**Determination of binding sites of small carboxylic derivatives to GABAA receptor**

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Strained carbocyclic molecules have proven to be very useful synthetic tools in recent decades. In this class of compounds, cyclopropane and cyclobutane derivatives are by far the most studied and versatile organic molecules.Due to their inherent ring deformation, selective modification of their structures can be strategically used in organic synthesis.They can be used as biologically active substances.

A common method for the synthesis of cyclopropanes is the addition of carbenes or their equivalents to alkenes.organocatalytic reactions and metal-catalyzed reactions of intermolecular cyclopropanation make it possible to obtain discrete three-membered ring systems with high diastereo- and enantioselectivity in laboratory syntheses.The ATR (radical atom transfer) reaction methodology catalyzed by transition metals is applied in multi-step methods to prepare carbocycles or heterocycles. Active catalysts for cyclization are obtained mainly from complexes of Ru, Fe, Cu. The most popular are Cu, Ru. Copper complexes are cheaper and more accessible. The following compounds have been synthesized: Cl-permethrin, Cl-permethric acid, Cyclobutane carboxylic acid, Cyclobutane-piperidine amide, Cyclobutine amide.

Also it is important to note that Gamma-aminobutyric acid (GABA) is a neurotransmitter, a chemical messenger in our brain. It slows down our brain activity by blocking synaptic transmission in the human brain. GABA is known for producing a calming effect. It’s thought to play a major role in controlling nerve cell hyperactivity associated with anxiety, stress and fear.

As it is known the receptors of γ-aminobutyric acid type A (GABAA) are the main mediators of rapid inhibitory synaptic transmission in the human brain. Decreased GABA activity may contribute to: hyperactive neurological disorders such as insomnia, anxiety, and epilepsy.

That is why the study of these receptors is important both in medicine and pharmacology.

Preliminary results of our investigation indicate that all compounds under study can interact with GABBAA receptors at different binding sites with different spatial arrangement of ligands (binding sites: 3-in-domain, 1 out-domain, 1 transmembrane domain with the formation of a pocket in the channel cavity). Chlorpermethrin, cyclobutine, piperidinamide - interact only on alkyl radicals, with the formation of hydrophobic interactions.

 Moreover, we are planning to study an in vitro the activity of these compounds, as bioactive compounds, their neuro inhibitory action with the potential for medical use in neurological disorders associated with GABA metabolism and reception.