

In nutrition sciences, nucleic acids (DNA and various forms of RNA) have not been considered as essential component, and their nutritional properties are currently not taken into account while formulating dietary recommendations. This attitude may be due to estimates which show that only about 5% of nucleic acids present in food are used again by the human body in anabolic processes (eg. biosynthesis of new nucleic acids). It is believed that remaining 95% of consumed nucleic acids undergo catabolism and are excreted in form of uric acid (purines) or H₂O and CO₂ (sugars) from the body. However the evidence is proving that, consumed nucleic acids serve, as a source of energy and important functional molecules for the consumer body.

According to current views, nucleic acids are predominantly found in food products containing cellular structures: DNA primarily in cell nuclei and RNA in the cytoplasm. Particularly rich in both types of nucleic acids are rapidly growing tissues or those, which have retained the growth and regeneration potential, such as raw meat (muscle), legumes and mushrooms. Moreover, from the available albeit scarce literature, it is known that the food processing such as cooking, frying, deep frying, microwave treatment, allow to preserve fragments of plant or animal DNA of sufficient quality and quantity for bioassays, carried out mainly by techniques used in molecular biology [Głazowska J. et al. 2016a, manuscript submitted to the publisher].

Currently, nucleic acids have begun to rise growing interest and changes, which they undergo during industrial food processing, culinary preparations and digestion in the alimentary tract, have become to be suggested as an important aspect from technological, food processing and nutrigenomic point of view. The latter role has been proposed as a result of investigations pointing to not only nutritional effects of ingested nucleic acids, but also their signalling properties influencing gene expression in consumer's organism [Głazowska J. et al. 2016b, manuscript submitted to the publisher].

The aim of this project is to determine the composition and form of nucleic acid present in food, as well as the changes, which they undergo during food processing. In this study, as a model food ingredient, the pork meat will be used, which is popular in the European region. The meat will be subjected to various types of thermal and non-thermal treatments, and an exhaustive characterization of nucleic acids in raw and processed meat will be performed.

In this project, the characterisation of nucleic acids at different levels of complexity is planned. The evaluation of the presence and the morphology of cell nuclei in meat as organelles containing DNA will provide information at the tissue and cellular level. The fragmentation of nucleic acid in single cell nuclei will be determined using the comet assay. Also the composition and content of nucleic acids, both DNA and RNA, before and after culinary treatment, will be evaluated. The fragmentation profiles of the isolated nucleic acids will be determined using electrophoretic techniques. As a result of this project, it will be possible to determine the content, form, and degree of fragmentation of isolated nucleic acids. This information will be an important supplementary to the knowledge about these fundamental, but still neglected food components, which are present in raw and low-processed food products. The results of this study will provide an important data for researcher and nutritionists dealing with food and formulating modern nutritional guidelines.