Antibiotic treatment affects intestinal permeability and gut microbial composition in Wistar rats dependent on antibiotic class - DTU Orbit (10/12/2018)

Antibiotics are frequently administered orally to treat bacterial infections not necessarily related to the gastrointestinal system. This has adverse effects on the commensal gut microbial community, by disrupting the intricate balance between specific bacterial groups within this ecosystem potentially leading to dysbiosis. We hypothesized that modulation of community composition and function induced by antibiotics affects intestinal integrity depending on the antibiotic administered. To address this a total of 60 Wistar rats (n=12 per group) were dosed by oral gavage with either amoxicillin (AMX), cefataxime (CTX), vancomycin (VAN), metronidazole (MTZ), or water (CON) daily for 10-11 days. Bacterial composition, alpha diversity and cecum short chain fatty acid levels were significantly affected by AMX, CTX and VAN, and varied among antibiotic treatments. A general decrease in diversity and increase in the relative abundance of Proteobacteria was observed for all three antibiotics. Additionally, the relative abundance of Bifidobacteriaceae was increased in the CTX group and both Lactobacillaceae and Verrucomicrobiaceae were increased in the VAN group compared to controls. No changes in microbiota composition or function were observed following MTZ treatment. Permeability to 4 kDa FITC-dextran was decreased after CTX and VAN treatment and increased following MTZ treatment. Plasma haptoglobin levels were increased by both AMX and CTX but no changes in expression of host tight junction genes were found in any treatment group. Antibiotic induced changes in microbiota could be linked to intestinal permeability, although changes in permeability did not always result from major changes in microbiota and vice versa.

General information
State: Published
Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Lund University, Aarhus University
Number of pages: 17
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: P L o S One
Volume: 10
Issue number: 12
Article number: e0144854
ISSN (Print): 1932-6203
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.01 SJR 1.164 SNIP 1.111
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.11 SJR 1.236 SNIP 1.101
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.32 SJR 1.427 SNIP 1.136
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.54 SJR 1.559 SNIP 1.148
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.94 SJR 1.772 SNIP 1.153
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 4.15 SJR 1.982 SNIP 1.156
Web of Science (2012): Impact factor 3.73
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes