



The Nitrate Transporter MtNPF6.8 (MtNRT1.3) Transports Abscisic Acid and Mediates Nitrate Regulation of Primary Root Growth in *Medicago truncatula*

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Elongation of the primary root during postgermination of *Medicago truncatula* seedlings is a multigenic trait that is responsive to exogenous nitrate. A quantitative genetic approach suggested the involvement of the nitrate transporter MtNPF6.8 (for *Medicago truncatula* NITRATE TRANSPORTER1/PEPTIDE TRANSPORTER Family6.8) in the inhibition of primary root elongation by high exogenous nitrate. In this study, the inhibitory effect of nitrate on primary root elongation, via inhibition of elongation of root cortical cells, was abolished in *npf6.8* knockdown lines. Accordingly, we propose that MtNPF6.8 mediates nitrate inhibitory effects on primary root growth in *M. truncatula*. pMtNPF6.8:GUS promoter-reporter gene fusion in *Agrobacterium rhizogenes*-generated transgenic roots showed the expression of MtNPF6.8 in the pericycle region of primary roots and lateral roots, and in lateral root primordia and tips. MtNPF6.8 expression was insensitive to auxin and was stimulated by abscisic acid (ABA), which restored the inhibitory effect of nitrate in *npf6.8* knockdown lines. It is then proposed that ABA acts downstream of MtNPF6.8 in this nitrate signaling pathway. Furthermore, MtNPF6.8 was shown to transport ABA in *Xenopus* spp. oocytes, suggesting an additional role of MtNPF6.8 in ABA root-to-shoot translocation. (15)NO₃⁻ influx experiments showed that only the inducible component of the low-affinity transport system was affected in *npf6.8* knockdown lines. This indicates that MtNPF6.8 is a major contributor to the inducible component of the low-affinity transport system. The short-term induction by nitrate of the expression of Nitrate Reductase1 (NR1) and NR2 (genes that encode two nitrate reductase isoforms) was greatly reduced in the *npf6.8* knockdown lines, supporting a role of MtNPF6.8 in the primary nitrate response in *M. truncatula*.

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