The location and behavior of α-tocopherol in membranes. J. Atkinson, T. Harroun, S. R. Wassall, W. Stillwell, and J. Katsaras, *Mol. Nutr. Food Res.*, **54**, 641–651 (2010). (Review)

Vitamin E (α-tocopherol) has long been recognized as the major antioxidant in biological membranes, and yet many structurally related questions persist of how the vitamin functions. For example, the very low levels of α-tocopherol reported for whole cell extracts question how this molecule can successfully protect the comparatively enormous quantities of PUFAcontaining phospholipids found in membranes that are highly susceptible to oxidative attack. The contemporary realization that membranes laterally segregate into regions of distinct lipid composition (domains), we propose, provides the answer. We hypothesize α-tocopherol partitions into domains that are enriched in polyunsaturated phospholipids, amplifying the concentration of the vitamin in the place where it is most needed. These highly disordered domains depleted in cholesterol are analogous, but organizationally antithetical, to the well studied lipid rafts. We review here the ideas that led to our hypothesis. Experimental evidence in support of the formation of PUFA-rich domains in model membranes is presented, focusing upon docosahexaenoic acid that is the most unsaturated fatty acid commonly found. Physical methodologies are then described to elucidate the nature of the interaction of α-tocopherol with PUFA and to establish that the vitamin and PUFA-containing phospholipids co-localize in non-raft domains.