Modulation of the gut microbiota with antibiotic treatment suppresses whole body urea production in neonatal pigs - DTU Orbit (31/12/2018)

Modulation of the gut microbiota with antibiotic treatment suppresses whole body urea production in neonatal pigs

We examined whether changes in the gut microbiota induced by clinically relevant interventions would impact the bioavailability of dietary amino acids in neonates. We tested the hypothesis that modulation of the gut microbiota in neonatal pigs receiving no treatment (control), intravenously administered antibiotics, or probiotics affects whole body nitrogen and amino acid turnover. We quantified whole body urea kinetics, threonine fluxes, and threonine disposal into protein, oxidation, and tissue protein synthesis with stable isotope techniques. Compared with controls, antibiotics reduced the number and diversity of bacterial species in the distal small intestine (SI) and colon. Antibiotics decreased plasma urea concentrations via decreased urea synthesis. Antibiotics elevated threonine plasma concentrations and turnover, as well as whole body protein synthesis and proteolysis. Antibiotics decreased protein synthesis rate in the proximal SI and liver but did not affect the distal SI, colon, or muscle. Probiotics induced a bifidogenic microbiota and decreased plasma urea concentrations but did not affect whole body threonine or protein metabolism. Probiotics decreased protein synthesis in the proximal SI but not in other tissues. In conclusion, modulation of the gut microbiota by antibiotics and probiotics reduced hepatic ureagenesis and intestinal protein synthesis, but neither altered whole body net threonine balance. These findings suggest that changes in amino acid and nitrogen metabolism resulting from antibiotic- or probiotic-induced shifts in the microbiota are localized to the gut and liver and have limited impact on whole body growth and anabolism in neonatal piglets.

General information
State: Published
Organisations: National Veterinary Institute, Section for Bacteriology, Pathology and Parasitology, Erasmus Medical College, Children's Nutrition Research Center
Contributors: Puiman, P., Stoll, B., Mølbak, L., de Bruijn, A., Schierbeek, H., Boye, M., Boehm, G., Renes, I., van Goudoever, J., Burrin, D.
Pages: G300-G310
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: American Journal of Physiology: Gastrointestinal and Liver Physiology
Volume: 304
Issue number: 3
ISSN (Print): 0193-1857
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.24 SJR 1.822 SNIP 0.918
Web of Science (2017): Impact factor 3.293
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.62 SJR 1.877 SNIP 1.037
Web of Science (2016): Impact factor 3.468
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.59 SJR 1.981 SNIP 1.005
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 4.06 SJR 2.189 SNIP 1.181
Web of Science (2014): Impact factor 3.798
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.14 SJR 2.202 SNIP 1.228
Web of Science (2013): Impact factor 3.737
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 3.85 SJR 1.704 SNIP 1.157
Web of Science (2012): Impact factor 3.649
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 3.61 SJR 1.729 SNIP 1.079
Web of Science (2011): Impact factor 3.431
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.718 SNIP 1.103
Web of Science (2010): Impact factor 3.522
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.902 SNIP 1.112
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.856 SNIP 1.097
Web of Science (2008): Indexed yes
Scopus rating (2006): SJR 1.935 SNIP 1.254
Scopus rating (2005): SJR 1.731 SNIP 1.195
Scopus rating (2004): SJR 1.666 SNIP 1.183
Scopus rating (2003): SJR 1.613 SNIP 1.168
Scopus rating (2002): SJR 1.685 SNIP 1.244
Scopus rating (2001): SJR 1.628 SNIP 1.222
Scopus rating (2000): SJR 1.209 SNIP 1.2
Scopus rating (1999): SJR 1.294 SNIP 1.177
Original language: English
DOIs:
10.1152/ajpgi.00229.2011
Source: dtu
Source-ID: n:oai:DTIC-ART:highwire/378676227::25861
Research output: Research - peer-review › Journal article – Annual report year: 2013