

## **PRESCRIBING INFORMATION**

### **<sup>Pr</sup>Streptomycin for Injection USP**

Powder for Solution

Aminoglycoside Antibiotic

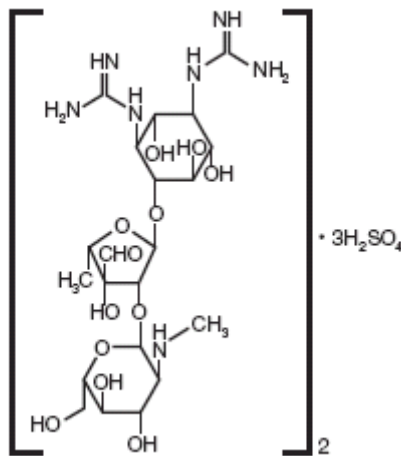
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## ACTIONS AND CLINICAL PHARMACOLOGY

Streptomycin is a water soluble aminoglycoside derived from *Streptomyces griseus*. It is marketed as the sulphate salt of streptomycin. The chemical name of streptomycin sulphate is D-Streptamine, 0-2-deoxy-2-(methylamino)- $\alpha$ -L-glucopyranosyl-(1 $\rightarrow$ 2)-0-5-deoxy-3-C-formyl- $\alpha$ -L-lyxofuranosyl-(1 $\rightarrow$ 4)-N,N'-bis(aminoiminomethyl)-,sulphate (2:3) (salt). The molecular formula for streptomycin sulphate is  $(C_{21}H_{39}N_7O_{12})_2 \cdot 3H_2SO_4$  and the molecular weight is 1457.41. It has the following structural formula:



Streptomycin sulphate, equivalent to 1 g streptomycin/vial is supplied as a sterile nonpyrogenic lyophilized powder for intramuscular use after reconstitution.

After reconstitution the pH range for Sterile Streptomycin for Injection USP should be between 4.5 and 7.0 in a solution containing 200 mg of streptomycin activity per mL.

Each vial contains Streptomycin Sulphate USP equivalent to 1 g of streptomycin.

### **Pharmacology:**

In recommended doses, Streptomycin is active against susceptible strains of many gram-negative and gram-positive organisms, and *M. tuberculosis*. When used alone, bacterial resistance has been shown to develop rapidly. Therefore, in the treatment of tuberculosis, it should be used in combination with other antitubercular drugs.

### **Pharmacokinetics:**

Streptomycin is not absorbed from the gastro-intestinal tract when given orally and therefore should be administered parenterally for systemic action.

Following intramuscular injection of 1 g of the drug, a peak serum level of 25 to 50 µg/mL is reached within 1 hour, diminishing slowly to about 50% after 5 to 6 hours. Appreciable concentrations are found in all organ tissues except the brain. Significant amounts have been found in pleural fluid and tuberculous cavities.

Streptomycin passes through the placenta with serum levels in the cord blood similar to maternal levels. Small amounts are excreted in milk, saliva and sweat.

Streptomycin is excreted rapidly in the urine by glomerular filtration. In patients with normal kidney function, between 29 and 89% of a single 600 mg dose is excreted within 24 hours. Any reduction of glomerular activity results in decreased excretion of the drug and concurrent rise in serum and tissue levels.

### **Sensitivity plate testing:**

If the Kirby-Bauer method of disc sensitivity is used, a 10 µg Streptomycin disc should give a zone of over 15 mm when tested against a Streptomycin-sensitive bacterial strain.

### **INDICATIONS**

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

1. *Mycobacterium tuberculosis*: Streptomycin may be indicated for all forms of this infection when the infecting organisms are susceptible. It should be used only in combination with other antituberculosis drugs. The common combined drug therapy is Streptomycin, PAS and isoniazid; this combination is effective only where the organisms are susceptible to the drugs being used in combination.
  
2. *Nontuberculosis infections*: Streptomycin should be used only in those serious nontuberculosis infections caused by organisms shown by in vitro sensitivity studies to be susceptible to it and when less potentially hazardous therapeutic agents are ineffective or contraindicated.
  - a. *Pasteurella pestis* (plague).

