**SA- AND NO-MEDIATED SIGNAL TRANSDUCTION IN PLANT DISEASE RESISTANCE**

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Studies during the past decade have rigorously established that salicylic acid (SA) plays a critical, multifaceted role in plant disease resistance. To help elucidate the mechanisms of SA action, we have identified several tobacco proteins which interact with SA. These include catalase and ascorbate peroxidase. SA inhibits these two major H2O2-scavenging enzymes. Another SA binding protein, the chloroplastic SABP3, is carbonic anhydrase. It also has antioxidant activity. SABP2 is a very low abundance protein with high affinity for SA (Kd=90nM). It has been purified >24,000 fold and the sequence of its encoding gene suggests it is a lipase.

We have used mutant analyses in *Arabidopsis* to identify several more potential components in the SA-mediated pathway. Among these mutants are those which exhibit constitutive expression of the SA- and pathogen-induced *PR* genes and enhanced resistance to pathogens (e.g. *cep* and cpr22). Another group are suppressor mutants which overcome salicylate insensitivity of our *sai1/npr1-5* mutant (e.g. *ssi1* and *ssi2*). Recently, we showed that *ssi2,* which activates the SA-mediated defense pathway but suppresses the jasmonic acid/ethylene-mediated defense pathway, alters the activity of a fatty acid (stearic acid) desaturase. Moreover, the product of this stearoyl desaturase, oleic acid or a derivative of it, appears to act as a signaling molecule which is required for activation of several jasmonic acid-mediated defenses.

Nitric oxide (NO), which plays a key role(s) in innate immune and inflammatory responses in animals, also participates in the tobacco resistance responses to TMV. Following infection, a NO synthase-like activity rises, leading to *PR-1* activation. Several critical players of NO signaling in animals are also operative in plants including guanylate cyclase, aconitase, and the second messengers cGMP, cADP ribose and Ca2+. Interestingly, SA and NO appear to share several common targets.

**Related Publications:**Klessig, D.F., Durner, J., Zhou, J.M., Kumar, D., Navarre, R., Zhang, S., Shah, J., Wendehenne, D., Trifa, Y., Noad, R., Kachroo, P., Pontier, D., Lam, E. and Silva, H. (2000) NO and salicylic acid signaling in plant defense. Proc. Natl. Acad. Sci. USA. 97: 8849-8855.

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