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Chitinase A (chiA) from *Serratia marcescens* is a hydrolytic enzyme, which catalyses the cleavage of ß(1→4) glycosidic linkages between the linearly arranged 2-deoxy-2-N-acetyl-D-glucosamine (NAG) residues of the natural biopolymer chitin. It belongs to the family no. 18 of glycosyl hydrolases, which is believed to act via a retaining mechanism of the configuration of the anomeric carbon (C1) of the scissile bond. The structure of the native chitinase A had been determined earlier.

ChiA has been crystallized under salting out conditions (0.75 M Na-citrate) using the vapour diffusion method. The native structure has been refined at 1.55 Å resolution using synchrotron data. In an attempt to study the mechanism of the enzyme, the crystal structures of the complexes of native chiA with the natural inhibitor allosamidin as well as the inactive mutants (E315Q and D313A) with the oligosaccharide substrate (NAG) have been determined and refined at 1.8 Å resolution. The crystals were produced under salting out conditions as mentioned above in the presence of excess of the inhibitor or the oligosaccharide (co-crystallisation). Diffraction data were collected at 100 K using the in-house rotating anode generator for the chiA/allosamidin complex and synchrotron radiation for the complexes of the chiA mutants with substrate. In all cases the added substances could be positioned unambiguously using difference Fourier maps. The entire chain of N-acetyl-chito-octaose could be modelled in the active site groove of the enzyme.

Based on these structural data, chiA appears to be a chitobiosidase, cleaving (NAG) disaccharide units from the reducing-end of the substrate. A critical ‘chair’ (C1) to ‘boat’ (A1B) conformational change at the cleavage site (subsite –1) was clearly visible in the electron density maps. The orientation of the critical 2-acetamido moiety of the substrate does not lend support to a substrate-assisted mechanism. Moreover, the conserved residue Tyr390 among the enzymes of the family seems to play an important role in the catalysis worth to be further investigated.