Complete Anatomy Intro Exercise

Goal: Practice manipulating the model here to find the pleural membranes and identify the visceral pleura and the parietal pleura. We will eventually use the example of treating a pneumothorax to highlight how to apply these skills.

The model is currently in the full body view and we need to explore within it. There are many ways to do this, but I will show you this one to start learning the system.

1. Open a new model from the Hub by clicking Models. Select Full Body from the bottom left icon Models in the Gross Anatomy Region section and then close.
   a. You may Open a new model from the Hub by clicking Models. Select Full Body from the bottom left icon Models in the Gross Anatomy Region section and then close.
   b. You may see a skeleton at this point. Let's put the model together with all layers and systems.
2. Click on the icons for each system at the bottom of the page and click the Plus button that appears until all layers are added and repeat for all systems. You will see a model of a male as they may appear in life.
3. You don't always need to build and start with a fully layered model. You can just increase the level of the individual system you need to review to isolate systems.
4. Selecting System Layers
   a. Let's turn off some select systems to isolate the thorax. We can do this instead of cutting if we want to isolate whole structures or systems like the skin, muscle, bone, etc.
      i. Skin: Click the integument system icon in the bottom of the model screen. Click the minus button when it displays until it is off. Next turn off these systems:
      ii. Urogenital system: turn it off
      iii. Endocrine: turn it off
      iv. Digestive: off
      v. Nervous system: off
      vi. Lymphatic: off
   b. Now modify the systems to display these layers:
   c. Venous: show layer 1
   d. Arterial: show layer 1
   e. Muscular: show layer 2
   f. Connective: show layer 1
   g. Skeletal: show layer 'bone'
5. Next we will see the membranes in the body relative to surrounding organs.
   a. We want to view the serous membranes of the lungs for this exercise so we need to hide some of the structures the membranes are deep to and not visible yet. We will also see the target structures relative to the nearby structures that we may be able to assess on a person like the muscle of the chest, the ribs, etc.
   b. Position the model so you are viewing from the nipple line on the left aspect of the chest. See Figure 1.

   c. Click on the second rib and it will turn green and provide a menu that is full of information about the structure and additional resources. Use this to study structures for class in more detail as you need to.

d. From the menu that opened with information about the rib to the right click *Multi Selection* and select the remaining ribs. Then select *hide* to expose the lungs and intercostal muscles.
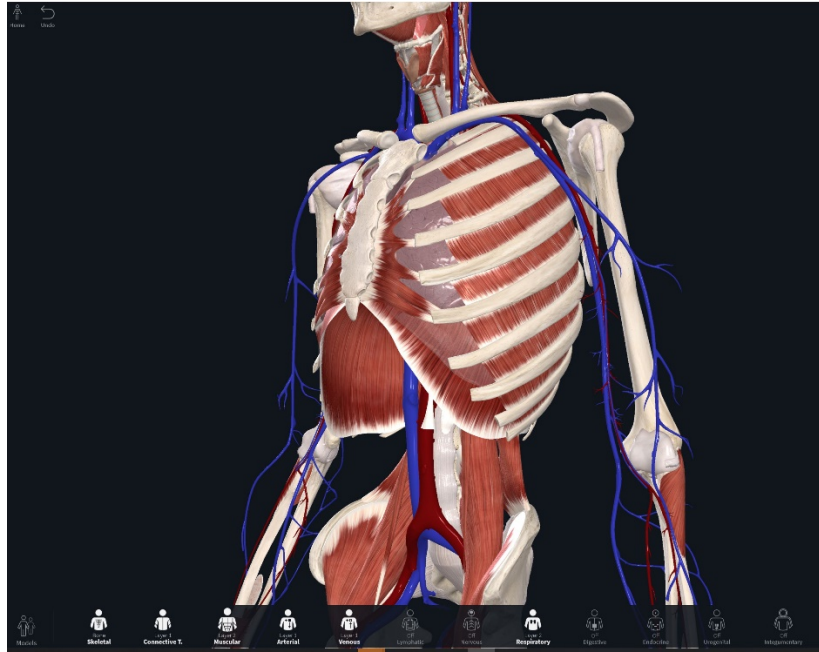

