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Understanding the role of *MAKR6* in *Arabidopsis thaliana* L. root development

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Motivation and Aim: The MEMBRANE-ASSOCIATED KINASE REGULATOR (MAKR) family is a recently discovered protein family, which includes seven members [1]. Its constituent proteins are essential regulators of plant development. BKI1 and MAKR1 regulate brassinosteroid signaling. MAKR2, MAKR4 and MAKR5 control root gravitropism, lateral root formation, and formation of root protophloem respectively. At the same time, biological functions of the remaining paralog, MAKR6, are still unknown. Here we infer *MAKR6* function based on the analysis of its expression pattern and the promoter analysis.

Methods and Algorithms: We measured the overall expression level of *MAKR6* using RT-qPCR. Using Agrobacterium-mediated transformation, we generated *Arabidopsis thaliana* reporter lines *pMAKR6:nls3GFP*, in which *pMAKR6* promoter regulated green fluorescent protein (GFP) expression. To detect the reporter signal, we used epifluorescent and confocal microscopy techniques. The list of transcription factors (TFs) – potential regulators of *MAKR6* expression – was compiled by superimposing the coordinates for *MAKR6* promoter and publicly available DAP-seq peaks for 365 TFs [2].

Results: We demonstrated that *pMAKR6* promoter is active in above and below ground parts of *A. thaliana* seedlings with cell-type specificity. Using RT-qPCR, we demonstrated that *MAKR6* is an early auxin response gene, which is upregulated after 30 minutes of auxin application. In the reporter line, auxin treatment enhanced GFP signal in both roots and shoots, and induced ectopic expression of GFP in the root differentiation zone. The potential binding regions for a number of known auxin response regulators (including ARF5) were found in *pMAKR6* promoter.

Conclusion: Taken together, our results evidence that *MAKR6* might be a new auxin responsive regulator of plant development in *A. thaliana*.

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