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Editorial

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For several decades the 1,4-dihydropyridine (DHP) chemical class has been a prototype of calcium-blocking drugs, with wide clinical use in the treatment of hypertension and myocardial ischemia. Drugs such as amlodipine, nifedipine and felodipine share the same mechanism of action when binding strongly to L-type calcium channels, blocking the passage of calcium ions inside the cells. This confers them activity as vasodilators and regulators of blood pressure, among many other potential uses[1].

Today, there is interest on the design of new drugs with improved safety profiles by optimizing physicochemical and pharmacological properties to provide better selectivity and bioavailability. The use of computational methodologies in drug design has the potential to reduce costs in the process of identifying new candidates to be evaluated in clinical trials. So, methodological and theoretical advances in the field of quantum and computational chemistry allow to carry out extensive and reliable "in silico" evaluations of chemical compounds that have not yet been synthesized, to identify key properties that confer them activity towards some desired target. Also, the tools provided by quantum chemistry allow explaining at a molecular-level the chemical basis of the biological activity of drugs[2].

For instance, a recent research describes how computational techniques can be used to try to explain the pharmacological activity observed in a series of compounds designed to mimic the activity of classic DHPs. The evaluated bis-1,4-dihydropyridines (bis-DHPs) were designed with structural features found in traditional DHPs, but with a second dihydropyridine ring added to increase the recognition of this group with the receptor calcium-channel. In this research two strategies were applied that have been used for decades in drug design; one of them based on the structure of drugs only and the other one based on the structure of the pharmacological receptor. In the first case, molecular and electronic properties of bis-DHPs that could be related to the evaluated pharmacological activity were determined. The calculated properties are based on quantum mechanics, which describes the behavior of microscopic systems, such as chemical compounds and their constituent electrons. Particularly, it was used the Chemical Reactivity Theory derived from the Density Functional Theory. In this way it was possible to determine chemical properties such as the hardness/softness or the electrophilicity that compounds must comply to exhibit vasodilator activity[1,2].

The second strategy that was adopted uses the known structure of the pharmacological receptor or, in that case, the structure of a pharmacological receptor model. The strategy consists on calculating or predicting how bis-DHPs can interact or bind to the known structure of the pharmacological receptor, in a procedure known as molecular docking. Considering the known structure of classic DHPs bound to their receptor in crystallographic complexes, the calculations suggested that the part of the chemical structure of bis-DHPs that is similar to the structure of DHPs is capable of mimicking the interaction mode with the receptor, while the rest of the compound's structure adapts to the receptor's surface. Therefore, it was possible to determine both the electronic and steric factors that are relevant in the interaction of bis-DHPs with calcium channels and, with this, explaining the vasodilator activity of different derivatives that meet these requirements[3].

This example shows how, through the use of chemical, physical and pharmacological knowledge combined with computational techniques, it is possible to explain the biological activity of new compounds, as well as predicting their potential.

This topic is accurately discussed in the manuscript of this journal's edition "The Hypertensive Patient and Its

Commitment to Comply with Medical Treatment" by Cerón-Delgado et al. The authors suggest that Systemic Arterial Hypertension (SAH), one of the major chronic non-communicable diseases that afflict modern life, it is a public health problem that disproportionately affects developed and developing countries, which can usually be started at a reproductive age, it also shortens life expectancy and its lack of control can increase a precarious quality of life. Another interesting review paper is "Medical care delays among breast cancer patients" by García-Perusquía et al. The authors report on breast cancer, its definition, classification, and they identify socio-structural factors and health services that are associated with delayed medical care.

On the other hand, other interesting paper published in this issue is "Anxiety, depression and perception of the quality of life in the patient with HIV/AIDS" by Salazar-Campos et al. The authors report the social impact of HIV, not only in relation to the economic and political repercussions for treatment and prevention, but also in the identification of variables related to the improvement of the quality of life of people with HIV.

We hope that the manuscripts in this eleventh issue of the journal awakes the interest of readers and also, we invite the scientific community to submit papers to this journal to keep on contributing to health and health sciences.

References

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