The D14 strigolactone receptor: part-enzyme part-receptor

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Strigolactones (SLs) are a class of plant hormones that control plant architecture and participate in parasitic and symbiotic interactions in the rhizosphere[1]. Recent studies on strigolactone (SL) perception and signaling have identified the putative receptor D14, the D14-interacting F-box protein MAX2, and possible targets of MAX2-mediated degradation including D53[2]. SL receptors (AtD14 in *Arabidopsis*) belong to the α/β-fold hydrolase superfamily and contain the Serine, Histidine, Aspartate catalytic triad located in an hydrophobic active site pocket. X-ray structures and enzymatic assays revealed that GR24 (a synthetic SL analogue) is hydrolyzed by a nucleophilic attack by the Serine residue leading to two inactive products[3,4]. Despite that, the role of SL degradation and D14 catalytic activity in the signaling process is not been well understood.

In our recent work[5], we combined genetic, physiological and biochemical approaches to uncover the mechanism and the function of SL degradation by D14. We generated bioactive profluorescent probes to monitor enzyme kinetics which allowed us to demonstrate that the receptor acts as a single turnover enzyme. We propose a model where the hydrophobic ABC part of the SL facilitates the positioning of the D ring within the catalytic triad, the SL is hydrolyzed, and a covalent receptor/D-ring complex is formed which initiates signaling by destabilization and/or surface change of the receptor.

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4 Zhao, L. H. *et al.* Crystal structures of two phytohormone signal-transducing alpha/beta hydrolases: karrikin- signaling KAI2 and strigolactone-signaling DWARF14. *Cell Res* 23, 436-439, (2013).
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