Figure 1 by Sean Haaverson

6. Cutting Tools

   a. We can cut and fracture. We will mostly cut to dissect. We will use the Cut tool to dissect the layers of tissue instead of hiding them here. We could hide them, but our goal is to see how all these structures are connected so dissection is helpful.

   b. Select the Tools icon from the menu to the left.

   c. Select the Cut icon.

   d. Use your finger or cursor to click on the intercostal muscle on the second strand of intercostal muscles at the mid-clavicular line and click just inside the muscle. While holding the cursor it will draw a dotted line to indicate the cutting tissue. Stop at the inside of the intercostal muscle and click the image of scissors on the left of the line you drew to cut away the intercostal muscle. All intercostal muscle down the chest should be cut away from this one incision. If not, move to the next and repeat.

   e. Take care not to select the connective tissue on the lung when selecting before clicking to cut away. It is easy when zoomed out to accidentally do this. Try zooming in by clicking the Cut tool again to turn it off and then zoom the screen. Click Cut again from Tools and try again.

   f. Click on the shiny surface on the lung to reveal a menu on your left with descriptions and other tools. It should display the "Parietal Pleura of the left lung" or the "Costal

Part of the Parietal Pleura of the left lung". Once ready to view the next deepest structure click the Tools menu on the right again and click Cut.

g. Cut away that layer by selecting the inside edge of the membrane and drag the incision line to the inside edge of the bottom of the membrane and clicking the left scissors icon to cut away the anterior parietal pleura. If not sure where the membrane is (it's a light color) just click cut again to exit the tool without making a cut and click on the parietal membrane again. It will become colored. Further you can select Hide from the menu for the parietal membrane and hide to see the boundary. This is also a means of looking deeper, but for this exercise keep it shown and cut with the tool.

h. Close the cut tool and click on the lung just anterior to your incision to identify the 'Visceral Pleura of the left lung".

i. Once ready to move deeper, use the cut tool to cut the visceral pleura just to the anterior of your previous incision (so you can see both layers stacked) and select the tissue cutting with the left scissor/ anterior.

j. Close the cut tool and click the exposed lung tissue to show "Superior Lobe of Left lung".

k. Once ready go deeper and cut the lung tissue just anterior to the incisions you made in the membranes and cut the anterior edge. You should see something like the image in Figure 2. If the view is not similar just rotate the chest.
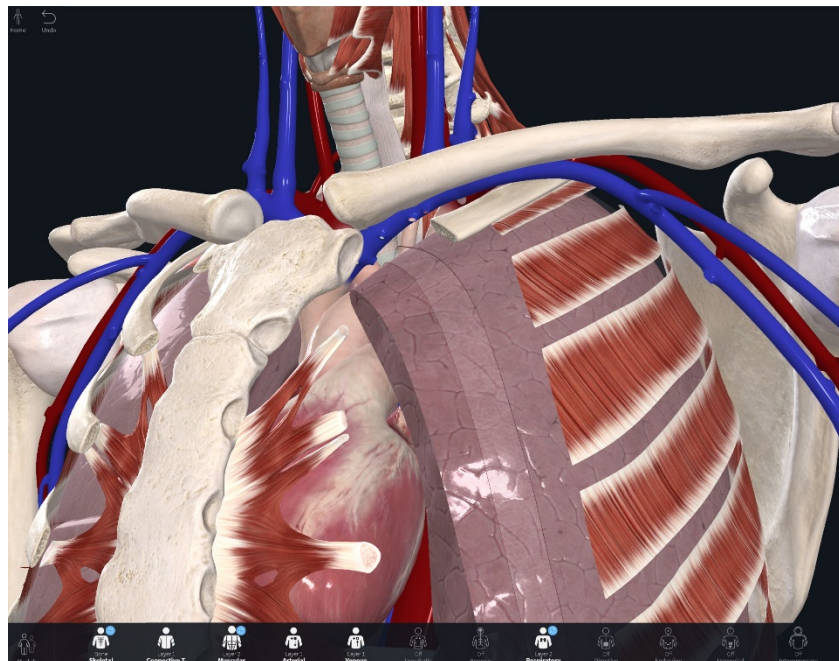

