Presence and Detection of Enteric Viruses in Fresh Produce

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Introduction

According to the CDC, more than 50% of foodborne disease outbreaks are caused by Noroviruses (NV), and about 5% are caused by Hepatitis A Virus (HAV).

- Of 2145 outbreaks from 1998-2007, in which Norovirus was confirmed as the etiologic agent, 13.5% were due to fresh produce.
- Produce can become contaminated with Enteric viruses via contaminated water sources before harvest, or infected food handlers during preparation and/or packaging.
- Enteric viruses are able to survive very well on surfaces and NV and HAV are found to be highly resistant to heat, pressure, temperature, and disinfectants.
- In a recent market survey of produce items collected from 14 states from March 2008 to February 2009, viral and bacterial indicators such as E.coli, F. phage and Somatic phage were enumerated.
- Types of produce examined included: cilantro, green onion, sprouts, baby spinach, strawberries, carrots, lettuce and other assorted vegetables.
- In this study, 208 produce eluates from the previous market survey were examined for NV Groups I and II, and HAV.

Methods

Viral RNA Extraction

- Extracted from PEG precipitates of eluates of 208 produce samples using the QIAamp Viral RNA Mini Kit (Qiagen, Valencia, CA)
- Extract positive controls of NVGI, NVGII, and HAV

Electrophoresis visualization of the presumptive positives showed high levels of inhibition and in some cases multiple banding or streaking.

Results

- Twelve of the 208 produce samples appeared presumptively positive for NVGII and 13 appeared presumptively positive for HAV.
- Electrophoresis visualization of the presumptive positives showed high levels of inhibition and in some cases multiple banding or streaking.

Distribution of Samples and Number Presumptively Positive for HAV and NV GII

Discussion and Conclusion

- The produce samples appear to be inhibited from possible co-concentrates.
- Presumptive positives found in lettuce and in baby carrots are consistent with the known distribution of vehicles in Norovirus outbreaks.
- Further confirmation and analysis of inhibition and produce samples is required.
- Produce that is minimally processed or consumed fresh can act as a vector of transmission for foodborne viruses.
- Because produce is typically eaten raw, it is an important source for foodborne illness.

Acknowledgments

This project was supported by Award Number 5R01DK082550 from the National Institute of Diabetes/Diabetes Research. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

References