GENE EXPRESSION OF SELECTED WRKY TRANSCRIPTION FACTORS IN ARABIDOPSIS THALIANA CELL CULTURES DURING A PARABOLIC FLIGHT

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Plants use gravity as a guide for growth and development. Recent studies demonstrate that plant cells which are not part of specialized tissues such as the root columella are also able to sense gravitational forces. Therefore we used undifferentiated, homogenous cell cultures of Arabidopsis thaliana (cv. Columbia) (A.t.) in order to identify early alterations in gene expression in response to altered gravitational fields. As experimental system we used parabolic flights (A300, Novespace). A single parabola consists of following phases: 1 g, 1.8 g for 20 sec, microgravity (µ g) for 22 sec, 1.8 g for 20 sec, 1 g. Up to 31 parabolas are executed within one flight. By the use of microarrays (ATH1, Affymetrix) we found several hundred transcripts to be altered in amount during the respective gravity segments. For this study, we specifically looked for genes at the beginning of signal transmission chains, such as those coding for transcription factors (TFs). TFs are small proteins regulating gene expression of their target genes by binding to specific promoter sequences. For quantification via qRT-PCR, six WRKY genes were selected. WRKYs are known to be involved in various physiological processes such as senescence or pathogen defense. The data indicate a transient gene expression profile, while most of the analyzed WRKYs were significantly down-regulated after the microgravity-phase of the parabola compared to the 1 g control.

Since only 34 out of 76 WRKY genes are present on the microarray, we decided to precisely analyze expression changes of six selected WRKY TFs via qRT PCR (IQ5; iScript one step with SYBR Green/BioRad). WRKYs can be divided into three distinct families. Additionally, more samples will be taken during the next parabolic flight campaign.