**Student Questions**

**Before Activity**

1. Do you know what mutations are? How could they be problematic for your body?
2. How similar or different are cancer cells to each other?
   1. All cancer cells have the same mutations
   2. Different types of cancers have different mutations, but all cancer cells of the same type have the same types of mutations
   3. Different tumors, even tumors that come from the same tumor, might have different mutations, but within each tumor all the cells will have the same mutations
   4. Within one tumor, there might be several different populations of cells, each with different combinations of mutations.

**After Activity**

1. Do you think your tumor is bigger or smaller than before?
2. Do you think the proportions of beads of each color changed?
3. What proportions of beads of each color did you expect?
4. Do you think the resistant cells helped the tumor grow?
5. Do you think the tumor with no resistance grew slower or faster?
6. Were there other factors that could’ve affected tumor size and growth?

**After Analysis**

1. Calculate the following:
   1. Mean number of cells of each type within a repeated group
   2. Mean number of cells of each type across different groups
   3. Mean number of all resistant “cells” vs all “non-resistant” cells
2. Do you think the resistant cells help the tumor grow? Why?
3. Did the tumor with no resistant cells grow slower or faster? Why?
4. Were there significant differences between the growth of resistant cell populations and non-resistant cell populations?
5. How did the original growth rate of cells affect the final tumor composition?
6. What other factors could have affected tumor size and growth?
7. How did your group’s tumor compare to other groups’ tumors?