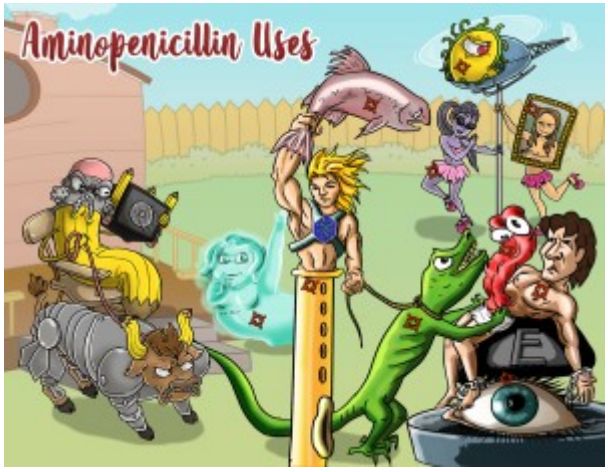
Aminopenicillin Uses

Aminopenicillins are antibiotics that belong to the penicillin family. Like penicillins, aminopenicillins are beta-lactam antibiotics that work by inhibiting bacterial cell wall synthesis. Aminopenicillins have a broader spectrum of activity than penicillin. They are effective against most gram-positive bacteria, including S. pneumoniae, S. agalactiae, and E. faecalis. They are also useful against some gram-negative bacteria like E. coli, H. influenzae, and P. mirabilis. Ampicillin is used for infections such as L. monocytogenes meningitis, neonatal S. agalactiae sepsis, and enterococcal infections. Amoxicillin is effective against S. pneumoniae, H. influenzae, P. mirabilis, and H. pylori as part of combination therapy. Aminopenicillins are also effective against Shigella and Salmonella.



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Drug Names

Ampicillin
Amp-pencil
Ampicillin is a beta-lactam antibiotic in the aminopenicillin family. It can be used for gram-positive organisms such as Streptococcus and Enterococcus species, as well as limited gram-negative bacteria. It may cause a rash if mistakenly given to patients with mononucleosis due to an immune-mediated reaction.

Amoxicillin
Armor-ox-pencil
Amoxicillin is a popular beta-lactam antibiotic used for treating infections caused by bacteria such as S. pneumoniae, H. influenzae (non-beta-lactamase-producing strains), and Proteus. It is widely used for infections, such as otitis media, skin infections, and strep throat, among others. Amoxicillin is susceptible to degradation by beta-lactamase inhibitors like clavulanic acid to broaden its spectrum of activity. It is well-absorbed and typically given orally.

Indications

Shigella
She-Jello
Aminopenicillins are useful against Shigella, which is a common cause of bacterial diarrhea worldwide. Transmission is via contaminated food and water but also via direct person-to-person contact. Shigella has a high virulence; as few as 10-100 bacteria can cause disease because the organism can survive the stomach's acidic environment and invade the intestinal mucosa.

Haemophilus influenzae
He-man in-flute
Haemophilus influenzae is a gram-negative coccobacillus that can cause several diseases, including meningitis, pneumonia, otitis media, and epiglottitis. Aminopenicillins are effective against non-beta-lactamase-producing strains of H. influenzae. For beta-lactamase-producing strains, they are combined with beta-lactamase inhibitors, such as clavulanic acid.

Salmonella
Salmon
Salmonella species include include Salmonella typhi and nontyphoidal species such as Salmonella enteritidis. They are gram-negative bacilli within the Enterobacteriaceae family. While S. enteritidis is a common cause of gastrointestinal disease in the U.S., antibiotics are typically avoided for it. Aminopenicillins can be used for targeted treatment in specific cases, especially for severe infections or in immunocompromised patients.

Listeria
Listeria-lizard
Listeria monocytogenes is a gram-positive bacillus that causes listeriosis, a serious infection primarily affecting newborns, older adults, and immunocompromised individuals. Clinical manifestations often include flu-like symptoms, and if the bacteria spread to the nervous system, they can cause meningitis. Pregnant women are particularly susceptible, with the risk of intrauterine or cervical infections leading to spontaneous abortion or granulomatosis infantiseptica. L. monocytogenes is the third most common cause of neonatal meningitis, as infants are exposed during transvaginal delivery.

Ampicillin is the treatment of choice for listeriosis, often combined with gentamicin for synergistic effects.

Enterococci

Intestines-cock-eyed

Enterococci are gram-positive cocci that were previously classified as Group D streptococcus due to Lancefield group D classification. Important clinical infections caused by Enterococcus species include urinary tract infections and subacute endocarditis. An important feature of this genus is a high level of antibiotic resistance. Many enterococci are intrinsically resistant to beta-lactam antibiotics, and resistance to vancomycin (VRE) has been increasing in the last few decades. Aminopenicillins are often the first-line agents against susceptible Enterococcus faecalis. However, for Enterococcus faecium (VRE), which shows higher resistance, treatment often requires alternative agents. For serious infections like endocarditis or bacteremia, aminopenicillins are combined with an aminoglycoside to achieve synergistic bactericidal activity.

Proteus mirabilis

Prometheus

Proteus mirabilis is a gram-negative bacilli that is facultative anaerobic with characteristic swarming motility and urease presence. It produces urease, which hydrolyzes urea to ammonia, raising the pH of urine. It is a lactose non-fermenter and forms colorless colonies on MacConkey agar. It is most commonly known for causing nosocomial infections, particularly urinary tract infections (UTIs). It can alkalinize urine and lead to struvite crystal formation in the urine and lead to large kidney stones (staghorn calculi). While less common, It can also cause other infections of the skin and lungs, particularly in immunocompromised patients.

E. coli

E-coal-eye

E. coli is a gram-negative bacilli. It is a part of normal flora in the intestines. E.coli is a lactose-fermenting organism, producing pink colonies on MacConkey agar. It is also indole-positive, which helps distinguish it from other Enterobacteriaceae. While most strains are harmless, pathogenic strains can cause various diseases. These include diarrheal disease caused by enterotoxigenic E. coli (ETEC), leading to traveler's diarrhea, and enterohemorrhagic E. coli (EHEC), which is associated with bloody diarrhea and hemolytic uremic syndrome (HUS). Other diseases include neonatal pneumonia and meningitis, septic shock, and UTIs. Aminopenicillins are effective against E. coli infections, particularly for susceptible strains in conditions like uncomplicated urinary tract infections.

Helicobacter pylori

Helicopter-bacteria

Amoxicillin is used as part of triple or quadruple therapy for H. pylori eradication. H. pylori is a gram-negative, spiral-shaped bacterium associated with peptic ulcer disease, chronic gastritis, and an increased risk of gastric cancer and mucosa-associated lymphoid tissue (MALT) lymphoma.

Streptococcus pneumoniae

Stripper Nude-Mona

Aminopenicilins are used for S. pneumoniae, a gram-positive diplococcus, infections. This pathogen is a leading cause of community-acquired pneumonia, sinusitis, otitis media, meningitis, and bacteremia. Amoxicillin is used as the first-line treatment for mild to moderate pneumococcal infections, including otitis media, sinusitis, and community-acquired pneumonia

Streptococcus agalactiae

Stripper Agalactic

Ampicillin is a first-line antibiotic for treatment and prevention of S.agalactiae, also known as group B streptococcus, which causes sepsis in neonates. It is also used for intrapartum prophylaxis to prevent neonatal GBS infections. Additionally, ampicillin is used for intrapartum antibiotic prophylaxis to prevent vertical transmission of GBS from colonized mothers to their newborns during delivery.