Research on the Regulation of Virulence by Cell-Cell Signaling in Pathogenic Bacteria

2004 Fiscal Year Final Research Report Summary

Research on the Regulation of Virulence by Cell-Cell Signaling in Pathogenic Bacteria

Research Project

Project/Area Number

15390140

Research Category

Grant-in-Aid for Scientific Research (B)

Allocation Type

Single-year Grants

Section

一般

Research Field

Bacteriology (including Mycology)

Research Institution

Kanazawa University

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Project Period (FY)

2003 – 2004

Keywords

Clostridium perfringens / DNA microarray / cell-cell signaling / virulence / gene regulation

Research Abstract

We investigated the amino acid sequence of the vapABC genes encoding a cell-cell signaling function of Clostridium perfringens, and tried to identify the gene directly involved in the production of signal substance. We found that the amino acid sequence in the signal peptide region of vapB was quite similar to those of the peptide pheromones of other bacteria. Although peptides of 4 to 20 amino acids were synthesized based on the sequence of the VapB signal region and the synthetic peptides were added to the cultures of C.perfringens, any significant activities were not detected, suggesting that the signaling peptide might be modified. However, since the vapABC mutant of C.peifringens lacked the ability to produce the signaling molecule, we assume that the genes are involved in the synthesis of the signal molecule and

are analyzing further.
We also investigated the global regulation of all genomic genes by a cell-cell communication with other bacteria by using DNA microarrays. Escherichia coli was co-cultured with C.perfringens and the effect of the cell-cell interaction on the expression of the genes in C.perfringens was analyzed on DNA microarays. However, the experiments were turned out to fail because the background signal was too high to analyze further. Some inhibitory substances might be present in the mixed culture, which made the background high in the experiments. Now we are trying to improve the experimental condition and are going to analyze the cell-cell interactions.
We tried to investigate host factors that influence the expression of C.perfringens genes by using human and horse serum. Many genes that influenced by the addition of human serum but not by horse serum were identified by DNA microarray analysis. Among these genes, virulence genes such as sialidase were included, suggesting some factors in human serum might regulate the expression of virulence in C.perfringens.

Research Products (8 results)

All | 2005 | 2004

All | Journal Article | Book

[Journal Article] Identification and characterization of a cell-wall anchored DNase gene in Clostridium perfringens. 2005

[Journal Article] Identification and characterization of a cell-wall anchored DNase gene in Clostridium perfringens 2005

[Journal Article] Organization and transcriptional regulation of myo-Inositol operon in Clostridium perfringens 2004

[Journal Article] ウェルシュ菌のゲノム構造の解析と病原遺伝子発現調節機構の解明 2004

[Journal Article] ウェルシュ菌のシグナル伝達機構 2004

[Journal Article] 5.クロストリジウム 2004

[Journal Article] Organization and transcriptional regulation of myo-Inositol operon in Closiridium perfringens 2004

[Book] Clostridium、「ゲノミクス・プロテオミクスの新展開～生物情報の解析と応用～」 2004

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