



Use of the Morphing Graphics Technique to Visualize Conformational Differences Between AChEs from Different Species and Inhibitor-Induced Conformational Changes

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There are currently more than 25 AChE structures deposited in the Protein Data Bank, from four different species and/or complexed or conjugated with a repertoire of ligands. A method for sorting and characterizing differences between these structures is presented.

Pairs of AChE structures were aligned using LSQMAN, and rmsd values were calculated. Intermediate models between the two structures were produced by LSQMAN, in Cartesian space, by taking the initial and final coordinates, and interpolating the predicted intermediate coordinates. The intermediate models were then collated into a single QuickTime movie file easily viewable on most computers.

This morphing approach highlighted a conformational difference in loop 319-324 (hAChE

numbering) between hAChE and TcAChE earlier reported by Kryger *et al* (*Acta Cryst.* [2000] D56:1385). A similar conformational difference in the same loop between *Dm*AChE and TcAChE was pinpointed utilizing the novel procedure.

A series of movies was compiled, comparing native TcAChE with its complexes and conjugates with a number of inhibitors. These reveal significant inhibitor-induced conformational changes at the top of the active-site gorge. A major conformational change was visualized for the conjugate of TcAChE with diisopropylphosphorofluoridate (DFP).

The simple morphing technique developed thus provides a valuable tool for locating and assessing conformational differences between closely related protein structures.