6 Abstract

In spite of the wide interest concerning the topic of aluminium toxicity in plants, there wasn't postulated any unambiguous conclusion, how is the aluminium signal transferred to the cell. It is well known, the root growth is immediately inhibited by Al^{3+}. The results of the diploma thesis showed, the root growth is inhibited in spite of the presence of Ca^{2+} which was referred as a cation with ammeliorative effects on the root growth in the conditions of Al-toxicity. After stabilizing microtubules with taxol or destabilizing with oryzalin, the root growth inhibition caused by Al^{3+} remained unaffected.

Cortical microtubules are considered to be one of the first aims of aluminium toxicity. Their early response to the presence of Al^{3+} indicate the putative role of microtubule (MT) reorientation in aluminium signal transduction. Changes in the organization of cortical microtubule arrays were visible after 1min of aluminium treatment. The arrays show strictly parallel organization, which is a unique reorientation observed only after aluminium treatment. However, the number and thickness of MT arrays changed significantly after each tested treatment (Al^{3+}, glutamate, low pH). Therefore, it's very tempting to declare cortical MTs a very sensitive structure which is involved in all cellular signalling. So far, we are not able to distinguish the effect of mechanical stimuli caused within the procedure and the effect of treatment (Al^{3+}, glutamate, low pH) on it's own. The analysis of number and thickness of MTs showed that after each treatment, there probably wasn't caused any depolymerization of cortical MTs, the MTs only loose their arrays, so that they become thinner while they are increasing in number.

The reorganization of MTs is prevented by gadolinium-inhibition of the part of Ca^{2+} channels. Therefore, the Ca^{2+} is one of the members of signalling pathways probably caused by Al^{3+}, glutamate and low pH.

MAP65-1 (microtubule-associated protein) is somehow involved in the reaction of cortical MTs on external Al^{3+}. In roots of GFP-MAP65-1 expressing line of *Arabidopsis thaliana*, there is a strong evidence of MAP65-1 reorganization after 5min 100μM $AlCl_3$ treatment. Nevertheless, the reorganization is transient, after 30min treatment the recovery is visible, MAP65-1 is bound to microtubules again. This transient reorganization of MAP65-1 isn't blocked by gadolinium in general. In contrast, such transient reorganization wasn't observed after the treatment with glutamate or low pH. We can conclude, that MAP65-1 shows a unique reaction on Al^{3+} treatment and may play an important role in Al signal transduction.