

SLC/AGO1基因控制拟南芥细胞分裂与定向伸长

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SLC/AGO1 Coordinates Cell Division and Expansion in Arabidopsis

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摘要

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摘要 植物通过控制细胞分裂和伸长决定器官的形状。为了研究器官形状决定的分子机理, 通过EMS诱变分离得到一个叶形细长的拟南芥突变体。细胞生物学观察发现, 该基因突变不仅影响了生长点中的细胞分裂, 也影响了叶片细胞的形状和数目, 其表皮细胞凸起数目明显减少, 呈单向伸长, 因此将该突变体定名为*slender leaves and cells (slc)*。有趣的是, 不同组织内细胞分裂和伸长受到不同程度的影响, 说明SLC基因在协调细胞分裂和伸长过程中起关键作用。图位克隆结果表明, SLC与小RNA介导的基因沉默相关基因AGO1等位, 其第574位组氨酸突变为酪氨酸。*slc*和*ago1*杂交F₁代植物呈现突变体表型, 证明AGO1和SLC确实为同一基因。以上结果表明, SLC/AGO1所介导的转录后基因沉默对控制植物器官和细胞形状决定均起重要作用。

关键词: AGO1 细胞分裂 细胞伸长 叶片形状 转录后基因沉默

Abstract: The shapes of organs in plants are determined by defined cell divisions and cell elongations. To understand how organ shape is genetically controlled, we used ethyl methanesulfonate (EMS) mutagenesis to identify a mutant with slender leaves, *slender leaves and cells (slc)*. Cytological studies showed that the mutation affected cell division, as well as cell shape and number. The interdigitation in pavement cells in *slc* was greatly reduced, in parallel with the formation of gigantic cells with 1-D cell elongation. Of note, the mean cell size in *slc* was no larger than that in the wild type, which suggests that expansion is at the cost of reduced cell size in other cells. The function of SLC may be to coordinate cell division and expansion to allow proper interdigitation among cells. Map-based cloning revealed that SLC is allelic to AGO1, a key component in post-transcriptional gene silencing. The mutation led to a change from a highly conserved histidine to tyrosine. Our results suggest that AGO1-mediated gene silencing is critical for determining the shapes of cells and subsequent organs.

Keywords: AGO1 cell division cell expansion leaf morphology post-transcriptional gene silencing

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