Abstract

Microtubules (MTs) are one of the essential cell structure that participate in a number of key events in the plant cells and their properties and functions are influenced and modified by many other proteins. These proteins belong to a group of microtubule-associated proteins (MAPs, microtubule-associated proteins). One of the MAPs, the molecular chaperone Hsp90, examines and fulfills a large number of different functions in the cell. Its colocalization with MTs has been demonstrated previously by Freudenreich and Nick (1998) and Petrášek et al. (1998). However, direct interaction with MTs was described only recently using cosedimentation assay. The specific cytosolic isoform of tobacco Hsp90 bound to MTs was called Hsp90_MT due to its ability to bind MTs. It has been also found that the binding to MTs is independent on the activity of ATP (Krtková et al., 2012). The authors also described a positive effect of Hsp90_MT on MT recovery after their exposure to cold stress.

Although MT cytoskeleton dynamics is influenced by a large number of MAPs, it is surprising that the molecular mechanism of MAPs interaction with MTs and their MT-binding domains have not been described yet. Therefore, we decided to determine the tobacco Hsp90_MT MT-binding domain by production of a set of recombinant proteins containing different combinations of putative MT-binding domains and subsequent cosedimentation assays with polymerized tubulin. We presumed the variable KE-rich domain to be responsible for MT binding due to its similarity to other MT-binding motives in other animal and plant MAPs. Our results show that the candidate Hsp90_MT section containing KE-rich domain is really the most binds to MT, and is therefore probably responsible for binding Hsp90_MT to MT. This result, however, will still be supported by additional experiments and can not be excluded that in addition to KE-specific motif could be also responsible for binding to MT hydrophobic interaction or for example a specific tertiary structure.

Key words: cosedimentation, Hsp90, microtubules