水產分離之仙人掌桿菌群細菌特性分析

生物研究組
黃子鳴 助理研究員

摘要

仙人掌桿菌群（*Bacillus cereus* group，BCG）包含許多種細菌，如 *B. cereus*、*B. thuringiensis*、*B. anthracis*、*B. mycoides* 與 *B. weihenstephanensis* 等。仙人掌桿菌群細菌可以引起食物中毒，為台灣重要的食媒性疾病，且可以自水產檢體中分離。本研究的目的為調查水產動物分離仙人掌桿菌群之種別、致病因子與病原性。共收集 7 株分離株，來自台南市與高雄市的甲魚場，3 株分離自魚類檢體。分析 16s rDNA 基因序列顯示所有分離株皆為 BCG，進一步檢測 *gyrB* 基因序列發現，甲魚分離株為 *B. thuringiensis*，而魚類分離株為 *B. cereus*。檢驗致病因子發現甲魚分離株帶有 BL 溶血素（hemolysin BL）與非溶血型腸毒素（nonhemolytic enterotoxin），而魚類分離株則帶有 T 腸毒素（enterotoxin T）。甲魚分離株的藥物感受性結果顯示對 oxytetracycline 有感受性，但是對磺胺劑類藥物有抵抗性。甲魚分離株以腹腔接種感染甲魚，2 週後 10^6 CFU 的死亡率為 83%。本實驗結果顯示，水產動物檢體可分離出仙人掌桿菌群，甲魚的 *B. thuringiensis* 分離株對甲魚有病原性，對 oxytetracycline 有感受性。未來需要確認甲魚分離株產生結晶毒素（crystal toxin）的能力以確認其為 *B. thuringiensis*。

Characterization of *Bacillus cereus* group isolates obtained from aquatic animals

Tzu-Ming Huang

Abstract

The *Bacillus cereus* group of microorganisms contains several species of *Bacillus*, including *B. cereus*, *B. thuringiensis*, *B. anthracis*, *B. mycoides* and *B. weihenstephanensis*. Members of the *Bacillus cereus* group are known to causes food poisoning outbreaks, and is thus an important pathogen of food-borne disease in Taiwan; moreover, they can be isolated from aquatic specimens. The objective of the present study was to identify the species, virulence factor, and pathogenicity of members of the *Bacillus cereus* group isolated from aquaculture. In total, 7 isolates from soft-shelled turtles (SST) and 3 isolates from fish were successfully cultivated. Sequencing of the16S rRNA gene revealed that all isolates belonged to the *Bacillus cereus* group. More specifically, sequencing of the *gyrB* gene indicated that the 7 isolates from SST were *B. thuringiensis* and the 3 isolates from fish were *B. cereus*. Detection of virulence factors by the polymerase chain reaction revealed the presence of genes encoding for the hemolysin BL and the non-hemolytic enterotoxin among SST isolates, as well as enterotoxin T among the fish isolates. The SST isolates demonstrated high sensitivity to oxytetracycline but resistance to sulfonamide. Intraperitoneal injection of *B. thuringiensis* isolate into SST at a dosage of 10^6 CFU (colony forming unit) resulted in a 83% mortality rate two weeks post-infection. We, thus demonstrate that members of the *Bacillus cereus* group can be isolated from aquaculture operations and that the *B. thuringiensis* isolated from SST was pathogenic and sensitive to oxytetracycline. In the future, the detection of crystal toxins in SST isolates will be necessary to confirm that it is a bona-fide *B. thuringiensis*.