The clostridial pore-forming toxins

I am undertaking my PhD within the College of Life and Environmental Sciences at the University of Exeter. I am part of Prof. Richard Titball's bacterial pathogenesis research group and particularly interested in novel toxins that are produced by the bacterium *Clostridium perfringens*, one of the most pathogenic species among the bacterial domain.

Clostridia are omnipresent bacteria that can be found nearly everywhere in the environment, particularly in soil, water and decomposing animal and plant matter. In addition, some clostridial species can be found in the gastro-intestinal tract of humans and animals, where they form part of the common gut flora. However, under certain circumstances some of these species are able to cause severe diseases by the production of a variety of toxins (see table 1).

Table 1. Examples of some severe diseases caused by clostridial species.

Clostridial species	**Associated disease**
C. botulinum	botulism
C. difficile	pseudomembranous colitis
C. perfringens	gas gangrene food poisoning gastro-intestinal diseases
C. tetani	tetanus

To date, the academic record counts around 60 toxins produced throughout various clostridial species (Hatheway, 1990). In general, they are produced by the bacteria to facilitate tissue invasion and to obtain cell nutrients by destroying target cells, thereby playing an essential role initiating diseases in the affected host. Some clostridial toxins are able to form hydrophilic channels through membranes and are therefore designated pore-forming toxins. These are the ones I am working on during

my PhD, including for example the epsilon toxin from *C. perfringens* (Cole *et al.*, 2004).

At the moment, I am focussing on the NetB from *C. perfringens*, a novel toxin that has been associated with an avian disease called necrotic enteritis, a severe gastro-intestinal disease that manifests in gross lesions within the intestines of poultry (Keyburn *et al.*, 2008). To date, there is no effective vaccine against this disease. Therefore, the aim of my project is to identify non-toxic NetB variants that might have the potential to be used as a toxoid to protect poultry against necrotic enteritis. Molecular and structural biology techniques will be used to achieve this objective.

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References

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