Talk

Type VI Secretion System: a bacterial killing machine and biocontrol weapon

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ABSTRACT

The T6SS is a bacterial nanomachine used to inject effectors (toxins) into target cells. The system is found exclusively in Gram negative bacteria and frequently targets other prokaryotic cells; thus being considered a potent antimicrobial weapon.

Our model organism, P. putida, encodes three T6SS systems (K1, K2 and K3). Each one of those contains the complete set of genes to encode the core components necessary to assemble a functional machinery (Tss components), accessory components (Tag proteins) and over eleven effectors including nucleases and pore-forming colicins together with their cognate immunity pairs (Tke1-Tki1, Tke2-Tki2, Tke3-Tki3, …). Among these systems, the K1-T6SS is a potent antibacterial device considered a biocontrol mechanism used by P. putida to kill a broad range of bacteria, including resilient phytopathogens such as Agrobacterium tumefaciens, Pseudomonas syringae, Pectobacterium caratovorum and Xanthomonas campestris.

The structure of the T6SS resembles an inverted bacteriophage with a tube (Hcp proteins) surrounded by a contractile sheath (TssBC proteins) and capped with a puncturing tip (VgrG trimer). The cytosolic part of the T6SS docks onto a membrane complex (TssJLM) by interacting with a phage baseplate-like structure (TssAEFGK). Upon contraction of the sheath, the tube-tip complex, loaded with the effectors, is ejected and penetrates the target cell. The system is then disassembled and partially recycled for the next round of firing.

Although the structure of the T6SS is very well conserved, some systems contain variations of core components that can be coupled to accessory proteins allowing to fine-tune different mechanisms including the assembly and/or the firing of the system. In this seminar, I will talk about TssA and its associate proteins (TagA, TagB, TagJ), an example of a core component that shows variability at domain level and that in combination with accessory proteins is involved in different aspects of the system assembly and thus is implicated in the system functionality.

REFERENCES

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