**The molecular mechanisms of membrane tethering at plasmodesmata intercellular junctions**

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Intercellular communication is critical for multicellularity. It coordinates the activities within individual cells to support the function of an organism as a whole. Plants have developed remarkable cellular machines -the Plasmodesmata (PD) pores- which interconnect every single cell within the plant body, establishing direct membrane and cytoplasmic continuity, a situation unique to plants. PD are indispensable for plant life hence human health. They control the flux of molecules between cells and are decisive for development, environmental adaptation and defence signalling.

A striking feature of PD organisation, setting them apart from animal cell junctions, is a strand of endoplasmic reticulum (ER) running through the pore, tethered extremely tight (~10nm) to the plasma membrane (PM) by unidentified “spokes”. To date the function of ER-PM contacts at PD remains a complete enigma. We don’t know the molecular mechanisms controlling this highly specialized membrane junctions.

Our work focuses on investigating the structure/function of the C2 domains of the Multiple C2 domains and Transmembrane region Proteins (MCTPs) family, which are candidate ER-PM tethers. Sequence analysis of the MCTPs was performed to delimit the C2 domains and molecular modelling was used to build accurate 3D models that were used for molecular dynamic simulations. Our results suggest the ability of C2 domains to dock onto biomimetic lipid bilayers, in an anionic lipid-dependent manner, as a result of electrostatic interactions between basic amino residues and lipid polar heads.

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