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氮素吸收调控中铵转运蛋白与锚蛋白的互作研究

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Interaction between AMT and AnkTm in regulation of ammonium uptake in Arabidopsis roots

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摘要 铵转运蛋白（AMT）介导的高亲和力铵跨膜运输是植物根系吸收铵态氮的主要途径。AMT蛋白水平上的调控能够快速有效地控制根系铵吸收能力，但参与调控的互作蛋白尚未见报道。本研究通过生物信息学手段预测得到铵转运蛋白AtAMT1;3可能和锚蛋白AtAnkTm8存在互作。基因表达分析实验发现AtAMT1;3和AtAnkTm8的根中组织特异性表达模式一致，并同时受到缺氮胁迫的上调表达，结果支持了它们互作的可能性。筛选鉴定出AtAnkTm8缺失突变体，分析在供铵条件下及对甲基铵敏感性的生长表型，结果发现AtAnkTm8的缺失没有影响拟南芥根的铵吸收能力，推测可能存在其他家族成员的功能冗余。AMT与AnkTm的互作为理解植物铵吸收调控过程提供了可能的新颖机制

关键词： 铵吸收 氮调控 AtAMT13 AtAnkTm8 蛋白互作

Abstract： In plant roots AMT-type ammonium transporters have been demonstrated to mediate high-affinity ammonium uptake across the plasma membrane. To tightly control ammonium uptake process, the regulation of AMTs at protein levels is essential. However, the underlying molecular mechanism remains unclear. Here, based on the available bioinformatics database，we predicted the putative interaction between AtAMT1;3 with AtAnkTm8 which encodes an ankyrin repeat protein. Gene expression analyses further supported this interaction because both genes were mainly expressed in the similar root tissues, and also expressed up-regulatedly under nitrogen deficiency. Two independent T-DNA insertion lines were isolated and characterized, in which the expression of AtAnkTm8 was defective. The growth of AtAnkTm8 insertion lines in the medium supplied with either ammonium as a sole nitrogen source or ammonium toxic analog methylammonium (MeA) did not differ from that of their corresponding wildtype plants. No effect on ammonium uptake capacity in AtAnkTm8 insertion lines was observed, which could be explained by the possible genetic redundancy of other AnkTm homologs. Taken together, our results describe a putative interaction between AMT and AnkTm, providing a novel regulatory mechanism on fine tuning ammonium uptake in roots.

Keywords： ammonium uptake nitrogen regulation AtAMT13 AtAnkTm8 protein interaction

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