An antiparallel actin dimer is associated with the endocytic pathway in mammalian cells

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The dynamic rearrangement of the actin cytoskeleton plays a key role in several cellular processes such as cell motility, endocytosis, RNA processing and chromatin organization. However, the supramolecular actin structures involved in the different processes remain largely unknown. One of the less studied forms of actin is the lower dimer (LD). This unconventional arrangement of two actin molecules in an antiparallel orientation can be detected by chemical crosslinking at the onset of polymerization in vitro. Moreover, evidence for a transient incorporation of LD into growing filaments and its ability to inhibit nucleation of F-actin filament assembly implicate that the LD pathway contributes to supramolecular actin patterning. However, a clear link from this actin species to a specific cellular function has not yet been established. We have developed an antibody that selectively binds to LD configurations in supramolecular actin structures assembled in vitro. This antibody allowed us to unveil the LD in different mammalian cells. In particular, we show an association of the antiparallel actin arrangement with the endocytic compartment at the cellular and ultrastructural level. Taken together, our results strongly support a functional role of LD in the patterning of supramolecular actin assemblies in mammalian cells.

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