Abstract of Presentation

The host cell actin cytoskeleton is altered in plants infected with *Pseudomonas syringae*

(1) Michigan State University, East Lansing, MI, USA; (2) Purdue University, West Lafayette, IN, USA; (3) Oregon State University, Corvallis, OR, USA
Presenter’s E-mail: shimono@msu.edu

Changes to the plant actin cytoskeleton have been observed in responses to infection by fungal and oomycete pathogens. However, similar responses have not been thoroughly described, nor investigated, in the case of phytopathogenic bacteria. Tian et al. (2009) first reported evidence for a relationship between the actin cytoskeleton and defense against bacterial infection. In this study, we investigated quantitatively actin organization in *Arabidopsis* plants infected with *Pseudomonas syringae* pv. tomato DC3000 using laser scanning confocal microscopy. We have established a protocol using 10 days-old *Arabidopsis* seedlings for infection and confocal microscopy analysis. Transgenic Col-0 seedlings expressing the actin marker, ABD2fGFP, were dip-inoculated with virulent or avirulent *P.syringae*. The disease phenotype of seedlings expressing GFPfABD2 showed the same trend as Col-0 mature plants, showing that seedlings can be used to study host cell-bacteria associations. We observed a significant increase in actin filament bundling and a significant decrease in overall filament density in seedlings inoculated with *Pst* DC3000 EV compared with mock-treated controls at 24-28 hours after inoculation. In contrast, actin skewness and density in seedlings inoculated with DC3000 D28E and HrpH- did not show any significant differences when compared with mock, suggesting involvement of the Type III Secretion System (T3SS) of actin dynamics. In summary, this work provides further evidence that *P. syringae* engages the host actin cytoskeleton during infection, and moreover, supports our hypothesis that the actin cytoskeleton is involved in both host resistance, and pathogen virulence.
A short description of the research and travel plan

At the end of 2000, the genome sequence of *Arabidopsis thaliana*, which is used as a model for plant research, was completed. As a consequence of this great achievement, the National Science Foundation launched a new mega project called “Arabidopsis 2010” – the objective of this project was to elucidate the function of every gene in *Arabidopsis*. The completion of the abovementioned project will be one of the most important achievements in the scientific field. The work I am presenting at the 15th International Symposium on Molecular Plant-Microbe Interactions (IS-MPMI), July 29-August 2, 2012 in Kyoto, Japan, is part of a larger project on “Dissecting cortical actin function during *Arabidopsis-Pseudomonas* interactions”, a project that was recently funded by the Arabidopsis 2010 consortium. It is the result of a joint effort between PIs Brad Day (Michigan State University), Chris Staiger (Purdue University) and Jeff Chang (Oregon State University).

As part of this NSF-funded research, my work for the past 2 years has focused on the cellular aspects of the relationship between the actin cytoskeleton and bacteria infection. For many years, the role of the actin cytoskeleton on plant development has been the focus of several research groups, but the relationship between the plant actin cytoskeleton and phytopathogenic bacteria infection has never been thoroughly investigated until now. In total, my work has identified both the cellular targets of the invading pathogen as well as the regulation of immune signaling by the host. As a result of my research, we are starting to get a clearer picture of the interplay between host and pathogen, one that illustrates the intricate association and manipulation that must occur for the pathogen to gain access to its host, as well as for the host to prevent infection. The data that is coming out of this work is very exciting and completely novel, and I am already working on one manuscript for publication, with a second manuscript in the early planning stages.

The XV International Congress on Molecular Plant-Microbe Interactions is the most important and well-attended international meeting for researchers who work in the field of plant-microbe interactions. The meeting, this year in Kyoto, Japan, provides a unique opportunity to network with colleagues and present and discuss new research. The meeting includes plenary lectures, concurrent sessions, and special workshops, all of which would enhance my professional development as a scientist and researcher in the field of plant-microbe interactions. Moreover, the 2012 IS-MPMI congress represents a great opportunity for me to share and discuss this new information with scientist from all over the world.

Expense estimates:
Registration fee: $850.00
Travel: $1600.00

Thank you for your consideration