Antibiotics

Antibiotics: Mode of Action and Mechanism of Resistance.

Antibiotic	Mode of Action	Mechanism of Resistance	Working Concentration	Stock Solution
Ampicillin (Amp)	A derivative of penicillin that kills growing cells by interfering with bacterial cell wall synthesis.	The resistance gene (*bla*) specifies a periplasmic enzyme, β-lactamase, which cleaves the β-lactam ring of the antibiotic.	50–125µg/ml in water	50mg/ml
Chloramphenicol (Cm)	A bacteriostatic agent that interferes with bacterial protein synthesis by binding to the 50S subunit of ribosomes and preventing peptide bond formation.	The resistance gene (*caf*) specifies an acetyltransferase that acetylates, and thereby inactivates, the antibiotic.	20–170µg/ml in ethanol	34mg/ml
Kanamycin (Kan)	A bactericidal agent that binds to 70S ribosomes and causes misreading of messenger RNA.	The resistance gene (*kan*) specifies an enzyme (aminoglycoside phosphotransferase) that modifies the antibiotic and prevents its interaction with ribosomes.	30µg/ml in water	50mg/ml
Streptomycin (Sm)	A bactericidal agent that binds to the 30S subunit of ribosomes and causes misreading of the messenger RNA.	The resistance gene (*str*) specifies an enzyme that modifies the antibiotic and inhibits its binding to the ribosome.	30µg/ml in water	50mg/ml
Tetracycline (Tet)	A light-sensitive bacteriostatic agent that prevents bacterial protein synthesis by binding to the 30S subunit of ribosomes.	The resistance gene (*tet*) specifies a protein that modifies the bacterial membrane and prevents transport of the antibiotic into the cell.	10µg/ml in liquid culture; 12.5µg/ml in plates	12.5mg/ml in ethanol
Neomycin (Neo)	A bactericidal agent that blocks protein synthesis by binding to the prokaryotic 70S ribosomal subunit. High concentrations of neomycin can result in toxicity to eukaryotic cells because it can interact with mitochondrial ribosomes, which are similar to prokaryotic ribosomes, and with reduced affinity, other eukaryotic ribosomes.	Expression of the bacterial APH (aminoglycoside phosphotransferase) gene (derived from Tn5).	50µg/ml for bacterial selection	25mg/ml in water
Hygromycin (Hygro)	A protein synthesis inhibitor that interferes with 80S ribosome translocation and causes mistranslation.	The resistance gene (*hph*) specifies a phospho-transferase that catalyzes the phosphorylation of the 4-hydroxyl group on the cyclitol ring (hyosamine), thereby producing 7′-O-phosphoryl-hygromycin B, which lacks biological activity both in vivo and in vitro.	50–1,000µg/ml for mammalian selection; 20–200µg/ml for bacterial selection	100mg/ml in HEPES buffer (pH 7.0) or water
Puromycin (Puro)	An aminonucleoside antibiotic that blocks protein synthesis by specifically inhibiting peptidyl transfer on both prokaryotic and eukaryotic ribosomes causing premature chain termination.	The resistance gene (*pac*) encodes puromycin N-acetyl-transferase.	1–10µg/ml for mammalian selection	10mg/ml in HEPES buffer (pH 7.0) or water
G418	Binds to the 80S ribosomal subunit found only in eukaryotes and blocks protein synthesis.	Expression of the bacterial APH (aminoglycoside phosphotransferase) gene (derived from Tn5) in eukaryotic cells results in detoxification of G418.	G418 is often used for initial selection at 500µg/ml, with a range of 50–1,000µg/ml	50mg/ml in either water or 100mM HEPES (pH 7.3) prepared in a highly buffered solution to maintain tissue culture media pH

TECHNICAL REFERENCE

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