- b. *Pasteurella tularensis* (tularemia).
- c. *Brucella*.
- d. *Donovanosis* (granuloma inguinale).
- e. *H. ducreyi* (chancroid).
- f. *H. influenzae* (in respiratory, endocardial and meningeal infections – concomitantly with another antibacterial agent).
- g. *K. pneumoniae pneumonia* (concomitantly with another antibacterial agent).
- h. *E. coli*, *Proteus*, *A. aerogenes*, *K. pneumoniae*, and *Streptococcus faecalis* in urinary tract infections.
- i. *Strep. viridans*, and *Strep. faecalis* (in endocardial infections – concomitantly with penicillin).
- j. Gram-negative bacillary bacteremia (concomitantly with another antibacterial agent).

**NOTE:** 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.

To reduce the development of drug-resistant bacteria and maintain the effectiveness of Streptomycin for Injection USP and other antibacterial drugs, Streptomycin for Injection USP should be used only to treat infections that are proven or strongly suspected to be caused by bacteria.

## **CONTRAINDICATIONS**

Streptomycin is contraindicated in those patients who have shown previous toxic or hypersensitivity reactions to it.

## **WARNINGS**

### **For Intramuscular Use**

EXTREME CAUTION IS ADVISED IN PEOPLE WITH VIII CRANIAL NERVE IMPAIRMENT. THE RISK OF SEVERE NEUROTOXIC REACTIONS IS SHARPLY INCREASED IN PATIENTS WITH IMPAIRED KIDNEY FUNCTION OR PRERENAL AZOTEMIA. THESE INCLUDE DISTURBANCES OF THE AUDITORY NERVE, OPTIC NERVE, PERIPHERAL NEURITIS, ARACHNOIDITIS, AND ENCEPHALOPATHY. RENAL FUNCTION SHOULD BE CAREFULLY DETERMINED AND PATIENTS WITH RENAL DAMAGE AND NITROGEN RETENTION SHOULD HAVE REDUCED DOSAGE. THE PEAK SERUM CONCENTRATION IN INDIVIDUALS WITH KIDNEY DAMAGE SHOULD NOT EXCEED 20 TO 25 µg/mL.

THE CONCURRENT OR SEQUENTIAL USE OF OTHER NEUROTOXIC AND/OR NEPHROTOXIC DRUGS WITH STREPTOMYCIN SULPHATE, PARTICULARLY NEOMYCIN, KANAMYCIN, GENTAMICIN, CEPHALORIDINE,

PAROMOMYCIN, VIOMYCIN, POLYMYXIN B, COLISTIN, AND TOBRAMYCIN SHOULD BE AVOIDED.

THE NEUROTOXICITY OF STREPTOMYCIN CAN RESULT IN RESPIRATORY PARALYSIS FROM NEUROMUSCULAR BLOCKAGE, ESPECIALLY WHEN THE DRUG IS GIVEN SOON AFTER ANESTHESIA AND THE USE OF MUSCLE RELAXANTS.

THE ADMINISTRATION OF STREPTOMYCIN IN PARENTERAL FORM SHOULD BE RESERVED FOR PATIENTS WHERE ADEQUATE LABORATORY FACILITIES ARE AVAILABLE AND CONSTANT SUPERVISION OF PATIENT IS POSSIBLE.

**Ototoxicity:**

Streptomycin may frequently affect the vestibular branch of the auditory nerve causing severe nausea, vomiting, and vertigo. The incidence is directly proportional to the duration and amount of the drug administered. Advanced age and renal impairment predispose to ototoxicity. Symptoms subside and recovery is usually complete following discontinuance of the drug.

Loss of hearing has been reported following long term therapy; however, ototoxic effect on the auditory branch of the eighth nerve is infrequent and is usually preceded by vestibular symptoms. Hearing loss, when extensive, is usually permanent.

### **Usage in Pregnancy:**

Streptomycin should be used during pregnancy only if the potential benefit outweighs the potential risk to the mother and fetus. Since Streptomycin readily crosses the placental barrier, caution in use of the drug is important to prevent ototoxicity in the fetus.

### **Susceptibility/Resistance:**

### **Development of Drug Resistant Bacteria:**

Prescribing Streptomycin for Injection USP in the absence of a proven or strongly suspected bacterial infection is unlikely to provide benefit to the patient and risks the development of resistant organisms.

