

P001 Natural membrane domains as key players in nuclear envelope assembly.

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To elucidate the role of membrane domains in membrane fusion we have exploited nuclear envelope (NE) assembly post-fertilisation in sea urchins. During fertilisation, egg membrane vesicles (MVs) bind to NE-free sperm nuclei and fuse with each other to form the NE. A cell free system developed by LA Cameron and DL Poccia mimics the *in vivo* behaviour and constitutes the major model to study NE assembly. Sperm permeabilised nuclei have been shown *in vitro* and *in vivo* to retain structures on both acrosomal and centriolar fossae. These structures called lipophilic structures (LS) are crucial for the assembly of the NE. To characterise LS we have exploited various nanoanalytical tools. LS morphology is shown on permeabilised nuclei by transmission electron microscopy (TEM). The lipid composition of permeabilised nuclei containing LS is enriched in cholesterol compared to phospholipids. The detailed phospholipids (PL) characterisation is determined by electrospray ionisation mass spectrometry (ESI-MS/MS). Permeabilised nuclei PL are mainly composed of unsaturated species: 18:0/20:4. To elucidate the lipid organisation in LS, deuterium solid-state NMR, a non-invasive technique, is applied for the first time to subcellular membrane compartments. ²H ssNMR determines the dynamic state of the membrane by correlating the spectrum profile to membrane fluidity. Our studies will show whether cholesterol-rich regions co-exist with polyunsaturated lipids.