A peer review on Streptomycin

Preeti Sangwan

M. Pharmacy (Pharmaceutics)

INTRODUCTION

It is the oldest aminoglycoside antibiotic obtained from streptomyces griseus, used extensively in the past but now practically restricted to treatment of tuberculosis. It is less potent than other aminoglycosides. The antimicrobial spectrum of streptomycin is relatively narrow, active primarily against gram negative bacilli, but potency is low. Sensitive organism are: H. ducreyi, brucella, yersinia pestis, francisella tularensis, nocardia, calym, granulomatis, M. tuberculosis. Only few strains of E. coli, H. influenza, V. cholera, shigella, klebsiella, enterococci and some gram positive cocci are now inhibited, that too at higher concentrations. All other organisms including psuedomonas are unaffected. Streptomycin is a water-soluble aminoglycoside derived from Streptomyces griseus. It is marketed as the sulfate salt of Streptomycin. The chemical name of Streptomycin sulfate is D-streptamine, O-2-deoxy-2-(methylamino)-α-L-glucopyranosyl-(1→2)-O-5-deoxy-3-C-formyl-α-L-lyxofuranosyl-(1→4)-N1-bis(aminominomethyl)-sulfate (2:3) (salt). The molecular formula for Streptomycin Sulfate is (C21H39N7O12)2·3H2SO4 and the molecular weight is 1457.41. It has the following structural formula:

![Structural Formula](image_url)

Resistance

Many organism develops rapid resistance to streptomycin either by one step mutation or by acquisition of plasmid which codes for inactivating enzymes. In the intestinal and urinary tract resistant organism may emerge within two days of therapy. E. coli, H. influenza, Str. Pneumonia, Str. Pyogens, staph. Aurens have become largely resistant. If it is used alone, M. tuberculosis also become resistant.

Pharmacokinetics

Streptomycin is highly ionized. It is neither absorbed nor destroyed in the g.i.t. However absorption from the injection in the muscle is rapid. It is distributed only extracellular fluid volume of distribution (0.3L/Kg) is nearly
equal to the extracellular fluid volume. Low concentrations are attained in serous fluids like synovial, pleural, peritoneal. Concentrations in CSF and aqueous humour are often non-therapeutic, even in the presence of inflammation. Plasma protein binding is clinically insignificant.

Uses

Streptomycin is advised for the treatment of individuals with moderate to severe infections caused by susceptible strains of microorganisms in the specific conditions listed below:

- **Mycobacterium tuberculosis**: The Advisory Council for the Elimination of Tuberculosis, the American Thoracic Society, and the Center for Disease Control recommend that either Streptomycin or ethambutol can be added as a fourth drug in a regimen containing isoniazid (INH), rifampin and pyrazinamide for initial treatment of tuberculosis.
- **Non-tuberculosis infections**: The use of Streptomycin should be limited to the treatment of infections caused by bacteria which have been shown to be susceptible to the antibacterial effects of Streptomycin and which are not amenable to therapy with less potentially toxic agents.
- It can also be used to treat infection caused by Pasteurella pestis (plague), Francisella tularensis (tularemia), Brucella, Calymmatobacterium granulomatis (donovanosis, granuloma inguinale), H. ducreyi (chancroid), H. influenzae (in respiratory, endocardial, and meningeal infections-concomitantly with another antibacterial agent), K. pneumoniae pneumonia (concomitantly with another antibacterial agent), E. coli, Proteus, A. aerogenes, K. pneumoniae, and Enterococcus faecalis in urinary tract infections, Streptococcus viridans, Enterococcus faecalis (in endocardial infections-concomitantly with penicillin), Gram-negative bacillary bacteremia (concomitantly with another antibacterial agent).

**CONTRAINDICATION**

Hypersensitivity to other aminoglycosides may contraindicate the use of Streptomycin because of the known cross-sensitivity of patients to drugs in this class.