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Bovine erythrocyte acetylcholinesterase (BEA) from natural membrane transferred to glass functionalized surface is modulated by essential oil compounds.

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Monomolecular layers at the air-water interface (Langmuir Films, LF) are useful tools for the study of biomembranes. This kind of systems provide a constant planar curvature and, different from other model membranes or even cells, allow the control of parameters such as packing degree and composition. In turn, LFs can be transferred, to functionalized substrates, maintaining their main properties, expanding the spectrum of tests to which they can be submitted and even enabling the construction of biosensors.

Acetylcholinesterase (AchE) is an enzyme with a crucial role in the nervous system. Currently, search for natural compounds with a modulatory effect on AchE activity is in high demand to be used as bioinsecticides and also in therapies for diseases such as Parkinson. The AchE (BEA) present (anchored) in Bovine Erythrocyte Membrane (BEM) serves as a model to study these issues.

In our laboratory FLs obtained by the spreading of BEA over the air-water interface could be transferred to alkylated glasses by applying different techniques in presence of monoterpenes (MTs). In these tests information was obtained on the modulating effect of the MTs Cineole, Camphor and Eugenol on BEA. For all MTs an inhibition of the enzymatic activity was observed, except for Eugenol which at low concentrations showed a slight increase in activity.

In the present work we applied a different transference method named Langmuir-Schaefer (LS) and we studied the effect of other MTs such as Thymol, Menthol and Geraniol on the activity of BEA in the MEB films packed at 35 mN/m. Menthol and Geraniol exhibited an inhibitory effect on BEA activity with an IC50 of 6.73 mM and 2.27 mM, respectively. Thymol seemed to be inactive on BEA at low concentrations however, in a range from 2mM to 15mM it showed a marked activating effect. The modulatory mechanism can be through as a specific interaction with the substrate binding site on BEA or through a modification of the molecular environment on the enzyme in the LS film. Further experiments will be necessary to elucidate this matter. Moreover, in order to improve the quality of the data obtained with the transferred enzyme using the LS technique, activity and fluorescence tests were carried out to evaluate the homogeneity of the supported film. We found that slight modifications of some aspects of the technique used could notably improve the homogeneity of the transferred BEM.

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