Figure 2 by Sean Haaverson

7. Add Collapsed Layers

   a. We can add some structures back in for our view by Showing Hidden. We turned the ribs off so we could easily dissect the tissue below it. It makes it much easier to isolate certain layers for dissection and then add others back in to see their relative position. Let's put them back into the model.

   b. Go to the Skeletal icon on the bottom of your screen and click it to reveal the buttons. Click the button to "Show hidden" which is likely the location of the Plus button.

   c. Now rotate and zoom into the model until you see the same view as Figure 3 in your model.
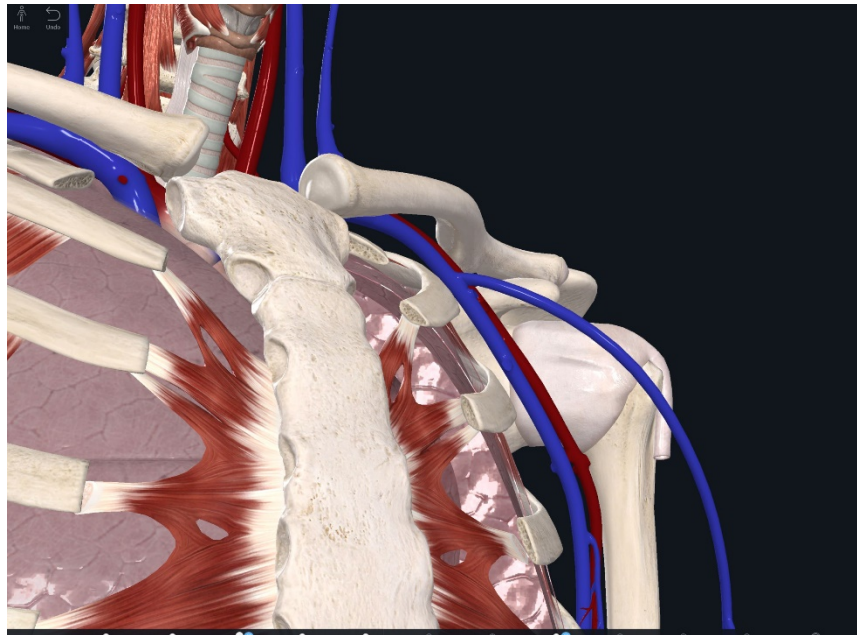

Figure 3 by Sean Haaverson

8. Add and Dissect Superficial layers

   a. We don't usually see the body of a patient already dissected so we should take the time to also look at the view through all the layers we would need to access if trying to treat the pleural cavity in the case of a pneumothorax at the ALS level, often called a "Dart".

   b. Select the Muscular icon at bottom, and show hidden, and click the plus button until it displays Layer 7 of the muscular system. Use the cut tool to dissect muscle from the same area to expose the lung cavity we have been looking at. You will likely cut through 2 layers, one cut will cut one layer, so we will cut twice.

   c. Turn the model to view under the left pectoral muscle looking back and lateral to the lung cavity we exposed. See Figure 4. If something doesn't look right, make sure you cut the muscle only and check to ensure your systems icons have the same layers indicated in the bottom of the picture of Figure 4.
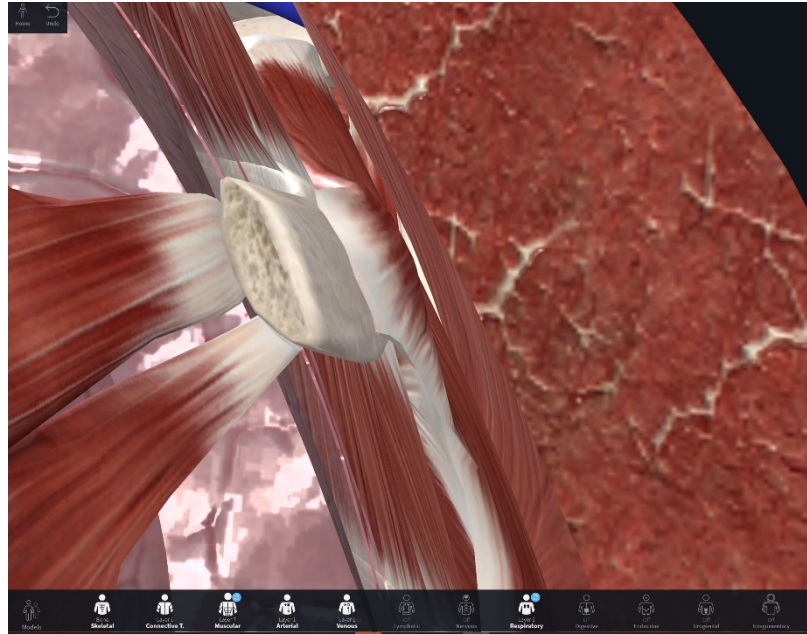
Figure 4 by Sean Haaverson

