"0396 : Prebiotics supplementation improves the endothelial dysfunction induced by a nutritional deficiency in n-3 polyunsaturated fatty acids (PUFA)"

Catry, Emilie ; Pachikian, Barbara D. ; Neyrinck, Audrey M. ; Bouzin, Caroline ; Cani, Patrice D. ; Dessy, Chantal ; Delzenne, Nathalie M.

ABSTRACT

Nutritional disorders are associated with a high risk of developing cardiovascular diseases, endothelial dysfunction being an early key marker. We have demonstrated that metabolic alterations induced by a nutritional depletion in n-3 PUFA are improved by a supplementation in prebiotics (non-digestible fructans). The present work focuses on the impact of prebiotics on the endothelial dysfunction induced by the n-3 PUFA depleted-diet (DEF) in ApoE–/– mice model. C57Bl/6J (WT) and ApoE–/– (KO) mice were fed a n-3 PUFA depleted-diet (DEF) for 12 weeks. For the last fifteen days, mice were or not supplemented with prebiotics (PRE). The vascular morphology and function were evaluated in first, second and third order mesenteric arteries by histology and wire myograph. Micro-arteries from KO DEF PRE mice develop an increased basal tone and present a larger vessel diameter, compared to vessels from non-supplemented mice. The PRE supplementation in KO DEF mice leads to an increased media thickn...

CITE THIS VERSION


Le dépôt institutionnel DIAL est destiné au dépôt et à la diffusion de documents scientifiques émanant des membres de l'UCLouvain. Toute utilisation de ce document à des fin lucratives ou commerciales est strictement interdite. L'utilisateur s'engage à respecter les droits d'auteur lié à ce document, principalement le droit à l'intégrité de l'oeuvre et le droit à la paternité. La politique complète de copyright est disponible sur la page Copyright policy.

DIAL is an institutional repository for the deposit and dissemination of scientific documents from UCLouvain members. Usage of this document for profit or commercial purposes is strictly prohibited. User agrees to respect copyright about this document, mainly text integrity and source mention. Full content of copyright policy is available at Copyright policy.
Prebiotics supplementation improves the endothelial dysfunction induced by a nutritional deficiency in n-3 polyunsaturated fatty acids

Emilie Catry¹, Barbara D. Pachikian¹, Audrey M. Neyrinck¹, Patrice D. Cani¹, Chantal Dessy² and Nathalie M. Delzenne¹*.

¹ Metabolism and Nutrition Research Group, Louvain Drug Research Institute, Université catholique de Louvain, Brussels, Belgium

² Pole of Pharmacology and Therapeutics, Institut de Recherche Expérimentale et Clinique, Université catholique de Louvain, Brussels, Belgium

* Contacts: chantal.dessy@uclouvain.be and nathalie.delzenne@uclouvain.be

Introduction – Current nutritional disorders are often associated with a high risk to develop cardiovascular diseases, endothelial dysfunction being an early key marker. We have previously demonstrated that metabolic alterations induced by a nutritional depletion in n-3 polyunsaturated fatty acids (PUFA) are improved by a supplementation in prebiotics (non-digestible fructans). The present work focuses on the impact of prebiotics on the endothelial dysfunction induced by the n-3 PUFA depletion in ApoE⁻/⁻ mice model.

Material & methods – Nine-weeks-old C57Bl/6J (WT) and ApoE⁻/⁻ (KO) mice were fed a n-3 PUFA depleted-diet (DEF) for 12 weeks. For the last fifteen days, WT and KO mice were or not supplemented with prebiotics (PRE). The vascular function was evaluated in first, second and third order mesenteric arteries by immunohistology and a wire myograph.

Results – KO DEF + PRE micro-arteries develop an increased basal tone and present a larger vessel diameter, compared to non-supplemented. The PRE supplementation in KO DEF mice leads to an increased media thickness in first order mesenteric artery, this is even higher in the second order in comparison to non-supplemented. KO DEF + PRE micro-arteries contract significantly more than vessels, in response to a KCl challenge. As expected KO DEF micro-arteries present an endothelial dysfunction after 12 weeks of n-3 PUFA depletion as attested by a significant decrease of endothelial-dependent relaxation in comparison to WT DEF arteries. Interestingly, PRE supplementation for only fifteen days is able to improve the endothelial function by restoring the endothelial-dependent relaxation in KO DEF mice.

Discussion & conclusion – We point out fructan-type prebiotics as a potential therapeutic tool in endothelial dysfunction. Our results argue in favor of an outward muscular remodeling in mesenteric arteries, leading to an increased blood flow and a better vascular reactivity. The results on endothelial function evoke an important involvement of the nitric oxide pathway in this phenomenon.