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Effects of orally applied butyrate on hepatic epigenetics and microsomal drug-metabolizing enzymes in chicken

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Abstract

Butyrate is produced in the anaerobic microbial fermentation of carbohydrates by certain probiotic bacteria as well in the large intestine of monogastric mammals, birds and humans and can be also considered as a prebiotic. It is known as histone deacetylase inhibitor, proved to cause histone hyperacetylation *in vitro* and playing a key role in the epigenetic regulation of gene expression, such as that of drug-metabolizing microsomal cytochrome P450 (CYP) enzymes.

In the present study it was aimed to investigate the *in vivo* epigenetic effects of orally applied butyrate as dietary supplement (1.5 g/kg diet) or as daily oral bolus (0.25 or 1.25 g/kg body weight) on hepatic core histones and on the gene expression and activity of CYP enzymes in chickens (n=9/group).

Butyrate triggered hyperacetylation of histone H2A, irrespectively of the form of application and the dose, while H3 hyperacetylation was caused only by the bolus with higher dose. CYP1A1 and CYP2H1 genes were up-regulated, while expression of CYP3A37 gene declined in butyrate-fed chicks. However, no significant changes were observed in the activity of CYP2H and CYP3A37 enzymes in response to oral butyrate application.

To conclude, butyrate acted as an epigenetic factor and influenced hepatic CYP gene expression of chicken *in vivo*. However, these alterations did not affect the CYP activity of the liver, so butyrate might be applied in safe as a nutritional supplement in poultry industry from food safety point of view as well, possibly not causing any relevant pharmacoepigenetic interaction.

Biography

Gabor Matis has completed his graduate studies in 2009 as Doctor of Veterinary Medicine at the Faculty of Veterinary Science, Szent Istvan University, Budapest, Hungary. Since then he was doing his PhD in the Department of Physiology and Biochemistry of the same faculty, under the supervision of Dr. Zsuzsanna Neogrady and Dr. Gyorgy Csiko. The PhD project was partly conducted in the University of Veterinary Medicine, Hannover, Germany, supervised by Prof. Dr. Korinna Huber. The PhD of Gabor Matis is being completed in September 2013. He is currently working as a research fellow in the same institution, highly interested in the wide spreading *in vitro* and *in vivo* epigenetic and metabolic effects of butyrate and in the investigation of the anti-inflammatory role of probiotics and their metabolic products on LPS-induced inflammatory processes, studied on cell culture models.

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