PREBIOTIC CARBOHYDRATE POLYMERS FROM BYPRODUCTS TOWARDS HEALTHIER GUT MICROBIOTA

Manuela Pintado

Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquiteto Lobão Vital, 172, 4200-374 Porto, Portugal
mpintado@porto.ucp.pt

The importance of human gut microbiota in maintaining host health is well-known and in the past few decades, the consumer's awareness for healthier foods has increased. There are several strategies to stimulate the proliferation of beneficial intestinal bacteria, including the consumption of prebiotics. Prebiotics, as is referred in Gibson et al. (2017), is "a substrate that is selectively utilised by host microorganisms conferring a health benefit". Currently, there is a range of prebiotic carbohydrates on the market, most of them isolated from plant polysaccharides such as inulin and fructooligosaccharides (FOS), but there is an increasing interest in the development of new prebiotics, with added functionality. Establishment of a bio-based and green society allows to take actions to exploit high value resources that can be converted into valuable biological ingredients. Conversion of food processing waste and by-products into valuable ingredients has been identified as a timely challenge for food research and development associated with numerous applications of carbohydrate polymers. In this sense, chitosan, extracted from crustaceous exoskeletons is a polysaccharide that presents a structure very similar to prebiotic glucooligosaccharides. The main difference is the presence of amino groups, which are the cause of antimicrobial effect of chitosan.

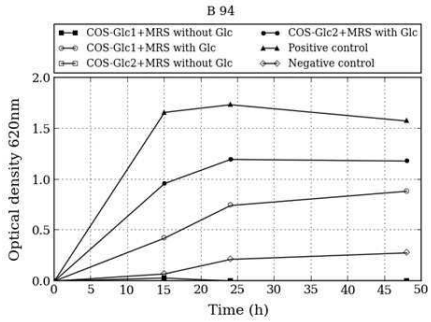

Fig. 1. Growth curves of Bifidobacterium lactis B94 in media containing MRS broth (with and without Glc as carbon source), supplemented with 0.5% (w/v) of COS-Glc1 or 0.5% (w/v) of COS-Glc2.

Chitooligosaccharide (COS) derivatives obtained by the Maillard reaction and enzymatic hydrolysis showed potential prebiotic effects, inducing changes in both the pattern of generated metabolic products and the count of Bifidobacterium (see Figure 1), which might contribute to a healthy intestinal environment. Another example studied in our group was Brewer's spent yeast, a natural byproduct from the brewing industry that may be a source of polysaccharides with bioactivity. The polysaccharides from autolyzed spent brewer´s yeast composed by a complex of glycogen-like polysaccharide, mostly 1,4-Glucans linkages (78% molar) showed ability for increasing probiotic species growth acting as carbon sources, and under colon conditions, leads mainly to the production of acetic, propionic and butyric acids proving positive effects on intestinal health.

During this presentation other examples of studies developed in our research group encompassing different ingredients obtained from byproducts containing polysaccharides with potential prebiotic activity will be presented. Studies of prebiotic potential of vegetable flour obtained from industry byproducts or xylooligosaccharides from wine bagasse will be presented.

The impact of each studied ingredient on probiotic strain or faecal bacterial dynamics and their metabolic activity will be discussed and their contribution towards a healthy intestinal environment as well.

Gibson, G. R., Hutkins, R., Sanders, M. E., Prescott, S. L. Reimer, R. A, Salminen, S. J., Scott, K., Stanton, C. Swanson, K. S., Cani, P. D., Verbeke, K. and Reid, G. 2017. Nature Reviews Gastroenterology and Hepatology,14: 491-502.