

Neomycin Sulfate

Neomycin sulfate is an aminoglycoside antibiotic that targets aerobic gram-negative bacilli. Aminoglycosides are not absorbed by the GI tract and do not enter the cerebrospinal fluid. The medication is indicated for patients with topical infection, as prophylaxis for patients scheduled for intestinal surgery, and for hepatic encephalopathy, especially in refractory cases. Side effects include ototoxicity, nephrotoxicity, rash, gastrointestinal (GI) superinfection, and neuromuscular blockade. This medication is contraindicated for patients who are pregnant.



PLAY PICMONIC

Mechanism

Aminoglycoside Antibiotic

[A-mean-ol'-glider and ABX-guy](#)

Neomycin sulfate is an aminoglycoside antibiotic that disrupts protein synthesis and causes rapid bacterial death. The bactericidal effect is concentration-dependent, meaning the drug's effectiveness increases with higher concentrations relative to the minimum inhibitory concentration.

Indications

Topical Infection

[Topical Infectious-bacteria](#)

Neomycin sulfate is indicated for topical infections and may be applied to the eyes, ears, and skin. Instead of parenteral administration, neomycin sulfate is reserved for topical applications. Because neomycin is more ototoxic and nephrotoxic than other aminoglycosides, it is not administered parenterally.

Intestinal Surgery Prophylaxis

[Intestine Surgeon Purple-axes](#)

Neomycin sulfate is indicated for intestinal surgery prophylaxis. The drug reduces ammonia-producing bacteria in the gastrointestinal tract and is useful in hepatic encephalopathy. The medication is administered orally to prevent bacterial infection related to surgical procedures of the intestines.

Hepatic Encephalopathy

[Liver with Altered-brain](#)

Hepatic encephalopathy happens when liver dysfunction causes brain dysfunction. It is mostly common in patients with chronic liver diseases. In hepatic encephalopathy, the liver can not remove any toxins that build up in the blood and go to the brain, which can cause motor or mental dysfunctions to occur.

Side Effects

Ototoxicity

Ear with Toxic-green-glow

Since aminoglycosides may concentrate within the cells of the ear, ototoxicity is a serious side effect of neomycin sulfate. Hearing impairment is caused by damage to sensory hair cells in the cochlea. High-pitched tinnitus, or ringing in the ears, is the first sign indicating cochlear damage. Damage to sensory hair cells of the vestibular apparatus leads to disruption of balance and manifests as headache, nausea, and dizziness. Since ototoxicity is primarily irreversible, the administration of neomycin sulfate should be stopped if the patient begins experiencing symptoms such as tinnitus or persistent headache.

Nephrotoxicity

Kidney with Toxic-green-glow

Since aminoglycosides may injure cells of the proximal renal tubules, nephrotoxicity is a serious side effect of neomycin sulfate. Symptoms of aminoglycoside-induced nephrotoxicity include proteinuria, casts in the urine, diluted urine, and elevated creatinine and blood urea nitrogen (BUN) levels. The risk of renal damage is especially high in elderly patients, patients with pre-existing kidney disease, and patients receiving concurrent administration of nephrotoxic agents.

Rash

Rash

Patients prescribed neomycin sulfate may develop hypersensitivity reactions. Symptoms include an urticarial rash and pruritus. Patients experiencing symptoms of hypersensitivity reactions should stop taking the medication and consult their healthcare provider.

GI Superinfection

GI Super-bacteria

Oral neomycin sulfate may lead to GI superinfection and intestinal malabsorption syndrome. Superinfections are the result of opportunistic pathogens that infect the body during treatment for another primary infection. Prolonged use of neomycin sulfate may lead to bacterial (e.g., *Clostridioides Difficile*) or fungal superinfection due to disruption of normal gut flora, allowing overgrowth of opportunistic pathogens.

Neuromuscular Blockade

Nerve-muscle-man with Blocks

Aminoglycosides can block neuromuscular junctions by inhibiting the release of acetylcholine at the presynaptic nerve terminal, leading to respiratory paralysis. Because of this, they are contraindicated in patients with myasthenia gravis, as they can exacerbate the condition.

Contraindications

Pregnancy

Pregnant-woman

Aminoglycosides are known teratogens and are in the pregnancy category D. Teratogens are agents that cause a defect or malformation in the development of the embryo or fetus. Aminoglycosides are especially associated with causing hearing deficits in fetus.