Antibiotic Resistance Make Up Lab

Bacteria are prokaryotic (having no nucleus), one-celled organisms. Individual bacterial cells are visible only with the aid of a high-powered microscope. Under proper nutritional and environmental conditions, bacteria can be grown in a laboratory. They are usually cultivated in sterile petri dishes containing a gelatin-like nutrient called agar.

Because bacteria multiply so rapidly, it is often necessary to control their growth in the human body, in food, and in the kitchen. Several varieties of products are used to control bacterial growth, including antibiotics, disinfectants, and antiseptics. All these products are antimicrobial agents. Different kinds of bacteria are sensitive to some chemicals and insensitive to others. Thus, different types of antimicrobial agents vary in the way they affect bacterial growth.

In this Virtual Lab you will determine the effectiveness of different antimicrobial agents by inoculating agar in a petri dish with different pathogenic bacteria, adding various antimicrobial agents, and measuring the bacterial growth around each antimicrobial agent.

LINK: **http://tinyurl.com/virtualantibioticresistance**

<u>Procedure:</u>

1. Inoculate the agar in the petri dish by clicking the test tube containing pathogenic bacterial stock culture-Staphylococcus aureus. *This is the only one we will use in the lab
2. Vials 1 through 7 contain filter paper disks that have been soaked in antimicrobial agents such as antibacterial soap, household bleach, household disinfectant, penicillin, amoxicillin, and erythromycin, or in sterile water (as a control). Drag a disk from each vial and place it in the petri dish.

*Note: To avoid contamination, disks should not be moved after they have been dropped into the petri dish.

3. Click the incubator to place the petri dish in it.
4. Click the red button on the incubator to turn it on. When the timer shows that 24 hours have passed, click the incubator to remove the petri dish.
5. Examine the patterns of bacterial growth. The colored area that covers most of the surface of the petri dish is the lawn culture of the bacteria-a visible layer of thousands of bacterial cells.

6. Drag the ruler to measure the diameters of the zones of inhibition around the disks (the tan areas).
Some disks may be surrounded by large zones of inhibition, where no bacteria grew due to the strong inhibitory effect of the antibiotic, antiseptic, or disinfectant on the disks. Other disks may have caused little or no inhibition–meaning that the bacteria are partially or completely resistant to the antimicrobial agent on them. To find out which antimicrobial agent corresponds to a specific number, move the cursor over the number. In the Table, enter the measurement for each antimicrobial agent.
7. Use the data in the Table to compare the effectiveness of different antimicrobial agents on the bacteria. Complete the Conclusion questions.

Data Table

Bacteria Species	Sterile Filter Paper (Control)	Anti-Bacterial Soap	Household Bleach	Household Disinfectant	Penicillin (antibiotic)	Amoxicillin (antibiotic)	Erythromycin (antibiotic)
Staphylococcus aureus							

Conclusion Questions

1. Compare the effectiveness of the different antibiotic drugs and chemical disinfectants. Which seem to be better at controlling bacterial growth? Why do you think this is so?

2. If you were a doctor treating a patient infected with Staphylococcus aureus, a bacterium that causes mild to moderate skin infections, which antibiotic would you prescribe? Why?