Antibiotics 1 assignment

Antibiotics An antibiotic is defined as a substance that is produced by microorganisms that in miniscule amounts inhibits the growth of another microorganism (Tortora 2010). Antibiotics can be found naturally in the environment or they can be manufactured with chemicals. They are specifically designed to hinder the growth and development in other microbes. Yet, these antimicrobial drugs should not cause extreme harm to normal microorganisms (Tortora 2010). The vast majority of antibiotics that have been produced in the past were used to treat various infectious diseases (Walsh 2003).

Although there are too many varieties of antibiotics to name, these antibiotics come from only a few particular drugs. Antibiotics are divided up into three major divisions, such as: eukaryotic molds and bacteria that form spores as well (Todar 2011). A small amount of the antibiotics we use today are formed by Bacillus, the endospore-forming bacteria. The others are produced by the molds, mostly Penicillium and Cephalosporium (Tortora 2010). The major subcategories of antibiotics are Penicillins, Cephalosporins, Macrolides, Fluoroquinolones, Sulfonamides, Tetracyclines, and Aminoglycosides (Tortora 2010).

Microorganisms that produce antibiotics do so at a specific time during the life cycle of the cell. These antimicrobial drugs are produced during the stationary phase of the cycle. The cells are not growing and dividing rapidly at this point, therefore they produce secondary metabolites. Secondary metabolites are produced after the initial exponential growth segment. This is part of the bacterial growth curve (Todar 2011). The term penicillin makes reference to the vast collection of related antibiotics.

Each member of the penicillin family has a general core that contains a beta-lactam ring. This ring is referred to as the nucleus. These antibiotics can occur one of two ways, naturally or can be produced synthetically. They work by preventing the linking of peptidoglycans and hindering the assembly of the cell walls in gram-positive bacteria (Tortora 2010). Cephalosporins are exceedingly similar to penicillin and have the tendency to hamper the production of the cell wall. However, they are more extensively used than any other beta-lactam antibiotics (Scott 2001).

This group of antibiotics uses generations to describe the constant development of the microbes. When it comes to the first generation of cephalosporins, there is a very small activity field. As the generations progress, they become more active against gram-negative bacteria (Tortora 2010). These microbes, along with penicillin, will grow and flourish in natural, moist environments. Consequently, they are responsible for the majority of food spoilage and the decay of various structures (Todar 2011). Another group of antibiotics is known as the Macrolides.

These antibiotics contain a macrolytic lactone ring and are more commonly known as erthyromycin. This antibiotic is responsible for blocking protein synthesis and is a common substitute for people that demonstrate allergies to penicillin. Macrolides now exist in azithromycin and clarithromycin. These drugs are used to treat streptococcal and staphylococcal infections (Tortora 2010). Continuing with the major classes of antibiotics, fluoroquinolones are the next topic of discussion. Fluoroquinolones are divided up into categories and the activity range increases with each of them.

These antibiotics, on the whole, are nontoxic and resistance to them can be developed very quickly (Tortora 2010). Sulfonamides, known as sulfa drugs, were some of the first artificial antimicrobial drugs to treat various microbes and their diseases. Although antibiotics have lessened the need for sulfa drugs in certain areas, they are still very important when it comes to urinary tract infections and other common issues. They are what we call bacteriostatic, meaning their action is due to the similarity in their structure to para-aminobenzoic acid.

The microorganisms that are known to be sensitive to sulfa drugs must produce para-aminobenzoic acid, while humans consume it in their daily diet (Tortora 2010). The tetracyclines are a similar collection of antibiotics that are created by Streptomyces spp. These specific antibiotics interfere with the addition of tRNA that carries the amino acids to the ribosome, preventing the amino acid from being added to the specific polypeptide chain in question (Tortora 2010). Tetracyclines are effective against gram-positive, gram-negative bacteria, and they enter the tissues of the body.

They are extremely helpful and valuable against intracellular rickettsias and chlamydias. These drugs are also offered in synthetic form in limited quantities. The synthetic form can be retained in the body longer than the natural form and has a wide-ranging spectrum of activity (Tortora 2010). When analyzing aminoglycosides one discovered that they were antibiotics in which glycoside bonds connected amino acids. These antibiotics inhibit the early stages of protein synthesis. They do this by changing the shape of the 30S segment of the 70S prokaryotic ribosome.

After this takes place, mRNA is interpreted incorrectly. These antibiotics were some of the first to produce noteworthy activity against a gram-negative bacterium (Tortora 2010). While looking at all of the different antimicrobial drugs, it is clear that some of them have a small range of activity and others an extensive range. With each of these come advantages and disadvantages. With the broad-spectrum drugs, they wipe out negative pathogens. However, they take good ones as well (Tortora 2010).

If someone were to go looking for a producer of antibiotics they would have the most luck if they were to screen moist, organic material. Including, but not limited to: soil, decaying matter, and other natural elements. It is fairly easy to discover microorganisms in these mediums that have antimicrobial activity (Atta 2009). The sources that I selected for use in this assignment were credible by my standards because they all came from textbooks, peer reviewed journals, and several independent books written on the subject.

Individuals that have much experience, outstanding credentials, and have done adequate research on the topics they were discussing wrote all the sources. Also, each of the books and journals gave straightforward information as to what antibiotics were and used statistical information and many other facts to support their statements. References Atta H. M. , Dabour S. M. , Desoukey S. G. 2009. Sparsomycin antibiotic production by streptomyces sp. AZ-NIOFD1: Taxonomy, fermentation, purification and biological activities. American-Eurasian J. Agric. & Eviron.

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