A role for auxin methylation during plant development

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Auxin gradients are instrumental for the differential growth that causes organ bending upon tropic stimuli and curvatures during plant development. Local differences in auxin concentrations are achieved by uneven distribution of auxin transporters, but it is not clear if other mechanisms, involving auxin homeostasis, are also a relevant regulatory target for the formation of auxin gradients. We have found that auxin methylation is absolutely required for correct auxin distribution across the hypocotyl, in particular during the response to gravity. We have found that loss-of-function mutants in Arabidopsis *IAA CARBOXYL METHYLTRANSFERASE1* (*IAMT1*) prematurely open the apical hook and their hypocotyls are impaired in gravitropic reorientation. This defect is linked to an increased polar auxin transport in the *iamt1* mutant, which causes the accumulation of auxin on either side of the gravistimulated hypocotyl. Partial inhibition of polar auxin transport in the *iamt1* mutant resulted in the restoration of normal gravitropic reorientation. We propose that IAA methylation is necessary to restrict polar auxin transport within the range of auxin levels that allow differential responses.