Nitric oxide functions in the plant hypersensitive disease resistance response

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Nitric oxide (NO) is a highly reactive molecule that rapidly diffuses and permeates cell membranes. In animals, NO is implicated in a number of diverse physiological processes such as neurotransmission, vascular smooth muscle relaxation, and platelet inhibition. During the last few years NO has been detected also in several plant species, and the increasing number of reports on its function in plants have implicated NO as an important effector of growth, development, and defense. Attempted infection of plants by an avirulent pathogen elicits a battery of defense responses often accompanied by the collapse of challenged host cells. This hypersensitive reaction (HR), triggers the cell death program in infected cells thus delimiting the infected zone and avoiding the multiplication and spread of the pathogen. The rapid accumulation of reactive oxygen species (ROS) and NO is one of the earliest events in the HR. Both NO and ROS are necessary to trigger host cell death; they are also components of a highly amplified and integrated defense system that triggers the local expression of resistance genes. NO also functions independently of ROS in the induction of various defence genes including pathogenesis-related proteins and enzymes of phenylpropanoid metabolism involved in the production of lignin, antibiotics and the secondary signal salicylic acid. NO signaling functions depend on its reactivity and ROS are key modulators of NO in triggering cell death, although through mechanisms different from those commonly observed in animals. I'll present the signaling functions of NO during the plant disease resistance response, focusing on the recent discoveries of NO-dependent nitrosylation of proteins

Keywords: nitric oxide, S-nitrosylation, hypersensitive reaction