

You are what you eat: do curry and cinnamon inhibit bacterial growth?

Adapted from <http://www.education.com/science-fair/article/curry-inhibit-bacterial-growth/>



Background reading:

Our diets have been shown to significantly alter the composition and functioning of the microbial population residing inside of our bodies. These diet-induced changes in our gut microbe population may contribute to the development of obesity and inflammatory bowel disease.

Some research has suggested that curry leaves have anti-microbial properties. One study showed that a certain protein isolated from curry leaves effectively inhibited the human pathogens *Escherichia coli*, *Staphylococcus aureus*, *Vibrio cholerae*, *Klebsiella pneumoniae*, *Salmonella typhi* and *Bacillus subtilis*. Similarly, cinnamon stick extract has been shown to have anti-microbial activity against *Bacillus cereus*, *Listeria monocytogenes*, *Staphylococcus aureus*, *Escherichia coli*, and *Salmonella anatum*.

If these two commonly used spices have the ability to inhibit pathogenic bacterial growth, could they also potentially inhibit the growth of normal, harmless bacteria that live in your body? Unfortunately we cannot take samples of bacteria from inside your GI tract to test so instead we will be taking samples of bacteria from the inside of your mouth.

Objectives:

- Observe the effects of food additives (in this case cinnamon and curry) on the growth of bacteria in your body
- Learn how to culture bacteria in a safe and sterile manner

Pre-lab questions:

1. What are some of the effects that diet is known to have on the human microbiome?
2. What methods can you use to ensure that you do not contaminate your plate with bacteria that are not from your sample? Research and describe two of these methods
3. What steps can you take to keep you and your classmates safe when working with bacteria? Look up and describe five safety techniques.

Materials:

- Curry oil
- Cinnamon oil
- Prepared petri dishes containing agar medium and nutrients (9 for each person or group)
- Sterile swabs

Safety:

- Protect hands with gloves and do not touch face or mouth with gloves
- Do not smell the plates
- Keep petri dishes with bacteria taped shut
- Kill bacteria on plates with bleach when you are done and properly dispose of plates in a biohazard container

Procedure:

1. Label three petri dishes "control", three "curry", and three "cinnamon"
2. Dip a sterile swab into the curry oil and spread the curry oil all over the plates labeled "curry". Repeat the same procedure with a new sterile swab using cinnamon for the plates labeled "cinnamon"
3. Use a new sterile swab to take a sample from your mouth by swabbing along your inner cheek. Apply the sample to a plate with the swab. Repeat this step for all of your plates using a new sterile swab each time.
4. Store the petri dishes at room temperature for several days until you begin to see bacterial growth. Each day make qualitative observations about the bacteria on the petri dishes Have bacteria started growing? How large are the colonies? What are the colors of the bacteria? Take pictures if you would like for future reference.
6. After several days make more detailed observations about the bacteria growing on the petri dishes. Make qualitative observations about the dishes first. Are certain color bacteria found on only one type of dish ? Are bacteria on certain dishes smaller than the others?
7. Count and record the number of bacteria found on each dish. Take the average of the number of bacteria found on the control plates, curry plates, and cinnamon dishes.

Post-lab questions

1. What are the chemicals found in cinnamon and curry that scientists believe might have antibiotic properties?
2. Based on your data, do you think that the antibiotic properties of cinnamon and curry should be advertised to customers? Explain your reasoning.
3. What are other naturally occurring food additives that are believed to have antibiotic properties?
4. What could be done to improve this experiment to give us more information about the antibiotic properties of curry and cinnamon?
5. What happens when antibiotic compounds inhibit the growth of your naturally occurring, non-pathogenic bacteria? Give two examples.