Characterization of a dual-affinity nitrate transporter MtNRT1.3 in the model legume Medicago truncatula

Titre	Characterization of a dual-affinity nitrate transporter MtNRT1.3 in the model legume Medicago truncatula
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Résumé en anglais	Primary root growth in the absence or presence of exogenous NO(3)(-) was studied by a quantitative genetic approach in a recombinant inbred line (RIL) population of Medicago truncatula. A quantitative trait locus (QTL) on chromosome 5 appeared to be particularly relevant because it was seen in both N-free medium (LOD score 5.7; R(2)=13.7) and medium supplied with NO(3)(-) (LOD score, 9.5; R(2)=21.1) which indicates that it would be independent of the general nutritional status. Due to its localization exactly at the peak of this QTL, the putative NRT1-NO(3)(-) transporter (Medtr5g093170.1), closely related to Arabidopsis AtNRT1.3, a putative low-affinity nitrate transporter, appeared to be a significant candidate involved in the control of primary root growth and NO(3)(-) sensing. Functional characterization in Xenopus oocytes using both electrophysiological and (15)NO(3)(-) uptake approaches showed that Medtr5g093170.1, named MtNRT1.3, encodes a dual-affinity NO(3)(-) transporter similar to the AtNRT1.1 'transceptor' in Arabidopsis. MtNRT1.3 expression is developmentally regulated in roots, with increasing expression after completion of germination in N-free medium. In contrast to members of the NRT1 superfamily characterized so far, MtNRT1.3 is environmentally up-regulated by the absence of NO(3)(-) and down-regulated by the addition of the ion to the roots. Split-root experiments showed that the increased expression stimulated by the absence of NO(3)(-) was not the result of a systemic signalling of plant N status. The results suggest that MtNRT1.3 is involved in the response to N limitation, which increases the ability of the plant to acquire NO(3)(-) under N-limiting conditions.

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