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Recurrences of *Clostridium difficile* infections in Stockholm relapse or re-infection?

R. Rezaei, Y. Chen, M.U. Rashid, C.E. Nord, A. Weintraub*

Division of Clinical Microbiology, Department of Laboratory Medicine, Karolinska Institutet, Karolinska University Hospital, Huddinge, Sweden

Abstract

Clostridium difficile is a major human nosocomial pathogen that can cause a wide range of diseases from mild antibiotic- associated diarrhea to severe life-threatening pseudomembarnous colitis (PMC). Approximately 20% of the patients treated for a first episode of *C. difficile* infection (CDI) will suffer from a recurrent infection, within 8 to 10 weeks. A recurrence can correspond to a relapse, i.e. infection with the same strain, or re-infection, i.e. infection with a different strain. The purpose of this study was to evaluate if recurrences of CDI are caused by the same strain or a new one. PCR ribotyping was used to analyze different strains of *C. difficile*. The different strains can be identified by PCR amplifying the 16S-23S rDNA spacer region. This region that is located between 16S-23S genes can vary between strains in both length and sequence.

Our study revealed that 70% of the patients, with a single recurrence of *C. difficile* infection, suffer of relapse while the remainder (30%) became re-infected with a new *C. difficile* strain. Twenty two percent of the patients with more than one recurrent *C. difficile* infection had relapse.

Introduction

Clostridium difficile is a Gram-positive, spore-forming anaerobic rod which cause a wide range of diseases in humans, from mild diarrhea to severe life-threatening pseudomembranous colitis. Approximately 20% of the patients treated for a first episode of *C. difficile* infection (CDI) suffer from a recurrent CDI within 8 to 10 weeks. A recurrence can correspond to a relapse, i.e. infection with the same strain, or a re-infection, i.e. infection with a different strain. The purpose of the study was to evaluate if a recurrence of CDI is a relapse or a re-infection.

Methods

A total of 54 toxigenic *C. difficile* strains collected between 2008 and 2011 from 27 patients were analysed by PCR-ribotyping. All patients had at least one *C. difficile* positive sample within 8 to 10 weeks after the first sample, indicating a recurrent CDI. The isolates were identified by characteristic colony morphology, typical smell and Gram staining. PCR ribotyping was used to analyse the isolated strains. The PCR products were separated on 5% polyacrylamide gels by electrophoresis (Figure 1). The gels were scanned and analysed by Bionumerics software version 6.5. The banding patterns were compared to a database including *C. difficile* reference strains.

Results

In 19 (70%) of the patients, the isolate from the recurrent CDI was of the same ribotype as the one isolated from the primary infection, indicating a relapse (Table 1). In 8 (30%) of the patients the recurrent CDI was due to a different ribotype, indicating a re-infection. A total of 20 different ribotypes were identified. The dominating ribotypes were 020 (11.1%), SE21 (11.1%), 002 (9.2%), 001 (7.4%), SE14 (7.4%), 231 (5.6%) (Table 2). No strain of 027 ribotype was isolated. Two different new ribotypes were isolated which did not match any known international ribotypes.

Number of patients	Number of samples	Relapse	Re-infection
27	54	19 (70%)	8 (30%)

Table 1. Relapse and re-infection in patients with recurrent CDI

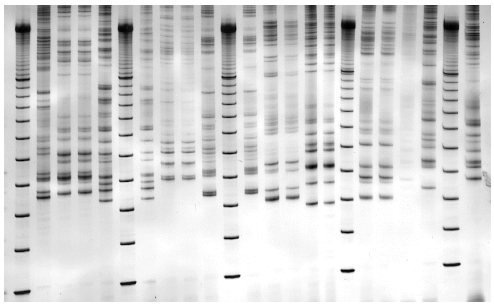

Figure 1. PCR-ribotyping of clinical *C. difficile* isolates

Ribotypes	Number of strains
020	6 (11.1%)
SE 21	6 (11.1%)
002	5 (9.2%)
001	4 (7.4%)
SE 14	4 (7.4%)
231	3 (5.6%)

Table 2. Most dominating ribotypes of *C. difficile* isolates

Conclusion

A recurrence of CDI could be due to the same or due to a different *C. difficile* strain. Here it is shown that 70% of the patients, the recurrent CDI was due to relapse and in 30% of the patients due to a re-infection. In addition, two new ribotypes were found in the first episodes of CDI in two patients.

References

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Contact: Andrej Weintraub
Div. Clin. Microbiol.
andrej.weintraub@ki.se