Role of charged lipids in membrane structure

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An observation of BMC Bioinformatics Journal on the Role of charged lipids in membrane structure

In this journal, the experimenters make observations to note in saying that charged lipids play and important role in what they call a phenomenon. This includes lipid protein binding, membrane potential and membrane permeation (Pöyry & Vattulainen, 2016). In this journal the experimenters note the following; effects of charged lipids on membrane properties and effect of charged lipids on membrane proteins (Pöyry & Vattulainen, 2016). They then go on to note what they call the interplay between charged lipids and Nano sized molecules or particles (Pöyry & Vattulainen, 2016).

The objectives of the experimenters in this journal review and discuss the recent findings that describe charged lipids as active players in the membrane system (Pöyry & Vattulainen, 2016). The experimenters in this journal will discuss how charged lipids affect membrane properties. Then further expand on how their charged nature comes into play in lipid-protein interactions (Pöyry & Vattulainen, 2016). In further detail the experimenters focused on the recent simulation work done in the field and integrate the work in recent simulations with that of their own observations to experiments (Pöyry & Vattulainen, 2016).

The tested hypotheses in this journal is represented as testing Phosphatidylcholine (PS) for key players in preprogrammed cellular death as discussed by computer generated simulations about the properties of charged lipids (Pöyry & Vattulainen, 2016). Who in turn also plays many roles in a variety of different processes.

The experimenters noted that the null hypothesis was testing phosphatidylinositol (PI) which is often involved in the modulation of membrane receptors and their signaling processes and testing to see if there was any significant difference between the two variables due to their role in many biological processes (Pöyry & Vattulainen, 2016).

The materials and methods the experimenters introduce in this journal are preexisting scenarios. Having done their own research on charged lipids the experimenters inputted their data to continue the experimentation. The experimenters in this journal mention that that dependent variables are the various simulations of the (PS) & (PI) that can get to the importance of " atomistic details" (Pöyry & Vattulainen, 2016). The experimenters used the force fields for complex charged lipids as the independent variables to change or manipulate the experiment. Specifically mentioning than any model can only be as good as the underlying force field referencing Insight into the Properties of Cardiolipin Containing Bilayers from Molecular Dynamics Simulations, Using a Hybrid All-Atom/United-Atom Force Field.

In this journal the experimenters reference several terms. These terms represent a few of the many biologically relevant processes where charged lipids are highlighted in the importance of understanding the function of charged lipids in cells (Pöyry & Vattulainen, 2016): Phosphatidylcholine or (PS): is one of the key players in programmed cell death and phosphatidylinositol or (PI): which is often involved in the modulation of membrane receptors and their signaling processes. Using already existing simulations the experimenters manipulate the force fields of the lipid bilayers in order to test the hypotheses.

In this journal the results show that the experimenters have failed to reject the null hypothesis in determining that the simulation data has shown in what they refer to as a convincing manner that " specific details are often important in determining the properties of charged lipids. It is not only the charge that matters. If it did, then lipids such as PS and PI would largely have the same effects, which is the not the case" (Pöyry & Vattulainen, 2016).

The experimenters in this journal note that the (PI) lipids have been observed to cluster around several human RTKs and around EGFR and state the same could be said about the (PS) except that the (PI) has a better chance in interacting with proteins than the latter (Pöyry & Vattulainen, 2016). The experimenters also note that the (PI) chemical details matter as well because the different properties of the (PI) lipids show.

In conclusion the experimenters mention that (PS) & (PI) have both had their fair share of attention in biology. The experimenters continue to state that when (PS) & (PI) are incorporated into bilayers they have been shown to increase the ordering of phosphatidylcholine (PC) chains and state they stiffen the bilayers. The experimenters making a considerable note; state that there has been a great deal of a lack of attention being paid to diffusion. Or as they put it dynamics of charged lipids. Being specific in noting that there is a clear void for future research to fill (Pöyry & Vattulainen, 2016).

In this journal the experimenters mentioned that future work would be more than welcomed in this field stating that this field of study for complex charged lipids is not " a simple feat" when pertaining to force fields (Pöyry & Vattulainen, 2016). Comparatively speaking, the experimenters state that it

is difficult to find commonalities especially when the models being tested in various studies are based on different force fields. Lastly and concluding the journal the experimenters state that studies based on the same force field work would most likely have more reliable trends that are revealing and would be most welcome.

References Cited

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