Molecular dynamics study of Sorafenib anti-cancer drug: inclusion complex in amphiphilic cyclodextrin

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Abstract
Sorafenib (SOR) is an oral multikinase inhibitor which impedes proliferation, angiogenesis and invasion of cancer cells with low water-solubility. Amphiphilic cyclodextrins (aCD) have been investigated as a possible nanocarrier for systemic administration of SOR increasing its bio-availability [1]. A theoretical study about inclusion complexes of SOR drug and a model of aCD system using a simulation protocol based on Molecular Mechanics (MM) and Molecular Dynamics (MD) methods [2] is here reported. In this work we have studied at first the single model aCD (SC6OH, heptakis(2-O-oligo(ethylene oxide)-6-hexylthio)-β-CD bearing 14 units of ethylene-oxide at the CD secondary rim) and the single molecule of SOR, then the formation of the complex in the dielectric environment [3]. The results data of final most stable geometry of the inclusion complex anticancer-cyclodextrin which showed the lowest potential and interaction energy were reported. The most stable host-guest geometry shows that the fluorine atoms of SOR drug are directed toward the hydrophobic primary rim of the aCD, while the part of the SOR rich in oxygen atoms is directed towards the hydrophilic secondary rim.

References
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