International Journal of Drug Research and Technology

Available online at http://www.ijdrt.com

Editorial Article

BEHIND MYCYFAPP PROJECT: CORRELATING INHERENT-TO-FOOD FACTORS WITH PANCREATIC ENZYME REQUIREMENTS

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EDITORIAL

Malnutrition and growth stunting in Cystic Fibrosis (CF) patients can be avoided by accurate Pancreatic Enzyme Replacement Therapy (PERT), among others. However, at present there is a lack of evidence-based methods to adjust PERT dosing; current recommendations for doses adjustment rely on low level of evidence and counsel a number of Units of Lipase per gram of lipids. But it is well known that dietary lipids need to be accessible to digestive enzymes so that digestion and absorption can occur. The food matrix is degraded through the digestion process thus allowing the release of embedded lipids and the access of enzymes (lipases) to their substrates (lipids). Recent advances in food science research revealed that the different food structures modulate fatty acids release during digestion and their final metabolic fate. In addition, pancreatic lipase exhibits different hydrolytic activity depending on intramolecular structure of the lipids (Paoletti, R, *et al.*, 2015). Therefore, lipolysis may cause different kinetics of release of absorbable fatty acid and this can be translated into different enzymatic dosage depending on the inherent-to food characteristics.

In this context, behind MyCyFAPP project (Calvo-Lerma, J, *et al.*, 2017) there are specific tasks focus on correlating the inherent to food factor with the enzymes requirements. In vitro digestion models, developed to mimic a standardize CF gastrointestinal conditions and food digestion in CF patients, are used in the lab to analyse food lipolysis. The experimental work

performed by using different doses of enzymes allow us to model lipolysis kinetics and extent and finally to estimate the optimal dose for each food or meal. It allows for characterizing inherent-to-food factors such as, molecular structure of lipids, food matrix structure and chemical composition, as well as ingredients interactions.

Physicochemical composition of lipids influence on digestion itself and this can manifest in a number of different ways: triglyceride type and chain length, degree of saturation and extent of solid fat content as well as crystal type and structure. Some studies have pointed out that emulsified lipids with a high degree of unsaturation (C18:1 and C18:2 triglycerides) are more effectively digested than those based on saturated triglycerides (C18:0). Another factor which is the physical state of the lipid phase can also affects digestion; fat sources that remain solid at or above in-body temperatures, are more resistant to digestion than liquid oils. It is assumed that solid fat fractions are more structurally robust to the biomechanical forces present in the gut, and therefore present a lower surface area of lipid, which retard lipolysis (Golding, G, *et al.*, 2010).

On the other hand, lipids from diet can be obtained through different matrix structures. They can be already emulsified and embedded in the matrix as it commonly happens in processed foods, but are also obtained in a relatively un-emulsified form as it is the case of cooking fat or oil, the visceral fat from meat and fish, or structural fat from seeds or nuts for example.

Additionally, the matrix material surrounding a lipid droplet may respond to changing environmental conditions in a number of ways: remain intact, swell or shrink, physically, chemically or enzymatically degrade or physically fragment. The behaviour of a particular material will depend on the type and the interactions of the molecules it contains.

Understanding the influence of all these inherent-to-food factors needs strong research efforts since there are a wide variety of foods and diets. In spite of the complexity of food systems, it is possible to move forward step by step towards improve accuracy of the PERT. This is one of the key issues addressed in MyCyFAPP project. In vitro digestion of a wide range of food products, covering all food groups, have been in vitro digested and the results are contributing both to go beyond the state of the art related to lipid digestion in complex food

systems and to setting up a preliminary, scientifically valid method to adjust the dose of PERT according food characteristics.

ACKNOWLEDGEMENT

Ana M Andrés Grau, on behalf of MyCyFAPP consortium, acknowledges the European Union and Horizon 2020 Research and Innovation Framework Programme for funding the above mentioned project under grant agreement number 643806.

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Cite This Article: Andrés Grau, AM (2017), "Behind MyCyFAPP Project: Correlating Inherent-to-Food Factors with Pancreatic Enzyme Requirements." ***International Journal of Drug Research and Technology*** Vol. 7 (6), E01.

INTERNATIONAL JOURNAL OF DRUG RESEARCH AND TECHNOLOGY