9. Locate Information for Deep Structures

   a. Let's use the information panel to identify the structures we have exposed.We are now ready to look at those membranes.

   b. Click on the structures within your model that corresponds with the crude-drawn circles in Figure 5. See how close they are to one another and consider the injury that occurs when a patient has a hemothorax or pneumothorax. You should be viewing (from deep to superficial aka inside to outside).

       i. Lung tissue of left lung

       ii. Visceral pleura

       iii. Parietal pleura

       iv. Internal/ inner intercostal muscles

       v. External/ outer intercostal muscles

   c. Let's now add in the vessels and nerves to see their arrangement and to complete the exercise question at the end of this exercise.

   d. While looking at the same view as figures 4 and 5, turn on the Arterial and Venous systems to their max, and the nervous system turned on and to layer 3 (Art= 5, vent= 3, nerve= 3).

   e. You should see bundles of nerves, veins, and arteries along the intercostal muscles and ribs.

   f. Take some time to annotate the screen with the annotation tools found above the cutting tools. You can draw, write, label, and sketch to meet your needs.

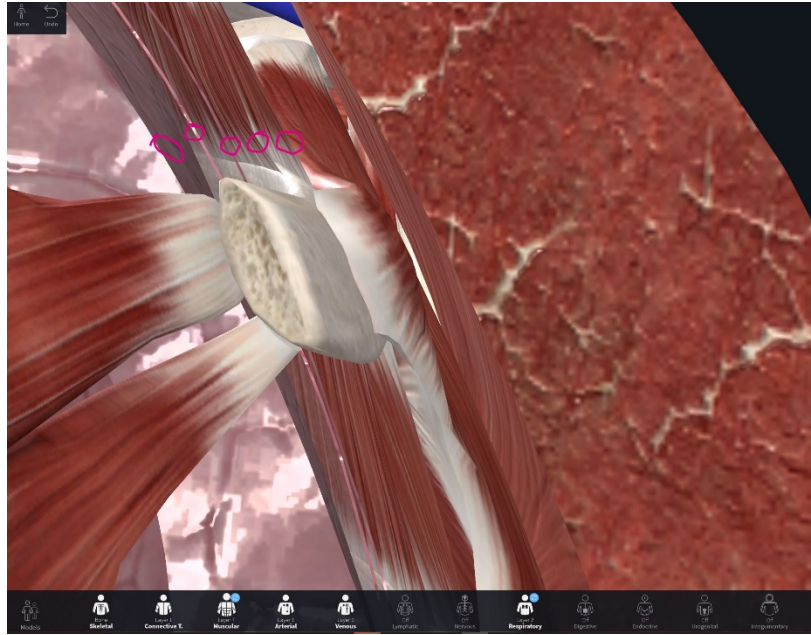g. Also play with the Growth tools to add growths and spurs to tissue and the remaining miscellaneous tools.

Figure 5 by Sean Haaverson

10. Use the anatomy to determine how to best treat the patient.

    a. You may save this screen by clicking Save in the lower right corner of the model screen so you will not lose it. Keep that screen open and now go to the next part of this lesson, the application exercise.

11. Go back to the learning module and lesson for Complete Anatomy and complete the Apply the Knowledge page.