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► To cite this version:

Dragan Milenkovic, Agnieszka Gomulkiewicz, Cécile Gladine, Dariusz Janczak, Irmina Grzegorek, et al.. Transcriptomic Alterations of the Aortic Intima and Media in Long-term High-fat Diet Fed Pigs and Its Reversal (P15-010-19). *Current Developments in Nutrition*, 2019, 3 (Supplement_1), 10.1093/cdn/nzz037.P15-010-19 . hal-02382585

HAL Id: hal-02382585

<https://hal.science/hal-02382585>

Submitted on 27 Nov 2019

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Transcriptomic Alterations of the Aortic Intima and Media in Long-term High-fat Diet Fed Pigs and Its Reversal (P15-010-19)

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Objectives: We have previously shown that 12 months (mo.) high-fat diet (HFD) in pigs led to pathophysiological alterations, incl. fattening and increased femoral artery intima-media-thickness, which were partly reversed after 3 mo. return to control diet (Zabek et al., PLoS One 2017). The aim of this study was to decipher underlying mechanism of action of these dietary interventions on the arteries by nutrigenomics analyses of intima and media of aorta.

Methods: 32 female pigs were divided into 3 groups: Control diet (CD) for 12 mo; HFD for 12 mo; 3) Reversal diet group (RD): HFD for 9 mo followed by CD for 3 mo After 12 mo animals were killed and abdominal aorta collected. RNA was isolated from aorta

intima and media for whole genome microarray analyses followed by bioinformatics analyses.

Results: HFD compared to CD group significantly affected gene expression profile in intima with genes belonging to the chemotaxis, inflammation or endothelial permeability. RD induced gene expression profile was distinct from the CD group. This suggests that 3 mo of reversal to CD is not sufficient to correct gene expression changes induced by HFD. Comparison of RD profile with that of HFD group revealed a group of genes with opposite expression, e.g., genes regulating inflammation, toll-like cell signaling pathway or cytoskeleton organization involved in the regulation of cell permeability. This suggests that return to the RD only partly restored gene expression alterations due to the HFD. Significant changes in expression of genes in media following HFD were also observed, such as genes involved in cytoskeleton organization and migration MAPK signaling. As for intima, the expression profile of media of pigs on RD was different on that of these on CD diet. Compared to HFD, a group of genes involved in PI3K or MAPK pathways presented opposite expression suggesting that RD can partly correct the changes in genomic effect induced by HFD.

Conclusions: This study revealed genomic modifications induced by long-term HFD consumption on arterial intima and media. The return to normal diet for 3 mo was not sufficient to counteract the genomic effect of long-term HFD consumption.

Funding Sources: WROVASC Integrated Cardiovascular Centre, co-financed by the European Regional Development Fund.