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MS5-O3 Effector proteins from pathogenic bacteria: focus on kinases

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Pathogens modify host cell responses through a ensample of proteins ejected into the host through a syringe-like bacterial secretion system. One of the ways the cellular responses are modified to assure pathogen survival and proliferation inside the host is to highjack and redirect host signaling pathways. Bacterial effector kinases are among the tools to do just that. Kinases NleH1 and NleH2 from pathogenic *E. coli*, OspG from *Shigella*, SteC and SboH from *Salmonella*, LegK1-4 from *Legionella* and YspK and YpkA from *Yersinia* represent currently known effector kinases. Sequence analysis of these kinases indicates that some of them were derived from eukaryotes *via* horizontal gene transfer (SteC, LegK1-4, YpkA). Other kinases (NleH, OspG, SboH and YspK) have been so far identified only in the pathogenic bacteria. Structural investigations showed that NleH and OspG contain only a core kinase fold and lack the regulatory activation loop. While NleH is fully active on its own, OspG activity is stimulated by ubiquitin and even more by the ubiquitin-conjugating enzyme E2-ubiquitin complex. The structure of OspG:UbcH7-Ub complex and mutational analysis of OspG suggest the mechanism of OspG activation. Both NleH and OspG inhibit the NF-kB pathway, however, their substrates are yet unknown.

Keywords: host-pathogen interactions; bacterial effector kinases; bacterial effectors, ubiquitination