

# Auxin stimulates and inhibits growth...but how?

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Due to the hydrostatic skeleton composed of the cell walls and pressurized cytoplasm plant cells cannot move. The shape of plant organs is achieved by a precise control of cell division orientation and regulation of cell growth. Albeit composed of immobile cells, plants organs move and reorient along directional stimuli. Auxin is redistributed in gravistimulated organs which leads to differential growth and bending. Auxin accumulates on the lower side of gravistimulated organs, but the growth reaction is exactly opposite in shoots and roots. Similarly, auxin *application* triggers rapid elongation of shoots, and inhibits elongation of root cells. To study the behaviour of root cells after application and withdrawal of auxin, we constructed a microfluidic device that allows for clean and rapid treatments while observed at the microscope. We aim to dissect the “rapid” (non-genomic) and “slow” (genomic) component of root growth inhibition. On the other hand, although auxin-induced shoot growth is one of the oldest experimental systems in auxin biology, the molecular players involved are still controversial. We use the *Arabidopsis* etiolated hypocotyl to clarify how auxin is perceived and the rapid growth is executed. Our results clearly demonstrate that both the auxin induced acidification and growth require the nuclear auxin perception and auxin-induced gene transcription. Understanding the molecular pathways behind the growth inhibition and growth stimulation will help us understand how plant cells perceive and regulate the fine balance between the cell wall and the turgor pressure – one of the essences of being a plant.