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A structure complex of a bacterial effort and an interacting protein: Insights into the transfer of virulence effector by pathogenic bacteria

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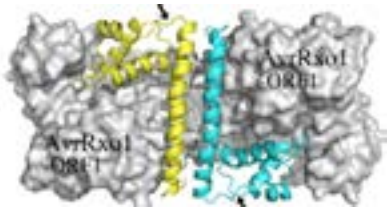
Bacterial effectors are proteins secreted by pathogenic bacteria into host cells through a type 3 or 4 secretion system. These bacterial effectors may help the pathogens to invade host cells and/or suppress its immune system; thereby promoting their infection, survival and reproduction. Effector proteins are primarily responsible for the pathogenicity of a given bacterial pathogen; therefore, learning the specific mechanism but which their effectors enter into host cells may provide insights for disease prevention. Bacterial Type 3 Secretion System (T3SS) has been extensively studied. It is a needle-like structure made by a number of structural proteins, which is responsible for transfer of protein effector to host cells. The needle tip is ~ 3 nm, which is smaller than the required dimension for most bacterial effectors. Despite some better understanding of the T3SS structure, how their bacterial effectors gain entry to host cells remains speculative. Using a T3SS-dependant effector as a model from *Xanthomonas oryzae* (a bacterium causing serious disease to some essential plants), we determined the structures of an effector protein in complex with a chaperone-like protein. In the genome of *Xanthomonas oryzae*, the coding sequence of effector protein is adjacent to that coding the chaperone-like protein. Our structural analysis indicates that the effector-chaperon complex crystallized as tetramers (1.64 Å resolution). The monomer of the protein effector contains a T4 polynucleotide kinase domain, while the monomer of the chaperon includes a novel kinase binding domain. Our data suggest that the chaperone protein interacts with the protein effector in a manner that helps to stabilize the protein effector and prevents the virulence effect of protein effort from harming the bacteria before being transferred to host cells. Currently, efforts are being made to understand the precise roles the chaperon protein plays during the transfer of protein effector to host cells.



Biography

Jianyong Li is a Biochemistry Professor at Virginia Tech. He has extensive experience in protein-related studies, including protein expression and purification, protein functional determination and protein structure and function relationships. Particularly worth to mention is the functional establishment of some unique yellow genes in insects and structural and function relationship of enzymes involved in kynurenate synthesis in mammals.

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