ANTHRAX: VIRULENCE FACTORS & RECOMBINANT VACCINE

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Bacillus anthracis makes very stable spores that allow it to remain viable in environment for many years before coming into contact with susceptible host. Its main virulence factors are two protein toxins and an anti-phagocytic poly-D-glutamic acid capsule. The two protein toxins are known as lethal toxin (LT) and edema toxin (ET). Lethal toxin is secreted by *Bacillus anthracis* which kills murine macrophages and susceptible animals. The LT consists of two proteins, protective antigen (PA) and lethal factor (LF). PA binds to the cell surface receptors and is cleaved prior to a heptamerization event which allows binding of LF. The PA-LF complex is endocytosed and endosomal acidic pH causes conformational changes in the PA-heptamer resulting in formation of a channel which allows translocation of the LF into the cytosol. LF is a Zn^{+2} dependent metalloprotease that can cleave several MAPK Kinases. Injection of LT to mice causes death in 1-2 days, whereas, death can occur as rapidly as 38 min in rats. We generated several non-toxic variants of protective antigen that are potential candidate for developing recombinant anthrax vaccine. In addition, a mutant of *B. anthracis* sterne strain was defective in growth while it produced toxin proteins. This mutant can be used to develop spore vaccine for animals. The use of toxin proteins in vaccine development will be discussed.