Development of multiplex immunochromatographic test systems for the simultaneous detection of several food contaminants

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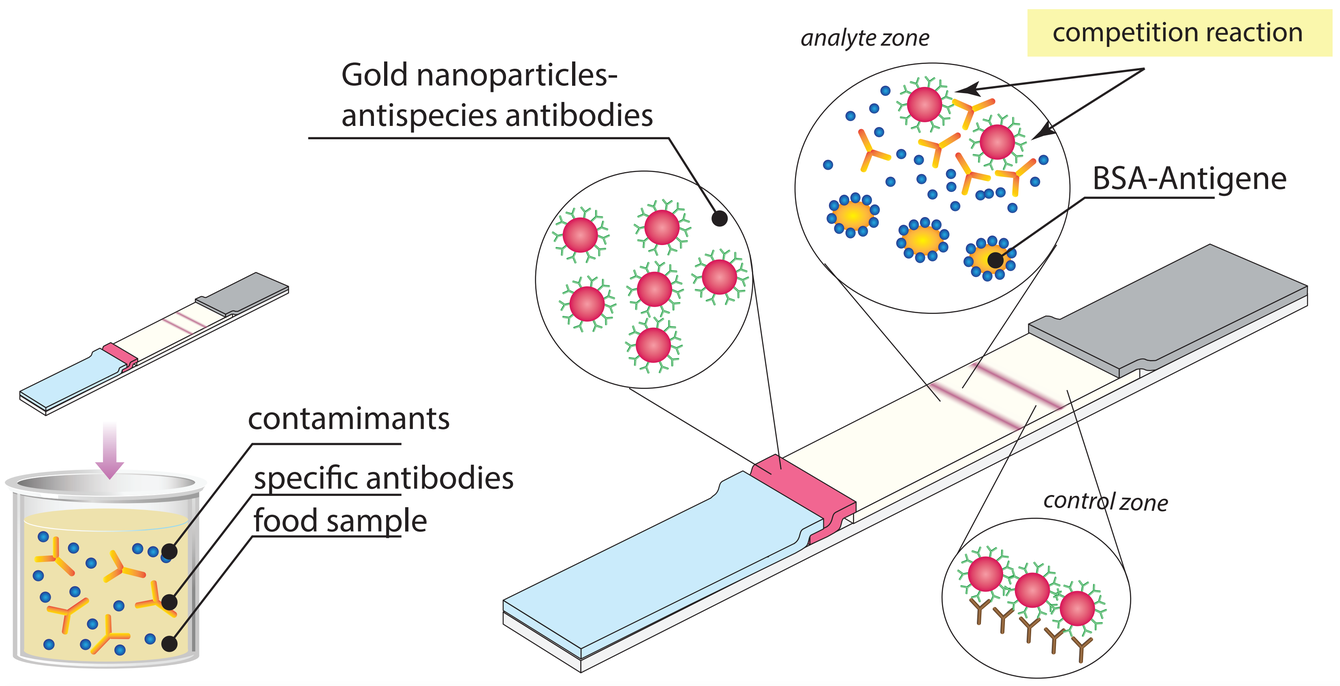
Aim

Development of a highly sensitive multiplex immunochromatographic test system for the simultaneous determination of six types of mycotoxins and six groups of antibiotics in food products

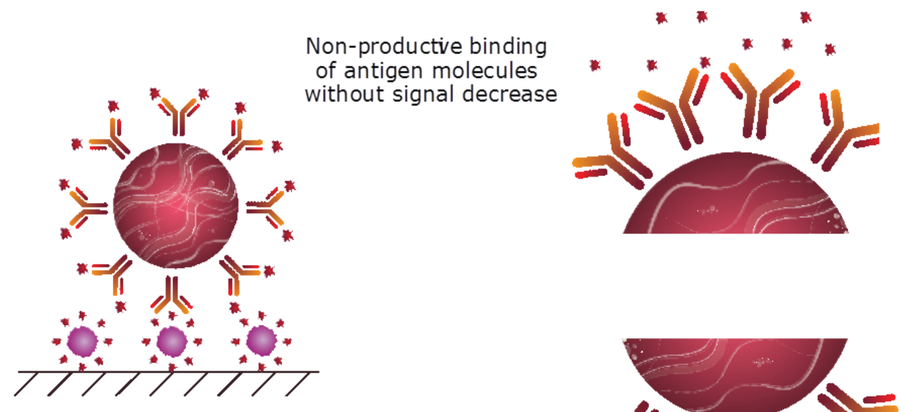
Purpose of the study

Among food toxic contaminants, the highest priority are antibiotics and mycotoxins . In accordance with safety standards, it is necessary to control up to six types of mycotoxins and more than three groups of antibiotics in products. In this regard, there is a need to create rapid tests to ensure the simultaneous control of these analytes. As part of our research, we carried out the development of test systems for antibiotics, their series included antibiotics of the tetracycline group, beta-lactams, quinolones and streptomycin and mycotoxins, including T-2 toxin, fumonisin B1, zearalenone, DON, aflatoxin B1 and ochratoxin A. Test systems have been developed in different configurations, from tests for detection of a single analyte — mono-tests, to multiplex tests, including the determination of up to 6 analytes on a single test.

