

## Interaction between thymol with cell membrane models

João Victor N. Ferreira<sup>1</sup> (IC), Tabata M. Capello<sup>1</sup> (PG), João H. G. Lago<sup>1</sup>(PQ), Luciano Caseli<sup>1\*</sup>(PQ)

<sup>1</sup>Instituto de Ciências Ambientais Químicas e Farmacêuticas, Universidade Federal de São Paulo, Diadema, SP

Keywords: Langmuir Monolayer, Cell Membrane, Thymol, drug

### Introduction

Understanding the interactions of drugs, such as thymol, is very important since this substance have many applications for pharmacological purposes. Found in the extract of thyme and oregano, this drug can be used as bactericidal and antifungal agent. It damages the cell wall of fungi and bacteria, thereby inhibiting the transmission of diseases.

For a better analysis of your properties and features, studies were realized in simplified models of cell membranes, enabling to handle at the molecular level the properties of the interaction drug-membrane.

For that, lipid Langmuir films were used to mimic a cell membrane. In this technique, a molecular film is produced by amphiphilic substances, spread on air-water interface.

In this work, we aim to study the interaction of thymol with Langmuir monolayers formed by lipids with different chemical natures.

### Results and Discussion

Langmuir monolayers of the lipids dipalmitoyl phosphatidyl choline (DPPC), dipalmitoyl phosphatidyl serine (DPPS) and dioctadecyl dimethylammonium bromide (DODAB) were spread on the air-water interface, and aliquots of thymol were inserted in the monolayer.

The Surface Pressure-Area ( $\pi$ -A) isotherms for DPPC (Figure 1) showed an expansion of the monolayer with the presence of thymol. Images obtained with Brewster Angle Microscopy (BAM) (Figure 2) showed the formation of aggregates for the mixed monolayer, which was not observed for pure DPPC.

For DPPS, we observe a smaller expansion with the incorporation of the drug, while for DODAB we observe a boosted expansion. Images of BAM also show that thymol cause the formation of aggregates for the DPPS monolayer, but for DODAB, we do not observe such aggregates, with the monolayer remaining relatively homogeneous.

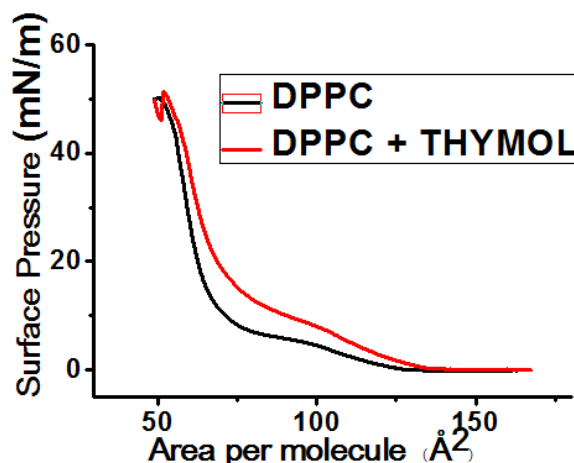


Figure 1.  $\pi$ -A Isotherms for DPPC and DPPC with thymol (1% in mol).



Figure 2. BAM images for DPPC with thymol (1% in mol) obtained at 34 mN/m

### Conclusion

The biological activity of the thymol is probably modulated by the charge of the lipid, which may be related to the natural electric charge present in the cell membrane. These facts may have an important impact on the understanding at the molecular level of drug-membrane interactions.

### Acknowledgments

