ABSTRACT

Tubulin is the basic building block of microtubules which ensure intracellular transport, morphological changes, the connection of proteins of metabolic pathways, the segregation of chromosomes during mitosis and many other essential processes in plant cells.

The localization of tubulin regarding nucleus is strictly controlled and during the interphase, tubulin is usually not present in the nucleus. As we previously showed, one of the exceptions of the presence of tubulin in the nucleus is the cold stress condition. Also, we discovered several plant-specific nuclear export sequences (NES) in tubulin molecules: one in α-tubulin and two in β-tubulin.

In this work I found that double mutation of both functional β-tubulin NESes cause slight accumulation of the protein in the nuclei. However, the phenotype of the transgenic plants expressing β-tubulin with mutations is probably not affected by the presence of the mutated protein.

The effect of the expression of the mutated β-tubulins was observed in *Nicotiana tabacum* BY-2 cells as well. The expression of β-tubulin carrying a single NES3 mutation or double mutation of both NESes bring changes of the division activity of the cells, while the NES2 mutation does not have any effect.

Furthermore, it was discovered that the 0℃ cold treatment does not cause massive accumulation of tubulin in the nuclei of the cells of whole *Arabidopsis thaliana* plants. This information adds to our previous findings of tubulin accumulation in cold treated nuclei of the plant suspension cells.

In an effort to elucidate the mechanism of β-tubulin export from the nucleus, we tested the effect of nuclear export inhibitor leptomycin B. We found out that the growth of the BY-2 suspension cells was steadily halted, however the growth of *Arabidopsis thaliana* plants was not affected at all. The reasons for this resistence of *Arabidopsis thaliana* are discussed.

We also tested the function of α- and β-tubulin NESes in fusion with GFP in animal HeLa cells. We found out that the GFP type used was not suitable for expression in these cells.