

**OBJECTIVE:** In this exploration lab, students will investigate parts of the body (at the microscopic scale) using advanced analytical instrumentation to enhance their understanding of body structure; including the **Integumentary** and **Skeletal** systems.

**ACTIVITY DESCRIPTION:** Using the cyber-enabled scanning electron microscope (SEM), students will look at various parts of the body. They will investigate, and obtain micrographs (images) of bone, cartilage, skin, finger and/or toe nails, teeth, and hair specimen.

**MATERIALS:**

Scanning Electron Microscope (cyber-enabled)  
SEM specimen mount  
Carbon Tape or carbon paste  
Scissors  
Hair  
Bone  
Teeth

Skin  
Cartilage  
Finger/Toe nail  
Sputtering apparatus (gold or carbon coating)  
Tweezers  
Latex/Nitrile gloves

**PROCEDURE:**

1. Put on gloves
2. Cut several small pieces of double-sided carbon tape and place on specimen mount.
3. Place a number next to each piece of tape to indicate the “specimen number”.
4. Use tweezers/forceps to place a small amount of each specimen onto one of the pieces of carbon tape. Be sure not to crush the specimen to eliminate any changes in structure.
5. Once the specimen are securely mounted, *invert the specimen mount* to ensure that the materials will remain mounted upon introduction to vacuum.
6. Optional: Place mount containing specimen in the sputtering apparatus and coat with a layer of conductive material (either Au or C).
7. Once the specimen is ready for imaging, transfer it into the SEM and proceed.
8. Use an acceleration voltage of 5kV to image the samples, and only increase if ideal resolution is not obtained.
9. Find a “specimen number” to indicate what is being viewed, image the specimen and determine what the structure of the body part resembles. Try to identify unique characteristics of the material. Take a photo!
10. Repeat **step 9** for all other samples as well. Record your observations.
11. Finally, compare all micrographs (photos) and observations to determine which specimen number corresponds to bone, skin, nails, or hair.