Microtubule associated protein

MAPs bind to the tubulin subunits that make up microtubules to regulate their stability. A large variety of MAPs have been identified in many different cell types, and they have been found to carry out a wide range of functions. These include both stabilizing and destabilizing microtubules, guiding microtubules towards specific cellular locations, cross-linking microtubules and mediating the interactions of microtubules with other proteins in the cell.

Within the cell, MAPs bind directly to the tubulin dimers of microtubules. This binding can occur with either polymerized or depolymerized tubulin, and in most cases leads to the stabilization of microtubule structure, further encouraging polymerization. Usually, it is the C-terminal domain of the MAP that interacts with tubulin, while the N-terminal domain can bind with cellular vesicles, intermediate filaments or other microtubules. MAP-microtubule binding is regulated through MAP phosphorylation. This is accomplished through the function of the microtubule-affinity-regulating-kinase (MARK) protein. Phosphorylation of the MAP by the MARK causes the MAP to detach from any bound microtubules.

This detachment is usually associated with a destabilization of the microtubule causing it to fall apart. In this way the stabilization of microtubules by MAPs is regulated within the cell through phosphorylation.