# Crystal Structure of the Tetramerization Domain of Acetylcholinesterase at 2.3A Resolution

Harel, M.,[1], Dvir, H.[1], Bon, S.[2], Liu, W.Q.[3], Garbay, C.[3], Sussman, J.L.[1], Massoulié, J.[2] and Silman, I.[4]
[1] Dept. of Structural Biology, [4] Dept. of Neurobiology, Weizmann Institute of Science
[2] Laboratoire de Neurobiologie, Ecole Normale Supèrieure, Paris, France; [3] Dept. de Pharmacochimie Moleculaire et Structurale, UFR des Sciences Pharmaceutiques et Biologiques, Paris, France

Tetramerization of acetylcholinesterase (AChE) is achieved by the interaction of 2 peptide motifs: a 40-residue 'tryptophan amphiphilic tetramerization' (WAT), at the C-terminus of the catalytic subunit, and a 17-residue 'proline-rich attachment domain' (PRAD), localized near the N-terminus of the ColQ collagenic tail polypeptide, with 4:1 WAT/PRAD stoichiometry. The two peptides were produced by chemical synthesis. WAT 21Met was replaced by selenomethionine, to permit collection of multiple anomalous dispersion (MAD) diffraction data. The synthetic WAT and PRAD were mixed at a 4:1 ratio, and crystallized. The monoclinic crystals obtained diffracted to 2.3 Å resolution, and MAD data sets were collected at the synchrotron. The structure was solved with the program SOLVE, which produced a traceable electron density map. The structure was refined to an R-factor of 24.6% with the 2 PRADs seen in full and the 8 WATs having disordered C-termini.

The WAT chains assume an $\alpha$-helical conformation, and are all parallel. The PRAD has a polyproline II conformation and threads its way antiparallel to the WAT chains. Most of the 3 highly conserved Trp residues in each WAT chain are stacked against the 8 Pro residues or 3 Phe residues of the single PRAD. An AChE tetramer structure can be modeled based on the WAT/PRAD complex structure.