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Boron-containing compounds as ACE/AChE dual inhibitors against hypertension.

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Abstract

Statement of the problem: Currently, antihypertensive treatment includes mono-target drugs, but considering this disease has a very diverse etiology these drugs are not satisfactory, since monotherapies often do not achieve the desired efficacy leading to increase doses or combine different drugs to improve the antihypertensive effect, which develop adverse effects. Multitarget treatment could reduce the appearance of adverse effects and in turn avoid drug interactions. Boron-containing compounds have been known for more than a century, increasing interest in scientific research due to their possible use in treatments as antibiotics, antiseptics agents, antihypertensives.

Methodology and Theoretical Orientation: Considering previous pharmacological activity of boroxazolidones, the aim of this investigation was to design and synthesize a series of boroxazolidones derived from α-amino acids, and evaluate their antihypertensive effect (in silico, in vitro and in vivo) as ACE/AChE inhibitors to determine the best compounds for this treatment.

Findings: According to in silico studies, BXZ-His, BXZ-Lys, BXZ Orn, BXZ-Phe and BXZ-Pro were selected as the most promising ACE and AChE inhibitors. After synthesis, these molecules were tested in vitro, to study the inhibitory activity on ACE and AChE. Finally, BXZ-Lys and BXZ-His were tested in vivo in spontaneously hypertensive rats.

Conclusion & Significance: BXZ-LYS significantly decreased systolic, diastolic, and mean arterial pressure, being more potent than the ACE inhibitor drug, captopril.

Biography:

Alina Barquet Nieto is a PhD student in Medicine Research at the Higher School of Medicine of the National Polytechnic Institute. She is a Biologist Pharmaceutical Chemist by profession with a Master of Science in Pharmacology.

She carries out research focused on the study and development of new compounds derived from α-amino acids and boron, for the treatment of hypertension and cardiac hypertrophy in spontaneously hypertensive rats and, in this way, contributes to the search for new drugs that reduce the adverse effects that are commonly presented.

About research topic: Systemic arterial hypertension is a serious chronic health problem characterized by high blood pressure (BP), and it is caused by multiple factors. High BP (>140/90mmHg) is one of the major risk factors for cardiovascular diseases (CVDs), including heart failure, coronary heart disease and myocardial infarction. Reduction of the blood pressure in patients who suffer from hypertension can decrease the risk of experiencing a cardiovascular disease by 35-40% this also reduces the risk of death by myocardial infarction by 20-25%.

About Institution:

The medicinal chemistry laboratory located at the Escuela Superior de Medicina in Mexico City is mainly dedicated to the design and synthesis of new compounds that can be used as pharmacological therapy for various pathologies such as cancer, hypertension, Parkinson's, Alzheimer's, etc. The teaching staff of this laboratory is highly trained and collaborates with various institutions for the development of innovative molecules.

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