

Chloramphenicol acetyltransferase

Chloramphenicol acetyltransferase acetylate the hydroxyl groups of [chloramphenicol \(Cm\)](#) from the acetyl-CoA. The acetylated Cm cannot bind ribosome 50S and is inactive.

InterPro entry

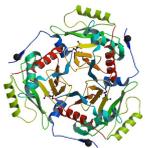
→ [IPR001451](#)

Chloramphenicol acetyltransferase (CAT) (EC:2.3.1.28) [1] catalyzes the acetyl-CoA dependent acetylation of chloramphenicol (Cm), an antibiotic which inhibits prokaryotic peptidyltransferase activity. Acetylation of Cm by CAT inactivates the antibiotic. A histidine residue, located in the C-terminal section of the enzyme, plays a central role in its catalytic mechanism.

There is a second family of CAT [2], evolutionary unrelated to the main family described above. These CAT belong to the bacterial hexapeptide-repeat containing-transferases family

The crystal structure of the type III enzyme from *Escherichia coli* with chloramphenicol bound has been determined. CAT is a trimer of identical subunits (monomer Mr 25,000) and the trimeric structure is stabilized by a number of hydrogen bonds, some of which result in the extension of a beta-sheet across the subunit interface. Chloramphenicol binds in a deep pocket located at the boundary between adjacent subunits of the trimer, such that the majority of residues forming the binding pocket belong to one subunit while the catalytically essential histidine belongs to the adjacent subunit. His195 is appropriately positioned to act as a general base catalyst in the reaction, and the required tautomeric stabilization is provided by an unusual interaction with a main-chain carbonyl oxygen [3].

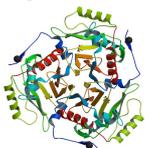
PDB



[3CLA - Transferase \(Acyltransferase\)](#)

Refined Crystal Structure Of Type Iii Chloramphenicol Acetyltransferase At 1.75 Angstroms Resolution

Ligand: CLM|CO



[1CIA - Transferase\(Acyltransferase\)](#)

Replacement Of Catalytic Histidine-195 Of Chloramphenicol Acetyltransferase: Evidence For A General Base Role For Glutamate

Ligand: BME|CO

[1CLA](#), [1NOC](#), [1PD5](#), [1Q23](#), [1QCA](#), [2CLA](#), [4CLA](#)

Reference

1. [The structure of nitric oxide synthase oxygenase domain and inhibitor complexes.](#)
Crane BR, Arvai AS, Gachhui R, Wu C, Ghosh DK, Getzoff ED, Stuehr DJ, Tainer JA
Science278p425-31(1997 Oct 17)
2. [Steroid recognition by chloramphenicol acetyltransferase: engineering and structural analysis of a high affinity fusidic acid binding site.](#)
Murray IA, Cann PA, Day PJ, Derrick JP, Sutcliffe MJ, Shaw WV, Leslie AG
J Mol Biol254p993-1005(1995 Dec 15)
3. [Chloramphenicol acetyltransferase.](#)
Shaw WV, Leslie AG
Annu Rev Biophys Biophys Chem20p363-86(1991)

Links

- [Antibiotics](#)
- [Chloramphenicol](#)

Enzyme

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