# Simulation of para-substituted phenyl propionic acid derivatives interactions with GPR40 in the treatment of type 2 diabetes disease

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**Abstract:** Diabetes is a disease that occurs when the level of sugar in the blood is too high. Insulin is a hormone made by the pancreas helps to pass sugar from the blood to the cells, so the blood sugar level is lowered. Type 2 diabetes is the most common type of diabetes which occurs at the middle-aged or old people and accounts around 95% of all diabetes. In patients who suffer from type 2 diabetes the insulin receptors in the cells become resistant or less responsive. It has been shown that GPR40 protein can be used as a favorite target for type 2 diabetes drugs. Many researchers worldwide have synthesized and introduced a large number of GPR40 agonists during the recent decade [2, 3]. Para-substituted phenyl propionic acid derivatives have emerged as a common structure as GPR40 agonists. In this study, the interactions of four para-substituted phenyl propionic acid derivatives with GPR40 is simulated by molecular docking. The homology model of GPR40 that is available online [4] was taken for docking. The docking results show 4-[[(3-phenoxyphenyl)methyl]amino]-benzenepropanoic acid (GW9508) performs better in compare to the others in terms of docking energy. The interactions for all compounds occurs in transmembrane 5 of GPR40 protein. The carboxylate group acts as a negative charge center and the aromatic ring along with two connected methylenes provide steric interactions. The main interactions are π interaction and hydrogen bond which occur between tyrosine 240 and phenoxy, and asparagine 244 and carboxylate, respectively.

**Keywords:** Diabetes; molecular docking; GPR40

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