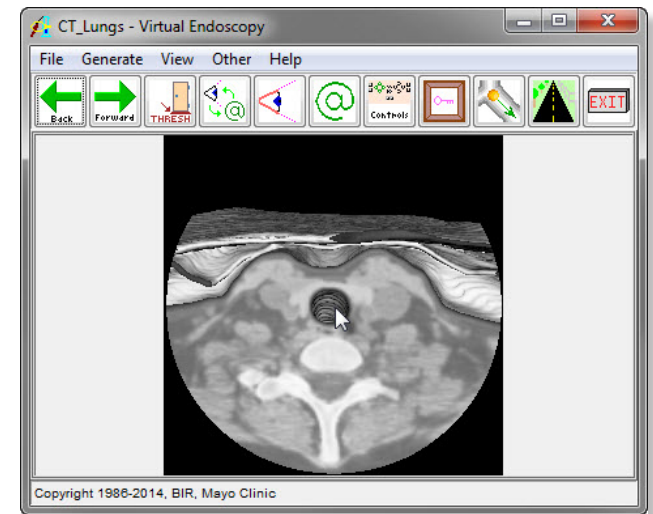## Advanced Controls

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).

Figure 2

Figure 3

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

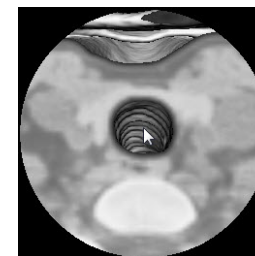10. Click **Render** in the View Parameters window to display the location of the coordinates (figure 4).
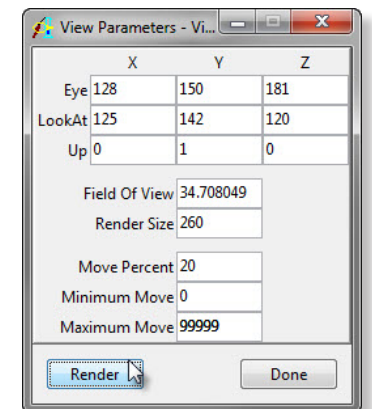

Figure 4

AnalyzeDirect

Virtual Endoscopy

11. Reset **Move Percent** to **20** in the View Parameters window and click **Done** to dismiss the window.

12. 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 or 'Look At' point. 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).

13. Press the **Manual Controls** PowerBar button or choose **Generate > Manual Controls**. The Manual Controls will appear in the main module window, 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.

14. 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.

15. 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.

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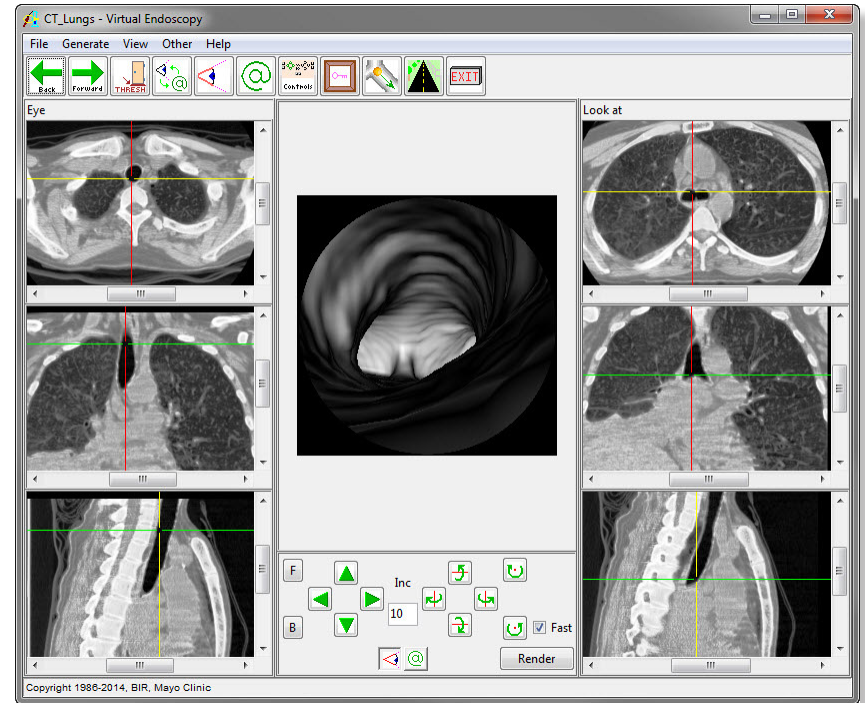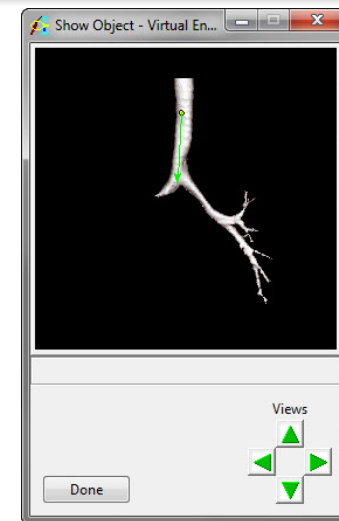

Figure 5

Figure 6