# Antibiotic Lab

## Problem
What effect does the presence of an antibiotic, such as erythromycin, have on the growth of bacteria at 30°C?

## Background Information
The antibiotic erythromycin is similar to penicillin, and is usually prescribed to patients that are allergic to penicillin. Erythromycin is commonly used to treat infections that occur in the respiratory tract; such as bronchitis, whooping cough, pneumonia, and many others. However, the antibiotic can also be used to treat infections found on the ear, intestines, urinary tract, and skin, as well as preventing oral infections caused by dental surgery. But how does it kill and prevent bacteria from reproducing, well, erythromycin halts the production of essential proteins that the bacteria need. However, it does not completely kill the bacteria, the antibiotic functions to a point where the host's immune system is able to take over. Furthermore, the antibiotic is unable to treat colds, flus, and other viral infections.

## Hypothesis
When a antibiotic, like erythromycin, is present within a sample of bacteria, then the growth of the bacteria will be minimized within a certain area. For erythromycin kills and prevents bacteria from reproducing by stopping the production of essential proteins.

## Experimental Design
Sterile cotton swabs are used to collect bacteria found on the subject's skin. The swab will then be used to spread out bacteria along the agar gel located with the petri dish. The controlled discs will be sealed containing nothing else, while the experimental discs will have a antibiotic disc of erythromycin placed in the middle of the disk. Once all discs are sealed, they will be placed with a incubator to be incubated at 30°C for the course of a week. Throughout the week the petri dishes will be checked and the zone of inhibition will be measured. The effectiveness of the antibiotic will be determined by the radius of the no growth ring.

## Variables
*Manipulated Variable:* Presence of antibiotic (Erythromycin)
*Responding Variable:* Amount of bacteria killed; determined by the area of the no growth ring
*Controlled Variables:* Incubation period, size of petri dish, source of bacteria, time spent swabbing the agar plates
*Control Group:* Samples lacking the presence of an antibiotic
*Experimental Group:* Samples containing an antibiotic

## Materials
- Lab apron
- Safety glasses
- Tape
- Ruler
- Petri dishes
- Sterile cotton swabs
- Incubator
- Dry erase marker
- Erythromycin

## Safety
All agar plates will be sealed with tape and will never be opened once plated. The plates will be incubated at room temperature, preventing the growth of harmful organisms. After the experiment is complete the plates will be disposed of using autoclaving.

## Procedure
1. Acquire a lab apron, safety glasses, and material required to perform the experiment
2. Using a sterile cotton swab, collect bacteria found on your forehead by rubbing it back and forth
3. Rub the cotton swab along the agar gel found on the petri dish, covering the majority of the surface
4. Place an erythromycin antibiotic disc in the middle of the experimental agar plates
5. Seal the lid on the petri dish with masking tape, ensuring that there is no exposure to the outside air
6. Repeat steps 2-5, however skip step four
7. Label the petri dishes so the controlled and experimental are distinguishable
8. Ensure the petri dishes are place in the incubator with the agar side facing upward
9. Set incubator temperature to 30°C, and leave the petri dishes inside
10. Once a day check the bacteria growth within the petri dishes, and using a ruler measure the radius of the zone of inhibition
11. Record the measurements from each day and analyze them once the lab has been completed

## Interpretations
The results for the table were found to be inconclusive. The experiment yield no growth of the bacteria that was placed on the agar gel. With no growth it is impossible to calculate the radius of the ring of inhibition. Lacking the experimental data needed to perform an analysis on the lab, results in the inability to interpret how the results would compare to the hypothesis. Therefore, the hypothesis can neither be accepted nor rejected.

## Evaluation
There are many limitations that could have caused the lab to produce inconclusive data. It is possible that when applying bacteria onto the agar gel, not enough bacteria stuck to the gel and as a result the bacteria was not able to thrive. Another shortcoming that could have resulted in the inability for the bacteria to grow could be the temperature of the incubator. With so many people checking the results of their petri dishes, the temperature within the incubator could have been changed. Therefore, the bacteria was not in a suitable environment to thrive and grow. Also, if the petri dishes were placed with the agar side down, then water would begin to condense at the bottom. With the excess of water in the petri dishes, the bacteria would be unable to grow under those conditions.

## Synthesis
Based on the results gathered in this lab, it is clear that the next step in this study would be to redo the lab. However, revisions must be made on the procedure to acquire accurate and more conclusive results.

## References
http://www.nlm.nih.gov/medlineplus/druginfo/meds/a682381.html