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Antibiotic Resistance Adventure

Part one

Warm up questions: -What is an antibiotic?

-Have you heard of antibiotic resistance? If yes, have someone explain. If not, talk to them about it briefly.

Background: So in recent history, infections by bacteria were a major cause of death of the human race. After the development of antibiotics (the first being Alexander Flemming in 1928 when he invented penicillin), this was no longer the case-humans were able to fight against them. Now, however, we face a problem. The bacteria is becoming resistant to antibiotics- the antibiotics aren't working any more. For example, have any of you heard of MRSA? What does MRSA stand for? Methicillin resistant staph aureus. Staph aureus is the bacteria that causes staph infections. Methicillin is the antibiotic that treats staph infections. MRSA is a type of staph bacteria that is resistant to the antibiotic that is normally used to kill it. So here we are going to watch a video about antibiotic resistance- what it is, how it happens, and what you can do to help prevent it.

****SHOW ANTIBIOTIC RESISTANCE VIDEO****

<http://www.brainpop.com/science/ecologyandbehavior/antibioticresistance/>

Explaining the mechanism: Draw on the board how antibiotic resistance happens having students contribute as you explain the process. You have a cell with bacteria that aren't resistant. The antibiotic comes in---a selective pressure. The stronger bacteria that have some sort of genetic difference survive and are able to make offspring that have this same strength. ****Mention the population growth of bacteria they talked about in math class to lead them into realizing they have a short generation time and that this plays a huge role in resistance**** They increase in population and QUICKLY, so that eventually most if not all of the bacteria left in the body are of the stronger and resistant variety.

Application and Brainstorming: Have them talk to each other about what steps you could take just from prior knowledge and from watching the movie to help prevent antibiotic resistance.

****Instructor note:** Really touch on the idea of taking the full course of antibiotics and explain why.

Part 2

Warm up: Draw what you think a bacterial cell looks like.

Antibiotic resistance in some cases is something we can't prevent by the measures we discussed. So what do we need to do? We need to get to the source and study bacteria more in depth.

****SHOW BACTERIA VIDEO****

<http://www.brainpop.com/science/diversityoflife/bacteria/>

Have students revise their bacterial cell working with each other including as many parts as they can.

Explanation:

- Describe bacterial morphology in more depth through the white board and specifically talk about plasmids and how what causes antibiotic resistance is most often a gene that is on the plasmids.
- Ask students: what is a major difference between bacterial cells and human cells?
- Talk about how penicillin is an antibiotic that destroys the cell wall of bacteria-peptidoglycan. This works because human cells do not have cell walls. Bacterial cells that are resistant to penicillin have a gene in their plasmid that makes the cell wall stronger and invincible to the antibiotic.

Evaluating of the drawing: Ask if anyone included cilia or flagella on their bacteria and have someone explain what those are.

Application: Studying the plasmids more or maybe changing the targets of antibiotics could contribute to the fight against antibiotic resistance.

Reflection: Write down three new things they learned about bacteria and one of them should be a preventative measure they can take to help stop antibiotic resistance.