

## Theoretical study on molecular orbital energy levels of h-2 blockers and correlation to their potency

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**Background and Aims:** Theoretical study on molecular orbital energy levels of H-2 blockers and correlation to their potency A.R.Bekhradnia, Sh. Ala, B. Bayat Pharmaceutical Sciences Research Center, Department of Medicinal Chemistry, Mazandaran University of Medical Sciences, Sari, Iran Aims and background: Famotidine, ranitidine and nizatidine are used for treatment of peptic ulcer disease that act by binding to H2 receptors in stomach and antagonize these receptors. These are medicines that reduce the amount of acid the stomach produces by blocking one important producer of acid: histamine2 receptors. A probable mechanism for binding these drugs or any other drug to related receptor, is electron transferring from Lowest Unoccupied Molecular Orbital (LUMO) of drug to Highest Occupied Molecular Orbital (HOMO) of receptors and vice versa. Both of probable mechanisms were investigated in this research.

**Methods:** Theoretical study on Famotidine, Ranitidine and Nizatidine were performed by means of the Gaussian 98 system of programs, Hypechem and ISIS soft wares. The geometrical structures of these molecules were investigated at HF/6-31G\* level of theory. Then thermodynamic parameters, total Energy, Enthalpy, Gibbs Free Energy, HOMO and LUMO energy levels were found at the same theoretical level.

**Results:** After optimization and thermodynamic parameters calculating , the HOMO energies were found for Famotidine , Ranitidine and Nizatidine :-0.29189,-0.38489 and -0.39589, repectively. These were calculated for LUMO energy levels as following: 0.13005,-0.07872 and -0.07670.

**Conclusion:** As the HOMO energy is increased, the potency of drug increases, too. In fact, HOMO level of drug and LUMO level of receptor were the important molecular orbitals for chemical interaction. Then Famotidine has the most potency in comparing to Ranitidine and Nizatidine. On the basis of molecular orbital levels, the potency of H2 blockers can be predicted.

**Keywords:** LUMO; HOMO; H2-receptor antagonists; Thermodynamic paramters