TRANSPORTER OF IBA1 links auxin and cytokinin to regulate root architecture

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Root system architecture and consequently lateral root formation and are critical for soil exploration by plant roots, allowing for uptake of water and nutrients. Conversion of the auxin precursor indole-3-butyric acid (IBA) to active auxin (indole-3-acetic acid; IAA) modulates lateral root formation. However, mechanisms governing IBA-to-IAA conversion have yet to be elucidated. We identified TRANSPORTER OF IBA1 (TOB1) as a vacuolar IBA transporter that limits lateral root formation, likely by sequestering IBA in the vacuole to prevent its contribution to the active auxin pool that drives lateral root formation. Moreover, *TOB1* transcripts and protein accumulate in response to the phytohormone cytokinin, which inhibits lateral root formation. The increased production of lateral roots in *tob1* mutants, TOB1 transport of IBA into the vacuole, and cytokinin- regulated *TOB1* expression suggest a mechanism linking cytokinin signaling and IBA contributions to the auxin pool to ultimately modulate root system architecture.