

P011 Protein interactions in the membrane environment
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The effect of the environment on association of components of cellular networks is sometimes neglected. For example, protein-protein interactions may occur in the cytoplasm, within a membrane, or at the membrane/cytoplasm interface. A test case for interactions at the membrane interfacial environment is offered by the spider toxin VSTX1, which interacts with the voltage-sensor of Kv channels. It is proposed that VSTX1 alters Kv channel gating by partitioning into the cell membrane, and then binding to the channel voltage sensor domain within the membrane. Atomistic simulations offer a powerful technique to estimate the ability of VSTX1 to partition into a model lipid bilayer. In particular, molecular dynamics simulations can help to locate the *depth* of penetration of the protein toxin into a lipid bilayer. Preliminary results indicate that VSTX1 tends to be preferentially located at the water/membrane interface, rather than deep within in the hydrocarbon core of the bilayer. Although somewhat dependent on the assumed ionisation state of the toxin sidechains, this preference for the interface region can be explained by the protein hydrophobic moment. This predicted localisation of the protein toxin in the membrane will help us to formulate more general models for how a water soluble toxin interacts with a transmembrane channel protein. Thus, this three component (toxin, membrane, channel) example provides a paradigm for developing methods for modeling more complex systems of interacting proteins at the membrane/cytoplasm interface.