Efficient Isolation and Identification of Enterotoxicogenic Bacillus cereus Group

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Abstract

Bacillus cereus is a group of obligate facultative aerobic spore-forming Gram-positive rod currently recognized as one of the most clinically significant foodborne pathogens. It is responsible for numerous outbreaks of foodborne disease including diarrheal and enteric illness, toxic shock syndrome, meningitis, and sepsis. The current methods recommended in the U.S. Food and Drug Administration’s Bacterial Isolates Handbook for the detection and identification of Bacillus cereus target either Gram-positive rods or Gram-positive bacilli with a yellow pigment. Therefore, Bacillus cereus can easily be overlooked, particularly in the presence of other Gram-positive rods or Gram-positive bacilli. The objective of this study was to improve the methodology for the detection and identification of Bacillus cereus from food products. Confirmation of the bacteria from incriminated foods is complicated by the presence of background Gram-positive rods. Bacillus cereus is not competitive with other organisms. Therefore, the challenge of the study was to screen viable bacteria in a food matrix.

Introduction

Bacillus cereus has been detected and implicated in several contaminated food products and supplement preparations. It has been associated with many foodborne illnesses and outbreaks. The current methods recommended in the U.S. Food and Drug Administration’s Bacterial Isolates Handbook for the detection and identification of Bacillus cereus target either Gram-positive rods or Gram-positive bacilli with a yellow pigment. Therefore, Bacillus cereus can easily be overlooked, particularly in the presence of other Gram-positive rods or Gram-positive bacilli. The objective of this study was to improve the methodology for the detection and identification of Bacillus cereus from food products. Confirmation of the bacteria from incriminated foods is complicated by the presence of background Gram-positive rods. Bacillus cereus is not competitive with other organisms. Therefore, the challenge of the study was to screen viable bacteria in a food matrix.

Methods

A pilot study was designed to compare colony morphology, time to detection, and ability to grow on a variety of foods. Sensitivity and specificity of isolated colonies are dependent on colony morphology and color development. The current methods recommended in the U.S. Food and Drug Administration’s Bacterial Isolates Handbook for the detection and identification of Bacillus cereus target either Gram-positive rods or Gram-positive bacilli with a yellow pigment. Therefore, Bacillus cereus can easily be overlooked, particularly in the presence of other Gram-positive rods or Gram-positive bacilli. The objective of this study was to improve the methodology for the detection and identification of Bacillus cereus from food products. Confirmation of the bacteria from incriminated foods is complicated by the presence of background Gram-positive rods. Bacillus cereus is not competitive with other organisms. Therefore, the challenge of the study was to screen viable bacteria in a food matrix.

Table 1: Summary of bacterial strains and the growth characteristics noted following inoculation at 37°C

Table 2: Comparison of colony morphology observed on Bacara, Brilliance and MYP media with known Bacillus cereus strains.

Table 3: Comparison of colony morphology observed on Bacara, Brilliance and MYP media with known Bacillus cereus strains.

Results

Isolates of B. cereus and B. anthracis derived from multiple food matrices were compared to Bacillus cereus type strains in order to determine the isolation efficiency of the new media. Sensitivity and specificity of Bacara were compared to Brilliance, MYP, and BCM. Comparisons were made using a variety of Bacillus cereus strains as well as MYP and BCM. Laboratory tests were performed to determine the detection and identification of Bacillus cereus from foods. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited.

Discussion

The exclusivity study comparison of MYP, Brilliance and Bacara consistently revealed that Gram positive bacilli produced a halo in Bacara, which was not observed in MYP or Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance. The halo was not observed in Bacara but was observed in MYP and Brilliance.

Conclusion

Chromogenic media prepared by AES Chemunex for B. cereus was compared to traditional media MYP and BCM as well as other chromogenic media. Bacillus cereus was selected for the study because the colony morphology of B. cereus was uniform; the color developed after overnight incubation, and each colony showed characteristic pigmentation. The results of the study demonstrated that the chromogenic media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited. The new media were compared to traditional media recommended for food testing in less effective since competitive organisms are not inhibited.