Technical Demo #6

Opening the Door for Estrogens:

A Hands on Demonstration of Computational Techniques

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We will present a hands on demonstration of how simulated annealing, interactive molecular dynamics and traditional molecular dynamics can be utilized to investigate the structure and dynamics of the estrogen-receptor ligand binding domain in complex with various ligands. Particular emphasis will be placed on observing the conformational changes of the receptor that enable ligand dissociation and on determining the amount of translational and rotational freedom of the ligand within the binding pocket. Using simulated annealing, we allow a user to passively observe conformational changes of the receptor that likely occur during the lifetime of the receptor and that lead to ligand dissociation. Using interactive molecular dynamics we enable a user to actively navigate through the energy landscape of the ligand-receptor system and even force the ligand to follow a particular dissociation pathway. Finally, using traditional molecular dynamics simulation techniques we demonstrate how a user can rigorously compare and contrast the dynamics of various ligand-receptor complexes. This demonstration makes it possible for a user to explore the affects of various mutants, to investigate various dissociation pathways, and to survey the energy landscape of different ligand-receptor complexes. The goal of the demonstration is to help develop or to possibly check a researcher's intuition.