The MAPK connection

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Plants sense molecular patterns leaked from pathogens through a very large number of plasma membrane receptors, leading to immunity. This widespread alerting system converges in minutes to several downstream events: ion channels, reactive oxygen species production, mitogen-activated protein kinase (MAPK) cascades, and more. MAPK activation, which is easy to measure, is often used as a read-out for immune responses, but how MAPKs are connected to upstream sensors and downstream transcriptional responses is still a bit of a mystery.

Publishing in *The EMBO Journal*, Tsutomu Kawasaki from the Kindai University and colleagues may have solved one-half of this problem. They focused on the fungal chitin-sensing pathway in *Arabidopsis*. Mutants, phenotypes, *in vitro* biochemical assays and many other experiments all point to a stepwise phospho-signalling pathway from the receptor CERK1 to multiple MAPKs. The keystone molecular link is cytoplasmic kinase PBL27, phosphorylated by the receptor and released after chitin sensing, which in turn phosphorylates MAPKKK5, activating a full MAPK cascade.

The chitin-induced MAPK activation is blocked in *mapkkk5* mutants, but an interesting side experiment shows that the flagellin response is enhanced. This suggests that the network of MAPK activation is more complex than a one-direction flow of information, with positive and negative cross-talk between various pathways. *GT*