DEFINING THE MOLECULAR INTERACTION OF PLANT DEFENSIN WITH FUNGAL PATHOGEN

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Plant defensins are a family of small (45-54 amino acids), basic, cysteine-rich proteins. Members of this family have been characterized in several plant species and in various tissues, where they are believed to constitute a vital component in the plant's innate immune system. Many plant defensins show inhibitory activity against various fungal pathogens although the molecular basis of this activity remains unknown. Permeabilisation of membranes is a common activity for many antimicrobial peptides and while this was originally thought to be their sole mechanism of action, recent findings indicate that intracellular targets may also be involved. We are interested in a defensin (NaD1) that is abundantly produced in the flowers of the ornamental tobacco, *Nicotiana alata*. We have previously shown that NaD1 is inhibitory towards *Fusarium oxysporum* f. sp. vasinfectum, an agronomically important pathogen of cotton. Transgenic cotton expressing this defensin has enhanced resistance to fusarium wilt in glasshouse trials. We are using fluorescence techniques and electron microscopy to examine the interaction of NaD1 with fungal hyphae. NaD1 appears to bind to the cell wall and be internalized through a process that may involve the formation of an oligomeric pore. We have solved the structure of NaD1 and are using site directed mutagenesis to determine the regions of the molecule that are essential for the antifungal activity.

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