

Nucleic acids as the abundant dietary meat component

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Introduction: Nucleic acids are the inherent components of food products, which are digested and absorbed in the gastrointestinal tract. Yet little is known about their nutritional role, because they are notoriously overlooked in food science [1]. Currently, the attention is focused mainly on DNA to trace GMOs, food adulterations or in supplementation of animal feed as the source of nucleotides. Nucleic acids naturally present in food are usually ignored. This study aim was to initially characterize these macromolecules and compare meat and plant food products.

Materials and methods: The research was carried out according to the methods described by Cieślewicz et al. [2]. Chicken meat (breast, leg and liver) and plant samples (green bean, potato, kohlrabi, celery) were obtained either from farm or supermarket in Northern Poland, respectively. Samples were stored at -80°C prior to analysis. The paraffin-embedded samples were prepared to compare the distribution, number and size of the cell nuclei found in the meat samples and to compare them with plant products. Both eosin and hematoxylin as well as fluorescent dyes were used to stain the tissue microscope preparations. To measure the integrity of genomic DNA in the food products, the comet assay, which is widely used in studies on genotoxic factors, has been adapted for this purpose. The Metafer 4 software was used to analyze the degree of DNA fragmentation in meat and plant products.

Results: The images obtained for the preparations from the analyzed samples showed clear differences in the distribution, number and size of cell nuclei in both animal and plant tissues. The density of cell nuclei was the greatest in the chicken liver. It was not possible to obtain images of satisfactory quality for potato, kohlrabi and celery tissues. The results from the comet assay showed that the chicken liver was characterized by the most severely damaged genomic DNA, which may be associated with constant exposure to harmful compounds and high regenerative activity of this organ. Damage of cell nuclei in chicken breast and leg was comparable and amounted to approximately 50% DNA in comet tail. Plant tissues, on the other hand, were characterized by little fragmentation, especially green bean seeds, the genetic material of which was almost undamaged.

Conclusions: The results indicate the presence of cell nuclei in all tested products, but the integrity of the genetic material differs significantly. The differences are seen not only between animal and plant tissues, but also between different tissues derived from the same organism (chicken breast and leg versus chicken liver). High level of DNA damage in meat justifies further research on the chemical identity of these modifications and their impact on the gastrointestinal cells.

Literature:

- [1] Głazowska, J., Stankiewicz, U., & Bartoszek, A. (2017). Absorpcja, metabolizm i rola biologiczna kwasów nukleinowych obecnych w żywności. *Żywność Nauka Technologia Jakość*, 24(1).
- [2] Cieślewicz, J., Koziara, Z., Ćwiklińska, W., & Bartoszek, A. (2021). The Toolbox of Methods for Multidirectional Characterization of Dietary Nucleic Acids; Verification for Raw and Processed Food Products. *Food Analytical Methods*.