

INVITED LECTURE T2

Cryo-electron tomography study of clathrin coated vesicles

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In all eukaryotic cells, clathrin coated vesicles carry the endocytic membrane traffic from the plasma membrane to endosomes and secretory traffic between the trans-Golgi network and endosomes. In synapses, clathrin mediated endocytosis is a major pathway for the synaptic vesicles recycling. The lattice-like coats of these vesicles are formed by spider-like clathrin trimer. Clathrin coats without membrane vesicles can be assembled *in vitro* from purified clathrin and adaptor protein complexes. *In vitro* assembled clathrin coats have homogeneous structures and we have obtained a molecular model of such coats by using cryo-electron microscopy single particle averaging technique. However, the coated vesicles isolated from cells are more heterogeneous in the clathrin lattice designs and protein compositions. Therefore, we used cryo-electron tomography to study the clathrin coated vesicles isolated from bovine brain. There is a wide range of designs for the clathrin lattices, with different patterns of pentagonal, hexagonal and sometimes heptagonal facets. Many coats, even smaller ones, contain encapsulated membrane vesicles which are general offset from the center of the coats. The interactions between the clathrin lattice and the underlying membrane vesicle are not uniformly distributed. Such eccentric positions of vesicles within the clathrin coats may reflect the polarity of the assemblies.