### **Potential for Microbial Overgrowth:**

The use of Streptomycin for Injection USP may promote the selection of non-susceptible organisms. Should superinfection occur during therapy, appropriate measures should be taken.

## **PRECAUTIONS**



Baseline and periodic caloric stimulation tests and audiometric tests are advisable with extended Streptomycin therapy. Tinnitus, roaring noises, or a sense of fullness in the ears indicates need for audiometric examination or termination of Streptomycin therapy or both. (See **Adverse Reactions**).

Care should be taken by individuals handling or preparing Streptomycin for injection to avoid skin sensitivity reactions.

As with all intramuscular preparations, Streptomycin for Injection should be injected well within the body of a relatively large muscle. **ADULTS:** The preferred site is the upper outer quadrant of the buttock, (i.e. gluteus maximus), or the mid-lateral thigh. **CHILDREN:** It is recommended that intramuscular injections be given preferably in the mid-lateral muscles of the thigh. In infants and small children, the periphery of the upper outer quadrant of the gluteal region should be used only when necessary, such as in burn patients, in order to minimize the possibility of damage to the sciatic nerve.

The deltoid area should be used only if well developed such as in certain adults and older children, and then only with caution to avoid radial nerve injury, intramuscular injections should not be made into the lower and mid-third of the upper arm. As with all intramuscular injections, aspiration is necessary to help avoid inadvertent injection into a blood vessel.

Injection sites should be alternated, and solutions of concentration greater than 500 mg/mL are not recommended.

As higher doses or more prolonged therapy with Streptomycin may be indicated for more severe or fulminating infections (endocarditis, meningitis, etc.) the

physician should always take adequate measure to be immediately aware of any toxic signs or symptoms occurring in the patient as a result of Streptomycin therapy.

While disturbances in renal function due to Streptomycin have been reported in the past, purification of the drug has minimized this side effect. In the presence of pre-existing renal insufficiency, however, extreme caution must be exercised in the administration of Streptomycin. Since in severely uremic patients a single dose may produce reasonable high blood levels for several days, the cumulative effect may produce ototoxic sequelae. When Streptomycin must be given for prolonged periods of time, alkalization of the urine may minimize or prevent renal irritation.

A syndrome of apparent central nervous system depression, characterized by stupor and flaccidity, at times to the extent of coma and deep respiratory depression, has been reported in very young infants in whom Streptomycin dosage had materially exceeded the recommended limits. Thus, infants should not receive Streptomycin in excess of the recommended dosage.

In the treatment of venereal infections such as granuloma inguinale, and chancroid, if concomitant syphilis is suspected, suitable laboratory procedures such as dark field examination should be performed before the start of treatment, and monthly serologic tests should be done for at least four months.

## **ADVERSE REACTIONS**

The following reactions are common: ototoxicity-nausea, vomiting and vertigo, paresthesia of face, rash, fever, urticaria, angioneurotic edema, and eosinophilia.

The following reactions are less frequent: deafness, exfoliative dermatitis, anaphylaxis, azotemia, leucopenia, thrombocytopenia, pancytopenia, hemolytic anemia, muscular weakness, and amblyopia.

Vestibular dysfunction resulting from the parenteral administration of Streptomycin is cumulatively related to the total daily dose. When 1.8 to 2.0 g/day are given, symptoms are likely to develop in the large percentage of patients, especially in the elderly or patients with impaired renal function, within 4 weeks. Therefore, it is recommended that caloric and audiometric tests be done prior to, during, and following intensive therapy with Streptomycin in order to facilitate detection of any vestibular dysfunction and/or impairment of hearing which may occur.

Vestibular symptoms generally appear early and usually are reversible with early detection and cessation of administration of the drug. After 2 to 3 months, gross vestibular symptoms usually disappear except for the relative inability to walk in total darkness or on very rough terrain.

Clinical judgement as to termination of therapy must be exercised when side effects occur.

