Dietary fibers are not born equal: qPCR to define prebiotic properties

F. DEPEINT, G. ABDEL NOUR, CN NIAMBA, P. POUILLART, A.M. ABDEL NOUR
Institut Polytechnique LaSalle Beauvais (France)
E-mail: afif.abdelnour@lasalle-beauvais.fr

Prebiotics have been defined by Robert 

Most researchers consider that changes in the composition of gut microflora can be characterised by an increase in probiotic bacteria (e.g., Bifidobacterium, Lactobacillus) and/or decrease in pathogenic bacteria (e.g., Bacteroides, Clostridium). Similarly, changes in the bacteria activity is often characterised by a butyrogenic activity.

We present here two clinical trials investigating prebiotic potential of dietary oligosaccharides. In each of those studies Bifidobacterium and Clostridium were amplified using qPCR and quantified against standard curves.

EXPERIMENTAL PROTOCOL: Subjects were fed a fibre-rich diet for 2 to 4 weeks. Three Fibres were tested against a placebo.

Fresh stool samples were collected, bacterial DNA extracted using DNA stool mini kit (Qiagen) and amplified using Taqman technology for specific bacterial strains.

RESULTS: The three fibres do not have the same prebiotic potential: Fibre C and Fibre D induce Bifidobacterium growth and do not have any significant effect on Clostridium. Fibre O inhibits Clostridium proliferation but does not have a bifidogenic activity.

CLASSIFICATION OF DIETARY FIBRES: A large number of dietary fibres have been investigated in human studies with the objective of determining their prebiotic potential. Delzenne et al. (2002) proposed the summary (table below) of the state of knowledge in 2002, clearly underlying the fact that not all fibres, whatever their structure or size, are qualified prebiotics.

qPCR: Molecular qPCR technology allows to investigate a large number of bacterial species with a variable level of specificity. Indeed we can target different levels, from the wider (bacterial families containing hundreds of species) to the more specific sub-species, even targeting genetic trends if necessary.