Evaluation of Infectious Diarrhea in Travelers to Peru Using the FilmArray GI Panel


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INTRODUCTION
Diagnosis of travelers’ diarrhea presents great challenges due to the high prevalence of pathogens that are less common in the USA and the limited availability of corresponding molecular testing. BioFire Diagnostics has brought to market a new diagnostic system, the FilmArray, that provides rapid PCR-based multiple pathogen identification from unprocessed specimens in about an hour. A FilmArray panel for detection of gastrointestinal pathogens (FilmArray GI Panel) is currently under development and aims to simultaneously detect 23 GI pathogens from stool, including bacteria, viruses, and protozoa. The purpose of this study was to evaluate the pathogen profile from travelers to Peru with diarrhea as compared to symptomatic Peruvians and to symptomatic US residents.

THE FILMARRAY GI PANEL
Simultaneous detection of 23 targets:

- **Bacteria**
  - Campylobacter
  - E. coli
  - Shigella
  - Salmonella
  - Y. enterocolitica

- **Viruses**
  - Adenovirus
  - Norovirus

- **Protozoa**
  - Cryptosporidium
  - Giardia

METHODS
The FilmArray GI Panel was used to test archived frozen fecal samples collected from 3 sets of symptomatic patients: (i) travelers - 106 adults in Lima, Peru in 2010; (ii) Peruvians - 92 adults as part of a longitudinal study of acute diarrhea in the Peruvian Amazon in 2008-2010; (iii) US residents - 400 children at PCMC, Salt Lake City, Utah.

RESULTS
The FilmArray GI Panel detected pathogens in 94% of traveler specimens, 74% of which had multiple pathogens, with an average of 2.5 pathogens per specimen. All specimens from Peruvian travelers had at least 2 pathogens (mean 4.4 pathogens per specimen). Among specimens from US children, 62% had multiple pathogens (mean 1.5 pathogens per specimen).

The prevalence of pathogens in travelers was: EAE0 65%, ETEC 34%, EPESC 27%, STEC 18%, Campylobacter spp. 29%, Shigella/EIEC 17%, Aeromonas 2%, P. shigelloides 2%, G. salmonella 1%, Cryptosporidium 2%, C. perfringens 1%, N. asturica 1%, Astorica 6%, S. typhimurium 8%, and Rotavirus 4%.

The traveler’s pathogen profile was found to be similar to the pathogen distribution in the indigenous Peruvian population, although with a lower prevalence of bacteria and protozoa. In contrast to the US specimens, all possible combinations of E. coli virulence factors were found in both travelers and Peruvians with very few specimens having only a single classically defined E. coli pathotype.

The virulence profile was similar in all three groups of patients. Multiple diarrheal pathogens were commonly detected in both travelers and Peruvians with acute diarrhea. This study supports the utility of the FilmArray GI multiplexed panel for epidemiologic studies of pathogen profiles in various populations from around the world.

CONCLUSION
The FilmArray GI Panel is an easy to use and rapid test for the detection and identification of multiple pathogens from a single specimen. Broader and more accurate pathogen detection may improve treatment and may reduce inappropriate antibiotic use and associated complications. Public health may benefit from more rapid detection of GI pathogen related outbreaks and a broader understanding of the epidemiology of enteric illness.

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