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## Immunoenzyme determination of main allergic proteins in dairy products and control of their values in hypoallergenic food stuffs

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**Statement of the Problem:** Cow's milk and products derived from it are an essential component of a food ration for many people and a source of a number of valuable biologically active compounds. However, at the same time, milk is one of the most common food allergens. Different processing technologies are actively developed to reduce the allergenicity of dairy products while preserving their nutritional value and functional properties. In this connection, analytical methods are required for correct assessment of the content of allergenic components in dairy products. Immunochemical methods provide such characteristic with high selectivity and productivity. However, the choice of their formats to work with wide variety of food stuffs requires additional studies.

**Methodology:** The study was focused on immunodetection of such main allergenic compounds of milk and dairy products as  $\beta$ -Lactoglobulin (BLG),  $\alpha$ -Lactalbumin (ALA) and Bovine Serum Albumin (BSA). Enzyme-Linked Immunosorbent Assays (ELISA) have been developed and characterized for this purpose.

**Findings:** Concentration and kinetic dependences of the analytical interactions were studied and the optimal modes of immunodetection were determined. The chosen protocols allowed carrying out all ELISA stages at room temperature. Advantages of competitive assay format for the detection of allergenic structures in partially hydrolyzed proteins have been confirmed in comparison with sandwich assay format. The developed ELISAs were characterized by detection limits of 10, 4.5, and 13.4 ng/mL for BLG, ALA and BSA, respectively. The BLG ELISA was used for testing milk and dairy products, including products with reduced allergenicity that were obtained by enzymatic hydrolysis of raw milk.

**Conclusion & Significance:** The developed methods allow controlling both intermediate technological products in dairy industry and final food stuffs. Their use will provide efficient protection of sensitive consumers from milk allergens.

### **Recent Publications:**

- 1. Verhoeckx K C M, Vissers Y M, Baumert J L, Faludi R, Feys M, Flanagan S, Herouet-Guicheney C, Holzhauser T, Shimojo R, van der Bolt N, Wichers H and Kimber I (2015) Food processing and allergenicity. Food & Chemical Toxicology 80:223-240.
- 2. Alves R C, Fatima B M, Begona G, Oliveira M B P P and Delerue-Matos C (2016) New trends in food allergens detection: toward biosensing strategies. Critical Reviews in Food Science & Nutrition 56:2304-2319.
- 3. Dzantiev B B, Byzova N A, Urusov A E and Zherdev A V (2014) Immunochromatographic methods in food analysis. TRAC Trends in Analytical Chemistry 55: 81-93.
- 4. Villa C, Costa J, Oliveir, M B P P and Mafra I (2018) Bovine milk allergens: a comprehensive review. Comprehensive Reviews in Food Science & Food Safety 17:137-164.
- 5. Bu G, Luo Y, Chen F and Liu K (2013) Milk processing as a tool to reduce cow's milk allergenicity: A mini-review. Dairy Science & Technology 93(3):211-223.

#### Biography

Elena A Zvereva has graduated from the Moscow Institute of Food Production and works in A.N. Bach Institute of Biochemistry, Research Center of Biotechnology of the Russian Academy of Sciences as a Senior Researcher. Her scientific interests are in the field of development of new immunochemical techniques for the detection of biologically active compounds - pesticides, hormones and antibiotics. These works cover the full cycle of the development of immunoanalytical techniques, beginning from obtaining immune reactants and finalizing by the creation of manufacturing technologies.

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