

## Description for the general public

In recent decades, more and more often we can find press reports that relate to the prevention of many diseases or their treatment through the use of appropriate food products being the carriers of substances or microorganisms with proven pro-health action. Among them we can distinguish so-called probiotics (gr. *pro bios* - for the life), which are live cultures of lactic acid bacteria and yeast, delivered to the organism most commonly with fermented milk drinks (such as yoghurts and kefir) or with silages. We get several advantages from their presence in the lower parts of gastrointestinal tract. It is known that regular consumption of these beneficial bacteria can promote cancer prevention and increase immunity.

But what might be said about interactions of these microorganisms with the components that naturally occur in food or are formed in foodstuff as a result of its processing and preparation? We are talking both about substances necessary for the proper functioning of human body, and about those unfavorable or even toxic. At present, little is known how these substances affect the efficacy of probiotics, although it should be noted that this is a complex problem and it will be difficult to provide clear explanation. So where to begin our search? Let's try to start from the food we eat every day. So far, you could meet with opinions that products baked or deep-fried (eg. French fries) are unhealthy. Where such a statement came from? One explanation is that they contain so called products of Maillard reaction, including acrylamide. These substances are potentially carcinogenic and can also trigger other undesirable changes in our body. These unhealthy ingredients can be also found in other products that we usually do not associate with the process of frying, for example in coffee, roasted nuts and grains, biscuits, cereal or corn flakes, muesli, chips and others. These products are frequently consumed as ingredients in flavored fermented milk beverages or as our "own" addition to them.

Does the presence of acrylamide reduce the survival of probiotics in yoghurts or our gastrointestinal tract limiting their positive impact on our body? Can acrylamide cause that "good bacteria" will produce substances with adverse impact on our body? In this project, though to some extent, we will try to find answers to these questions.

To accomplish this we will prepare the 'artificial' (model) yoghurt with acrylamide and we will examine how various components of this beverage (proteins, fats and sugars) in combination with acrylamide, will affect the growth of yoghurt bacteria and probiotics. We will examine which compounds are then produced by these microorganisms. We will check whether the ingredients of milk, commonly regarded as "antidote" in various poisonings, can act protectively against toxic acrylamide. We will investigate also whether these "good bacteria" can protect our body from the negative effects of acrylamide, breaking it into harmless products or binding to their cells. For microorganisms for which the ability to degrade acrylamide will be found, we will try to describe this phenomenon using appropriate mathematical models. Once we get more knowledge about these interactions in our "artificial" milk beverage, we will test whether in the "real" yogurt similar phenomena occurs.

We will take the first step toward understanding how acrylamide can affect microflora that is able to live in our intestines and is beneficial to our organism. The understanding of these phenomena in food product, which is the environment easier to control and modulate than human digestive system, will help to design relevant experiments with simulation of these phenomena in the intestine. Thanks to our project we will be able to offer new dietary recommendations for people who normally consume products containing significant amounts of acrylamide. In turn, the detection of microorganisms having the ability to degrade acrylamide and which are consumed with fermented milk beverages will allow in the future to develop food products known as functional food. The function of these products will be to minimize the risk posed by eating foods rich in harmful acrylamide.