AUXIN SIGNALLING

Confiscated precursor

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Auxin transport and signalling have been studied for more than a century, but the field still offers interesting surprises today. Indole-3-butyric acid (IBA) is an endogenous precursor of the major auxin form indole-3-acetic acid (IAA), containing the same indole ring but a longer aliphatic side chain. IBA-derived IAA contributes to the final auxin pool and is required for developmental processes. A team led by Lucia Strader has now discovered a vacuolar transporter of IBA that plays a role in auxin-mediated early lateral root development.

The authors designed an elegant genetic screen to find mutants that suppress the short root phenotype of an IBA hyperaccumulator. One candidate gene belonged to a family that encodes for membrane proteins, including nitrate transporters, and was named *TRANSPORTER OF IBA1* (*TOB1*). Mutants are slightly resistant to exogenous IBA. Various assays confirm that TOB1, localized to the tonoplast and expressed in lateral root primordia, transports IBA and nitrate, but not IAA. The *tob1* mutant has a slightly different early root architecture, with longer and denser lateral roots, determined both on plates and using a three-dimensional root imaging system.

Going beyond auxin, the team shows that the *tob1* mutant is partly resistant to the inhibitory effect of cytokinin on lateral root formation. In the wild type, cytokinin spectacularly induces the expression of TOB1 in the whole root, which could reduce the global pool of IBA. This molecular mechanism might explain this important cytokinin–auxin cross-talk in root patterning.

In an intriguing move rarely seen in scientific articles, the authors provide three different models that are each compatible with parts of the data. At this stage, the most appealing of them is a possible TOB1-mediated sequestration of IBA in the vacuole, thus reducing the IBA-dependent auxin pool needed for early lateral root development. However, only future work will tell us more about the role of this protein in auxin signalling.

Guillaume Tena

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