## DOSAGE AND ADMINISTRATION

### INTRAMUSCULAR ROUTE ONLY

1. Tuberculosis: All forms when organisms are known or believed to be drug susceptible.

*Adult, combined therapy:* Streptomycin – 1 g daily with PAS 5 g t.i.d. and isoniazid 200 to 300 mg daily. Elderly patients should have a smaller daily dose of Streptomycin, based on age, renal function, and eighth nerve function. Ultimately Streptomycin should be discontinued or reduced in dosage to 1 g, 2 to 3 times weekly. Therapy with Streptomycin may be terminated when toxic symptoms have appeared, when impending toxicity is feared, when organisms become resistant, or when full treatment effect has been obtained. The total period of drug treatment of tuberculosis is a minimum of 1 year; however, indications of terminating therapy with Streptomycin may occur at any time as noted above.

2. Tularemia: 1 to 2 g daily in divided doses for 7 to 10 days until the patient is afebrile for 5 to 7 days.
3. Plague: 2 to 4 g daily in divided doses until the patient is afebrile for at least 3 days.
4. a. Bacterial endocarditis: In penicillin-sensitive alpha and nonhemolytic streptococcal endocarditis (penicillin sensitive to 0.1 µg/mL or less), streptomycin may be used for 2 week treatment concomitantly with

- penicillin. Streptomycin dosage is 1 g b.i.d. for 1 week, and 0.5 g b.i.d. for the 2nd week. If the patient is over 60 years of age, the dosage should be 0.5 g b.i.d. for the entire 2-week period.
- b. Enterococcal endocarditis: Streptomycin in doses of 1 g b.i.d. for 2 weeks and 0.5 g b.i.d. for 4 weeks is given in combination with penicillin. Ototoxicity may require termination of Streptomycin prior to completion of the 6 week course of treatment.
5. For use concomitantly with other agents to which the infecting organism is also sensitive: Streptomycin in these conditions is considered as a drug of secondary choice: gram-negative bacillary bacteremia, meningitis, and pneumonia; brucellosis, granuloma inguinale, chancroid, and urinary tract infection.

*For adults:*

- a. With severe fulminating infection: 2 to 4 g daily, administered intramuscularly in divided doses every 6 to 12 hours.
- b. With less severe infections and with highly susceptible organisms: 1 to 2 g daily.

*For children:*

20 to 40 mg per kg of body weight daily (8 to 20 mg per pound) in divided doses every 6 to 12 hours. (Particular care should be taken to avoid excessive dosage in children).

The dry lyophilized powder is dissolved by adding Water for Injection USP in an amount to yield the desired concentration as indicated in the following table:

<b>Approx. Conc. mg/mL</b>	<b>Volume (mL) of Diluent</b>
200	4.2
250	3.2
400	1.8

Sterile reconstituted solutions should be protected from light. Reconstituted solution should be used within 24 hours and any remainder discarded.

### **HOW SUPPLIED**

Streptomycin for Injection USP is supplied in vials containing streptomycin sulphate equivalent to 1 g streptomycin base activity per vial.

Store dry powder at controlled room temperature 15°C - 30°C.

#### **SteriMax Inc.**

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**READ THIS FOR SAFE AND EFFECTIVE USE OF YOUR MEDICINE  
PATIENT MEDICATION INFORMATION**

**Streptomycin for Injection USP  
Powder for Solution**

Read this carefully before you start taking Streptomycin for Injection USP. This leaflet is a summary and will not tell you everything about this drug. Talk to your healthcare professional about your medical condition and treatment and ask if there is any new information about Streptomycin for Injection USP.

**What is Streptomycin for Injection USP used for?**

Streptomycin for Injection USP is used to treat patients with moderate to severe infections caused by certain bacteria such as in the treatment of tuberculosis.

Antibacterial drugs like Streptomycin for Injection USP treat only bacterial infections. They do not treat viral infections.

**How does Streptomycin for Injection USP work?**

Streptomycin for Injection USP is an antibiotic that kills or stops the growth of certain bacteria in your body.

**What are the ingredients in Streptomycin for Injection USP?**

Medicinal ingredients: streptomycin (as streptomycin sulphate).

Non-medicinal ingredients: none.

**Streptomycin for Injection USP comes in the following dosage forms:**

Powder for solution; 1 g / vial.

