Quantitative proteomics of MPK4 phosphorylation dynamics and interacting proteins
by
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Abstract
Arabidopsis MAP kinase 4 (MPK4) is a negative regulator in plant immunity, and is activated by pathogen-associated molecular patterns (PAMPs), such as flg22. The molecular mechanisms by which MPK4 is activated and regulates plant defense remain elusive. We have investigated Arabidopsis defense against a bacterial pathogen *Pseudomonas syringae* pv. tomato (*Pst*) DC3000 when *Brassica napus* MPK4 (*BnMPK4*) is overexpressed (OE). We showed that the OE plants have increased sensitivity to flg22-triggered reactive oxygen species (ROS) burst in guard cells, which resulted in enhanced stomatal closure compared to wild-type (WT). During flg22 activation, dynamic phosphorylation events within and outside of the conserved TEY activation loop were observed. To elucidate how BnMPK4 functions during the defense response, we used immunoprecipitation coupled with label-free quantitative proteomics to identify BnMPK4 interacting proteins in the absence and presence of flg22. Using kinase assays, we showed that some of the interacting proteins were potential MPK4 substrates. Our results led to generation of MPK4-associated protein network, and insight into the MPK4 molecular functions.

Biography
Professor Sixue Chen completed his Ph.D. in China and postdoctoral studies in Germany, Denmark, and University of Pennsylvania, USA. He is the Colonel Allen R. and Margaret G. Crow Professor in Department of Biology, and Director of Proteomics and Mass Spectrometry University of Florida, USA. Dr. Chen’s areas of expertise fall in Biochemistry, Plant Metabolism, Functional Genomics, Proteomics, Metabolomics, and Mass Spectrometry. During his tenure as the Proteomics Facility Director at the Danforth Center in Missouri, USA, he developed high throughput protein identification technology. Professor Chen has successfully administered projects, trained students and scientists, collaborated with other researchers, and produced more than 200 peer-reviewed publications. At University of Florida, Dr. Chen has established three major research projects: plant guard cell hormone and CO$_2$ signaling, stomatal immunity and glucosinolate metabolism. These projects have been funded by the US National Science Foundation, Department of Agriculture, and National Institute of Health.