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THE MODEL FOR AUXIN REGULATED *AtPIN1* EXPRESSION IN THE ROOT APICAL MERISTEM

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Plant hormone auxin regulates many aspects of plant growth and development. PIN-FORMED (PIN) gene family encodes transmembrane proteins, which mediate auxin efflux. PIN proteins are asymmetrically localized within cells, thereby forming in tissue auxin concentration gradients and maxima. Auxin has various effects on PIN1 expression in a cell providing for both positive and negative feedbacks on its own transport [1]. Earlier we proposed that this dual regulation determines stem cell niche maintenance in root apical meristem [2].

Using two reporter lines of *Arabidopsis thaliana* we investigated dose-response auxin regulation of PIN1 expression at the levels of RNA and protein. PIN1::PIN1-GFP containing part of PIN1 coding region reveals both transcriptional and posttranscriptional regulation, whereas pPIN1::GUS displays only transcriptional regulation. The reporter line pPIN1::GUS[-1388;+82] was created by authors; PIN1::PIN1-GFP was provided by Alexis Peaucelle (INRA, France). PIN1::PIN1-GFP and pPIN1::GUS seedlings were grown in a 16 hours light/8 hours dark cycle at 25/22°C on 1/2MS with sucrose. Before microscopic analysis 3 dag seedlings were incubated for 24 h in liquid 1/2MS supplemented with different IAA concentrations. The experimental images were analyzed using ImageJ program.

We found the following changes in PIN1 expression pattern in the root for both lines under low and moderate auxin treatments: (1) increased domain of PIN1 expression in the root meristem; (2) ectopic expression in epidermis and cortex, (3) increased level of PIN1 expression in provascular cells. However, we observed differences in PIN1 expression between the lines: in columella and under high auxin concentrations. The experimental data suggests posttranslational PIN1 regulation by high auxin concentrations. A mathematical model [2] was extended to describe the observed phenomena. The model simulation well agrees with the experimental data and predicts new aspects on the mechanisms of auxin transport in the root meristem.

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1. Vieten et al. (2005) Development 132, 4521-4531.

2. Mironova et al., (2010) BMC Systems Biology 4:98.