**Do not use Streptomycin for Injection USP if you:**

- have had previous toxic or hypersensitivity (allergic) reactions to Streptomycin for Injection USP

**To help avoid side effects and ensure proper use, talk to your healthcare professional before you take Streptomycin for Injection USP. Talk about any health conditions or problems you may have, including if you:**

- have cranial (skull) nerve problems
- are taking other antibiotic medicines such as; neomycin, kanamycin, gentamicin, cephaloridine, paromomycin, viomycin, polymyxin B, colistin and tobramycin
- have recently had surgery or been under anesthesia
- are taking or have recently taken muscle relaxants
- have kidney problems
- are pregnant or think you might be pregnant

**Tell your healthcare professional about all the medicines you take, including any drugs, vitamins, minerals, natural supplements or alternative medicines.**



**How to take Streptomycin for Injection USP:**

- Streptomycin for Injection USP will be given to you by a healthcare professional who will inject it into your muscle after mixing it with water.
- Although you may feel better early in treatment, Streptomycin for Injection USP should be used exactly as directed.
- Misuse or overuse of Streptomycin for Injection USP could lead to the growth of bacteria that will not be killed by Streptomycin for Injection USP (resistance). This means that Streptomycin for Injection USP may not work for you in the future.
- Do not share your medicine.

**Usual Dose:**

Your healthcare professional will decide how much, how often, and for how long you will receive Streptomycin for Injection USP.

**Overdose:**

If you think you have been given too much Streptomycin for Injection USP, contact your healthcare professional, hospital emergency department or regional poison control centre immediately, even if there are no symptoms.

**Missed Dose:**

If you miss an appointment to receive an injection of Streptomycin for Injection USP, contact your healthcare professional as soon as possible.

### **What are the possible side effects from using Streptomycin for Injection USP?**

These are not all the possible side effects you may feel when taking Streptomycin for Injection USP. If you experience any side effects not listed here, contact your healthcare professional.

Side effects may include:

- nausea, vomiting
- feeling like you're spinning and loss of balance (vertigo)
- burning or prickling feeling in the face
- rash, itching
- fever
- swelling
- muscle weakness
- lazy eye

Streptomycin for Injection USP can cause abnormal blood test results. Your healthcare professional will decide when to perform blood tests and interpret the results.

<b>Serious side effects and what to do about them</b>			
Symptom / effect	Talk to your healthcare professional		Stop taking drug and get immediate medical help
	Only if severe	In all cases	
<b>Hearing problems:</b> partial or complete loss of hearing (deafness)			√
<b>Exfoliative dermatitis:</b> large areas of skin peeling with redness and itching		√	
<b>Allergic reaction:</b> rash, hives, swelling of the face, lips, tongue or throat, difficulty swallowing or breathing			√
<b>Kidney problems:</b> infrequent and/or painful urination, dark amber or red urine, fatigue, muscle weakness, swelling, nausea, vomiting, lack of appetite			√
<b>Low levels of white blood cells:</b> infection, fatigue, fever, aches, pain, flu-like symptoms		√	
<b>Low levels of blood platelets:</b> bruising, bleeding, fatigue, weakness		√	
<b>Hemolytic anemia:</b> pale skin, yellow skin, eyes and mouth (jaundice), dark-coloured urine, fever, weakness, dizziness, confusion, reduced ability to exercise		√	

If you have a troublesome symptom or side effect that is not listed here or becomes bad enough to interfere with your daily activities, talk to your healthcare professional.

## **Reporting Side Effects**

You can report any suspected side effects associated with the use of health products to Health Canada by:

- Visiting the Web page on Adverse Reaction Reporting (<https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-reporting.html>) for information on how to report online, by mail or by fax; or
- Calling toll-free at 1-866-234-2345.

*Note: Contact your health professional if you need information about how to manage your side effects. The Canada Vigilance Program does not provide medical advice.*

## **Storage:**

Streptomycin for Injection USP will be stored by your healthcare professional at room temperature (15°C-30°C).

Keep out of reach and sight of children.

## **If you want more information about Streptomycin for Injection USP:**

- Talk to your healthcare professional.
- Find the full prescribing information that is prepared for healthcare professionals and includes this Patient Medication Information by visiting the Health Canada website (<http://www.canada.ca/en/health-canada.html>); the manufacturer's website ([www.sterimaxinc.com](http://www.sterimaxinc.com)), or by calling 1-800-881-3500.

This leaflet was prepared by **SteriMax Inc.**, Oakville, ON L6H 6R4

[www.sterimaxinc.com](http://www.sterimaxinc.com)

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