



HAL
open science

Early antibiotic-induced alteration of gut microbiota colonization affects gut adaptation in adult offspring

Gaëlle Boudry, Stéphanie Ferret-Bernard, Gerard Savary, Laurence Le Normand, Cécile Perrier, Sophie Blat, Jean Paul Lalles, Isabelle Luron

► To cite this version:

Gaëlle Boudry, Stéphanie Ferret-Bernard, Gerard Savary, Laurence Le Normand, Cécile Perrier, et al.. Early antibiotic-induced alteration of gut microbiota colonization affects gut adaptation in adult offspring. colloque fondateur de la SF DOHaD, SF-DOHaD., Nov 2012, Paris, France. hal-01210341

HAL Id: hal-01210341

<https://hal.science/hal-01210341>

Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Early antibiotic-induced alteration of gut microbiota colonization affects gut adaptation in adult offspring

G. Boudry, S. Ferret-Bernard, G. Savary, L. Le Normand, C. Perrier, S. Blat, J.P. Lallès, I. Le Huërou-Luron

INRA, UR1341 ADNC, F-35590 Saint-Gilles

Gaëlle.boudry@rennes.inra.fr

Maternal environment during pregnancy and lactation influences health of the offspring and its microbiota¹. Antibiotics use in pediatric practices is recognized to deeply affect gut barrier function and to disrupt the normal process of antigen presentation and handling². However less is known on the long-term consequences of early alteration of gut colonization. Our aim was to investigate gut barrier function and GALT response to LPS in piglets born from sows whose microbiota had been manipulated by antibiotics. Long-term consequences on gut adaptation to a high-fat (HF) diet were examined in adult offspring. Sows were given amoxicillin per os (ATBQ, n=11 vs. CTRL, n=12) from 10 days before to 21 days after parturition. One piglet per litter was sacrificed at post-natal day (PND) 14, 21 and 28. The remaining piglets were given either a low fat (LF) or a HF diet from PND140 to 170. At PND14, increased ileal permeability in ATBQ piglets was associated with altered cholinergic regulation, and decreased mucosal acetylcholine concentration in ATBQ vs. CTRL. At PND21, TNF α secretion of LPMCs in response to LPS was observed in ATBQ piglets, but not in CTRL. HF diet did not affect glucose tolerance at PND170. However, while ileal permeability was increased in HF-fed CTRL pigs compared to LF-fed ones, no such increase was observed in ATBQ animals, and carbachol-induced permeability was only effective in LF-fed CTRL pigs. Secretion of TNF α by ileal explants stimulated by pokeweed mitogen was blunted in ATBQ pigs compared to CTRL ones, irrespective of the diet. Moreover, TNF α secretion by ileal explants was not increased in response to LPS in HF-fed ATBQ pigs as opposed to LF-fed ATBQ pigs or LF-and HF-fed CTRL pigs. Manipulating the maternal microbiota modified both ileal barrier function and GALT response to LPS during the neonatal period. It also deeply influenced the intestinal adaptive response to a HF diet in adult offspring, suggesting a microbiota imprinting in gut response to a HF diet.

Key-Words: Adaptative responses, Developmental origins of adult health, Large animals, Immune function, microbiota

1. F. Fåk et al. *Am J Physiol.*, 294:G148-54, 2008.

2. A. Schumann et al. *Physiol Genomics* 23:235-45, 2005.

No conflict of interests. Funded by FP7-european project 'Interplay'