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Design and comparison of biomimetic membranes based on natural bovine and triatomine membranes

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Phospholipid monolayers are often used to emulate biological membrane behavior and interactions with diverse compounds. Yet frequently, these monolayers consist of a single phospholipid or binary mixtures. These monolayers do not share many similarities with biological membranes, for this reason, the aim of this work is to construct Biomimetic Membranes (BM) and test whether they reproduce the behavior of Natural Membranes (NM) and their interaction with an insecticide of sanitary interest, Fipronil. The NMs were synaptosomal membranes of *Bos taurus* cerebral cortex (NM_{Bt}) and cerebral ganglia membranes of *Triatoma infestans* nymphs (NM_{Ti}). The BMs were assembled with the major lipid components of their respective MN (BM_{Bt} and BM_{Ti}). Biomimetic Membranes π -A isotherms do not reflect the same behavior of NMs, they are devoided of transition and exhibit a smoother outline. The collapse pressure (π_c) of BM_{Bt} was quite similar to that of NM_{Bt} , yet π_c of BM_{Ti} was higher than the one observed in NM_{Ti} . The compression modulus of both BMs at $\pi = 30$ mN/m was higher than the one found in NMs, this means that BMs at that π , are more condensed than the natural ones. The presence of fipronil in the subphase, even at low concentrations, causes an increase of ΔV , more evident in NMs. π_{cutoff} essays showed that penetration of fipronil in NMs is only possible up to 34 mN/m, whereas in BMs this value increases to 50 mN/m in BM_{Bt} and 44 mN/m in BM_{Ti} , suggesting that the presence of proteins in NMs modifies the interaction of fipronil. Fluorescence anisotropy studies showed that BMs behaved similarly to NMs. Fipronil exerted no effect over DPH and TMA-DPH anisotropy values of NMs, but it did affect BMs. EFM images of transferred monolayers show that BMs allow a more homogeneous distribution of the DiI18 fluorescent probe than NMs, but they both exhibit non-defined condensed domains at π above 30 mN/m. Fipronil exerts changes in the distribution of the fluorescent probe in NMs and BMs and this effect was more noticeable at high π values (30 mN/m or higher). In Summary, even though BMs did not emulate their respective NMs perfectly, many parameters were successfully reproduced, and BM_{Ti} reproduced its natural counterpart more accurately.

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