An update on detergent usage in Cryo-EM structure determination of membrane proteins

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The past few years have been revolutionary for the field of single-particle electron cryo-microscopy (cryo-EM), with over 50% of the total deposited structures being determined since 2014. Currently, there are over 950 unique (<95% sequence identity) cryo-EM structures deposited in the PDB, 80 of which are membrane proteins. Although we are witnessing many significant strides in this field, challenges in membrane protein production, purification, and structure determination still persist. These challenges often revolve around the choice of detergent used to solubilize and purify the membrane protein, as it is well established that the detergent used can have drastic effects on the stability and activity of the protein. Thus, choosing the correct detergent is of paramount importance.

We have built a database containing detergent usage data for all unique membrane protein structures deposited in the PDB. Here, we'll present data on which detergents are commonly used in the Cryo-EM structure determination of membrane proteins, and examine if any trends in detergent usage exist among specific classes of membrane proteins. The results from this analysis show that a large number of detergents are compatible and frequently used with Cryo-EM, including DDM, LMNG, and Amphipol A8-35. Additionally, we will highlight examples where the use of fluorinated surfactants, such as Octyl Maltoside and Fos-Choline-8, have been used to improve the vitrification process.