Antibiotic streptomycin

ANTIBIOTIC STREPTOMYCIN: MODE OF ACTION Streptomycin is an antibiotic used to treat tuberculosis. Streptomycin is also used in the treatment of infective diseases like septic sore throat particularly caused by gram-negative bacteria. It is produced by the soil microbe Streptomyces griseus. Streptomycin is the first of a class of drugs called aminoglycosides to be discovered. Albert Shcatz, Elizabeth Bugie and Selman Waksman were the first American biochemists who isolated the microbe in 1943, and reported its antimicrobial activities in 1944. In fact Streptomycin was the first antimicrobial agent developed after penicillin (Ghosh n. pag).

Streptomycin is classified chemically as an aminoglycosidic antibiotic and some of the other aminoglycosides include kanamycin, neomycin, tobramycin and amikain. In general all aminoglycoside make use of their inhibitory action by blocking protein synthesis in bacteria. Streptomycin kills bacteria by inhibiting protein synthesis by combining irreversibly with the 30S subunit of the70S ribosomes, found typically in prokaryotes. To be more specific, it binds with the S12 protein which is involved in the initiation of protein synthesis.

Researchers have found through experiments that streptomycin stops the initiation of protein synthesis by blocking the binding of initiator N-formylmethionine tRNA to the ribosome. Besides, Streptyomycin is also known to stop the normal dissociation of 70S ribosomes into their 50S and 30S subunits. Therefore formation of polysomes is inhibited. Streptomycin action involves distorting the ribosome so that transition from initiation complex (30S-mRNA-tRNA) to chain elongating ribosome is blocked. As a result of this the normal sequence of translation is disrupted and the bacteria is unable to synthesize proteins which is vital for its cell growth and thereby

fails to survive. Studies also have shown that the drug also disrupts the cell membrane of susceptible bacteria.

Over the years many bacterial species, such as Bacillus subtilis Strain SRB15T+ have undergone mutations in their genome that enable these to bypass the streptomycin-mediated inhibition of cell growth (Ghosh n. pag).

To summarize, streptomycin stops bacterial growth by damaging cell membranes and inhibiting protein synthesis. Streptomycin binds to the 30S ribosome and changes its shape so that it inhibits protein synthesis by causing a misreading of messenger RNA information.

The reason it kills the bacterium and not the human being is because humans have structurally different ribosomes from bacteria which allow the selectivity of Streptomycin antibiotic for bacteria. Streptomycin is administered by regular intramuscular injection and is not given orally. One of the most common adverse effects of this medicine is ototoxicity that can result in permanent hearing loss (Wikipedia n. pag). Other side effects may include headache, nausea, difficulty in hearing, ringing sensation in the ears, loss of balance, fatigue, difficulty in passing urine and itchy rashes on the skin.

Work Cited

Ghosh, S. Streptomycin-A Highly Potent Antibiotic (24 May 2007) Suite 101, 8 Septemper 2007 Wikipedia Streptomycin (5 September 2007) Wikimedia Foundation, Inc., 8 Septemper 2007