Surface Area to Volume Ratios

As cells get bigger their volume goes up. The problem is the surface area doesn't keep up with the increase in volume. While a bigger cell needs more materials and has more waste, it has a harder time exchanging materials with the environment. This reality limits cell size.

Find pictures of the following to compare the surface area to volume ratios. You must find micrographs that have a size bar. Use the program Image J. Recognize that you are not comparing volume, but area with this program. For your final calculations how could you estimate volume? To do this you need to describe the model you used to estimate volume from measured area.

Root hairs
Cells of the alveoli
Cells of the villi
Microvilli

The cell types above have special material needs.

1. Discuss this and compare the surface area to volume ratio of each of these to a **similar cell without special adaptations.**
2. As a pair you must present your cell pictures annotated with measurements.
3. Show your calculation of surface area to volume ratios for each (special cell and comparison cell).
4. Explain your model for estimating volume.
5. Make a summarizing statement about surface area to volume ratios.

Make sure you can:

LO: ENE-1.B Explain the effect of surface area-to-volume ratios on the exchange of materials between cells or organisms with the environment.

LO-ENE-1.C Explain how specialized structures and strategies are used for the efficient exchange of molecules to the environment