











#### HELICOBACTER PYLORI

H. pylori is a gastric pathogen using type IV secretion system T4SS also known as cag system in epithelia cell colonization. The effector CagA leads to host cell morphology changes, chronic gastric inflammation and gastric carcinoma formation.

#### BARTONELLA

Bartonella requires two different T4SS for pathogenicity. The TrW system for gene duplication creating variant pilus subunits and for colonization of erythrocytes and VirB system and Bartonella effector proteins Beps responsible for cellular effects of Bartonella with host cell.

#### LEGIONELLA PNEUMOPHILA

L.pneumophila can replicate within macrophages interfering with endocytosis. The effectors translocated by Dot/Icm T4SS system are identified. RalF guanine nucleotide exchange factor uses ADP ribosylation factor ARF proteins to Legionella containing vacuole. LidA is involved in maintaining integrity of Legionella cell. Recently it was shown that activation of caspase 3 is dependent on Dot/Icm T4SS which cleaves Rabaptin 5 preventing Rab5 to be used to the phagosomal membrane and inhibiting endocytic fusion.

#### AGROBACTERIUM TUMEFACIENS

The VirB/D4 system in plant pathogen A. tumefaciens is prototypical T4SS. It translocates single stranded DNA T-DNA into dicotyledonous plants causing tumors known as crown galls. T-DNA is translocated as a nucleoprotein complex with VirD2 which along with VirE2 carries translocation of T-DNA to the nucleus.

#### BORDETELLA PERTUSIS

The Ptl T4SS found in B.pertussis which causes whooping cough secretes effector protein PTX pertussis toxin into intracellular milieu which causes ribosylation of Gi, inhibitor G protein which increases intracellular levels of cAMP and modulates intracellular signalling pathways leading to cell death.

#### CONCLUSION

Bacterial conjugation aids in convenient transfer of genetic material find its use in plant engineering. Agrobacterium has DNA transmission capabilities and follows type IV secretion system very similar to mechanisms used by pathogens to insert proteins into human host. Marc Van Montagu and Jeff Schell discovered gene transfer mechanism in Agrobacterium resulting in development of methods to alter bacterium into a delivery system for genetic engineering in plants.

The study of process of pathogenesis in bacteria is useful in vaccine development as disease acquire resistance to drugs.

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