

Fibre fights off hyperglycemia

Richard Béliveau

Translated from Le Journal de Montréal, July 23, 2018

An interesting study published in the prestigious scientific journal Science shows that a diet very rich in fibre favors the establishment of beneficial intestinal bacteria, which leads to a reduction in the chronic hyperglycemia responsible for the complications of type 2 diabetes.

CHRONIC HYPERGLYCEMIA

Type 2 diabetes, itself responsible for more than 80% of all cases of diabetes, has in recent years become one of the principal chronic diseases affecting the global population. This disease principally afflicts overweight individuals, particularly those whose excess fat is located in the abdominal cavity: in such persons, these organs are no longer able to absorb and incorporate sugar efficiently in response to insulin (it is thus said that they are resistant to insulin), which leads to a state of chronic hyperglycemia.

Clinically, the measure of glycated hemoglobin is the method currently used to ascertain the presence of chronic hyperglycemic conditions. This measure is based on the tendency of sugar to chemically bind to proteins, in this case to the hemoglobin contained in red blood cells. As the lifespan of red blood cells is about 120 days, the level of hemoglobin bound to sugar (glycation) represents a marker for average glycemia over a period of two months. When the level of one of the hemoglobin subgroups (HbA1c) passes above 7%, it is then considered to indicate a condition of chronic hyperglycemia.

This measure is very important because hyperglycemia is a condition which damages the blood vessels and considerably heightens the risks of cardiovascular diseases such as heart attacks and strokes as well as of diverse pathologies including renal insufficiency (gradual loss of kidney function), retinopathies (important eye diseases causing blindness) or even problem of circulation in the lower limbs (arteritis).

BACTERIAL COMMUNITY

The mechanisms responsible for the development of insulin resistance and type 2 diabetes are very complex, but several studies suggest that the intestinal microbiome, i.e. the hundreds of billions of bacteria which naturally reside in the human digestive system, could play a very important role. These bacteria feed by fermentation of the complex carbohydrates and dietary fibre present in the diet, generating (amongst other things) short chain fatty acids, which are noted for their anti-inflammatory activities. It has been reported that weak production of these fatty acids was associated with an increased risk of type 2 diabetes, suggesting that an increase in the intake of fibre (and consequently in the levels of short chain fatty acids) could have a positive effect on this disease.



The results of a randomized clinical study recently published in the journal *Science* support this hypothesis¹. In this study the participants, all diagnosed with type 2 diabetes, were randomly allocated into two sections, one group where patients were recommended to adopt a standard approach (perform exercise, low calorie diet and avoid sugars) while the other group of patients should daily consume a mixture of foods very high in fibre from diverse sources (grains, beans, vegetables, oats, nuts) along with a preparation of prebiotics (to favour the growth of intestinal bacteria). Throughout the length of the study (3 months), blood samples were taken to monitor glycemia (measuring levels of HbA1c) and stool samples were harvested to determine the species present in the intestinal microbiome.

This approach permitted the authors to demonstrate that a diet rich in fibre considerably improved the control of glycemia: while about 50% of the patients treated with the standard approach showed normal glycemia (HbA1c < 7%) after 12 weeks, 90% of the participants in the “high fibre” group had attained that objective.

This remarkable improvement is a consequence of the drastic changes in the composition of the intestinal microbiome in people who consume an increased level of fibre: the scientists observed that these individuals presented greater microbial diversity and had elevated quantities of about 15 bacterial species known to produce short chain fatty acids, particularly acetate and butyrate. The increased presence of these fatty acids stimulates the production of glucagon-like peptide-1 and of peptide YY, both known to stimulate the secretion of insulin, confirming that the improved glycemia observed in patients fed with lots of fibre is a direct consequence of the modifications in the intestinal microbiome.

The typical Western diet is very low in fibre (15 g per day rather than the recommended 30 to 40 g) and the best way to improve this situation is to increase the total consumption of plant-based foods, such as beans, cereals (especially whole-grain), nuts, fruits and vegetables. This is not just good for diabetic individuals but also for the prevention of cardiovascular diseases and of certain types of cancers (particularly colon).

⁽¹⁾ Zhao, L et al. Gut bacteria selectively promoted by dietary fibers alleviate type 2 diabetes. *Science* 2018;359:1151-1156.