Proceedings of the Nutrition Society (2020), **79 (OCE2)**, E377 doi:10.1017/S0029665120003250

The 13th European Nutrition Conference, FENS 2019, was held at the Dublin Convention Centre, 15–18 October 2019

Molecular markers of dietary essential amino acid-deficiency

Joanna Moro[1], Nadezda Khodorova[1], Catherine Chaumontet[1], Patrick Even[1], Anne Blais[1], Serge Pilard[2], Douglas Rutledge[3], Delphine Bouveresse[3], Julien Piedcoq[1], Nicolas Delhaye[1], Claire Gaudichon[1], Daniel Tomé[1] and Dalila Azzout-Marniche[1]

[1]*UMR PNCA, AgroParisTech,INRA, Université Paris-Saclay, Paris, France,*

[2]*Plateforme-analytique, Institut de Chimie de Picardie FR CNRS 3085, Université de Picardie Jules Verne, Amiens, France and*

[3]*UMR GENIAL, AgroParisTech,INRA, Université Paris-Saclay, Paris, France*

Abstract

Introduction: The quality of dietary protein sources became a particularly sensitive issue in the current debates on a rebalancing between animal and vegetable food sources.

The ability of a protein to meet the nutritional requirements of essential amino acid (EAA) is the basis for assessing the quality of protein.

The objective of this study was to characterize the impact of lysine- and threonine-deficient gluten-based diets on the metabolism of growing rats and to identify molecular markers of these diets.

Materials and Methods: Growing rats were fed for 3 weeks with a threonine-supplemented and 70% lysine-deficient gluten diet; a lysine-supplemented and 47% threonine-deficient gluten diet; a gluten diet supplemented in lysine and threonine to meet all the AA requirements, and a control diet with milk protein to meet all the AA requirements.

Body weight and food intake were measured daily. At the end of the experiment, tissues and biological fluids were removed. The body composition was analyzed, gene expression measurements involved in protein and lipid metabolism were performed and the urinary metabolome was analyzed by LC-MS. Statistical analysis was done by variance analysis and metabolome analysis by discriminant analysis of independent components.

Results: This EAA deficiency does not modify the food intake. Lysine deficiency induces a decrease in body weight gain, and lean body mass, associated with an increased in proteolysis and a decreased in proteosynthesis, a decreased in bone mineral density, and no effect on lipid metabolism.

Threonine deficiency induces a decrease in body weight gain, and liver and skin weight, without changes in protein metabolism, bone mineral density, and lipid metabolism. After approval of the deficiency model, the metabolomic analysis performed on urine samples revealed the presence of specific discriminating molecules of the diets and types of proteins.

Discussion: EAA deficiency has an impact on the growth, and bone and protein metabolism of growing rats. These deficiency states have resulted in different metabolome profiles that could lead to the identification of specific molecular markers of protein sources and related to EAA deficiencies.

Conflict of Interest

There is no conflict of interest