Selective pressure affects transfer and establishment of a Lactobacillus plantarum resistance plasmid in the gastrointestinal environment

Objectives and methods: A Lactobacillus plantarum strain recently isolated from French raw-milk cheese was tested for its ability to transfer a small plasmid pLFE1 harbouring the erythromycin resistance gene erm(B) to Enterococcus faecalis. Mating was studied in vitro and in different gastrointestinal environments using gnotobiotic rats as a simple in vivo model and streptomycin-treated mice as a more complex model. Transfer and establishment of transconjugants in the intestine were investigated with and without selective pressure. Results: Compared with the relatively low transfer frequency of similar to 5.7 x 10(-8) transconjugants/recipient obtained in vitro by filter mating, a surprisingly high number of transconjugants (10(-4) transconjugants/recipient) was observed in gnotobiotic rats even without antibiotic treatment. When erythromycin was administered, a transfer rate of similar to 100% was observed, i.e. the recipient population turned completely into transconjugants (3 x 10(9) cfu/g faeces). Additionally, the time to reach a stable transconjugant population level was much faster in the erythromycin-treated gnotobiotic rats (1 day) than in the untreated animals (4-5 days). Transconjugants persisted in the gut in relatively stable numbers at least 12 days after termination of antibiotic treatment. In the streptomycin-treated mice, no transfer was observed either with or without erythromycin treatment. Conclusions: The overall results imply that the gastrointestinal tract may comprise a more favourable environment for antibiotic resistance transfer than conditions provided in vitro. However, the indigenous gut microbiota severely restricts transfer, thus minimizing the number of detectable transfer events. Treatment with erythromycin strongly favoured transfer and establishment of pLFE1.

General information
State: Published
Organisations: National Food Institute, Center for Systems Microbiology, Department of Systems Biology
Pages: 845-852
Publication date: 2008
Peer-reviewed: Yes

Publication information
Journal: Journal of Antimicrobial Chemotherapy
Volume: 61
Issue number: 4
ISSN (Print): 0305-7453
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 4.34 SJR 2.419 SNIP 1.568
Web of Science (2017): Impact factor 5.217
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 4.21 SJR 2.283 SNIP 1.521
Web of Science (2016): Impact factor 5.071
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 4.06 SJR 2.259 SNIP 1.516
Web of Science (2015): Impact factor 4.919
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 4.61 SJR 2.298 SNIP 1.765
Web of Science (2014): Impact factor 5.313
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.7 SJR 2.479 SNIP 1.824
Web of Science (2013): Impact factor 5.439
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1