**Bacteria and Antibiotics – Answer Key**

**#1 - What are Antibiotics?**

**You should be able to answer these questions and teach your group about antibiotics.**

Who uses antibiotics?

**Doctors prescribe them for patients with bacterial infections**

What are antibiotics used for?

**To combat bacterial infections and diseases**

When were antibiotics invented?

**1928**

What was the first antibiotic and who invented it?

**Penicillin, Sir Alexander Fleming**

With whom did he share the Nobel Prize?

**Ernst Boris Chain and Howard Florey**

How do antibiotics work? (3 ways)

**Stopping vital processes, killing them or preventing them from reproducing**

**There are broad spectrum and narrow spectrum antibiotics**

**Broad – kills many types of bacteria**

**Narrow – kills only few types of bacteria**

List 3 disease that antibiotics treat.

**Infections, tuberculosis, strep throat, pneumonia, whooping cough, UTIs**

**#2 - Antibiotic Resistance**

**You should be able to answer these questions and teach your group about antibiotic resistance.**

What does it mean to be “antibiotic resistant”? How does this occur?

**Bacteria are no longer killed by the antibiotics that are meant to treat them**

**Mutations occur in the genes of the bacteria that make it resistant, or less harmed, by antibiotics. When antibiotics are used to treat a patient, there may be some mutated bacteria which are not affected by the drugs, these resistant bacteria survive to reproduce.**

How do antibiotic resistant genes in bacteria spread? (2 ways)

**Vertical gene transfer – binary fission of bacteria with antibiotic resistant genes multiply so that all daughter cells are also drug resistant.**

**Horizontal gene transfer – conjugation of bacteria allow drug resistant genes to pass from bacteria to bacteria through sexual reproduction.**

How can we prevent antibiotic resistant bacteria from spreading?

**do not have antibiotics prescribed for minor infections that will clear up on their own**

**when you do get antibiotics, finish the entire course to kill all residual bacteria and not leave any resistant bacteria behind**

Why is the evolution of resistant bacteria so quick?

**Bacteria have a very quick reproduction rate givie the correct conditions**

**#3 – MRSA**

**You should be able to answer these questions and teach your group about MRSA.**

What is MRSA?

**Methicillin-resistant Staphylococcus aureus – a resistant strain of staph infection**

What are some of the symptoms of MRSA?

**Red bumps, cysts 🡪 deep abscesses 🡪 further in body can create problems in joints and organs**

Why is a hospital such a good location for the evolution of bacteria?

**Many people with low immune systems and high variety of bacteria, doctors and nurses travel from patient to patient**

**High volume of antibiotics and other cleaners cause a strong selection pressure for mutated bacteria**

**Many people who get sick in the hospital have a resistant strain of the bacteria**

Why has this bacteria become so dangerous? (relate to adaptability)

**It is very adaptable to its environment because of the proteins on the surface of the cell**

**These allow it to attach to host cells to invade our body**

**Most commonly found in places with many people with low immune systems (hospitals, prisons)**

What term have doctors given to MRSA?

**superbug**

**#4 – Other Antibacterials**

**You should be able to answer these questions and teach your group about Antibacterials.**

What are the differences and similarities between antibiotics, antiseptics and disinfectants?

**Disinfectants – antibacterials applied to inanimate objects**

**Antiseptics – applied to living tissue**

**Antibiotics – taken internally to fight infection from within**

**Similarities – all used to kill bacteria from area**

What are some examples of each of these substances?

**Disinfectant – Lysol/bleach Antiseptic – hydrogen peroxide/iodine Antibiotic – penicillin/amoxicillin**

Describe the effectiveness of antiseptics at various concentrations.

**Low conc. = cause drug resistant bacteria to spread, too high conc. = damage tissue**

**Need a conc. that will kill all bacteria, but not damage any of the living tissue**

What effect may disinfectants have on the evolution of bacteria?

**Allow resistant bacteria to reproduce and spread. Bacteria that survive the disinfectant will be able to reproduce creating a strain of bacteria that is resistant to certain disinfectants.**

What can we do to control this evolution?

**Do not use antibacterial items for everyday cleaning**

**Only use for times where there may be dangerous bacteria (cutting raw meat)**