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A P-type ATPase of *Metarhizium acridum*, MaENA1, modulates the thermo- and UV- tolerances of conidia involved in multiple mechanisms of stress tolerance revealed by digital gene expression profiling

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In fungi, the P-type ATPase, ENA ATPase, plays a key role in osmotic and alkaline pH tolerance, its functions in thermo- and UV- tolerances have not been explored. Entomopathogenic fungi are naturally widespread with considerable potential in pest control. AP-type ATPase gene from entomopathogenic fungus *Metarhizium acridum*, *MaENA1*, was functionally analyzed by deletion. *MaENA1* transcript was induced by NaCl. Δ *MaENA1* was less tolerant to NaCl, heat and UV than wild type, with no significant alterations in growth, conidiation and virulence. Digital gene expression profiling of conidial RNAs resulted in 281 differentially expressed genes (DEGs) between WT and Δ *MaENA1*. 85 DEGs, mostly (56) down-regulated, were identified to be associated with heat/UV tolerance, including 6 Cytochrome P450 superfamily genes, 35 Oxidoreductase genes, 24 Ion binding genes, 7 DNA repair genes and 5 other genes. In addition, 8 genes were components of stress responsive pathways: Ras-cAMP PKA pathway, RIM101 pathway and 4 pathways of MAPK cascade. These results demonstrated that *MaENA1* specifically regulates tolerances to Na⁺, heat and UV with no effects on other traits including virulence and conidiation in *M. acridum*, and involves multiple mechanisms of stress tolerance. Hence, *MaENA1* has a potential to improve stress tolerances of conidia in entomopathogenic fungi.

Biography

Yuxian Xia (born 1964, Sichuan, China) is a Professor in Microbiology at Chongqing University, China. He received the BS degree from Sichuan Agricultural University, MA degree from Southwest Agricultural University, China, and the PhD in Biochemistry from University of Bath, UK, in 1985, 1991, and 2000 respectively. He has been with Chongqing University since 2001, and has published about 60 scientific papers on the locust *Locusta migratoria manilensis* and its fungal pathogen *Metarhizium acridum*. His interest has been directed toward understanding the mechanisms underlying the conidiation, virulence and stress tolerance of entomopathogenic fungus and the immune responses of host insect.

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