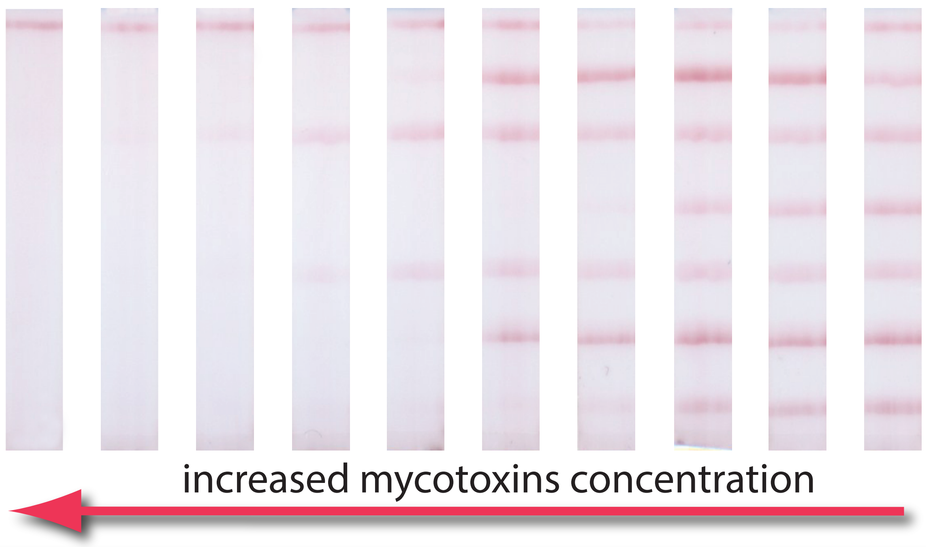
The scheme of immunochromatographic test with indirect labeling

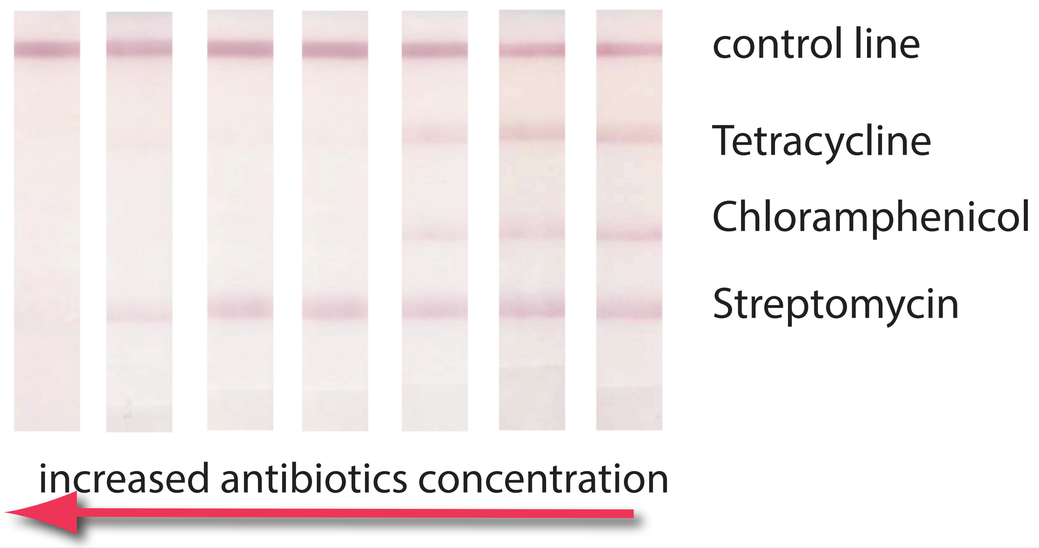


Advantages of indirect labeling

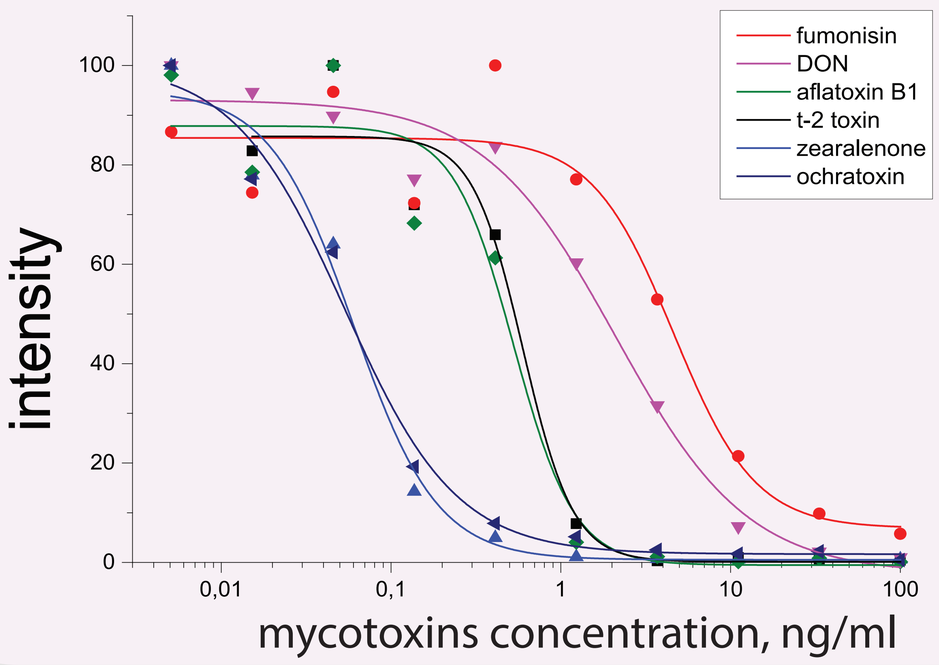


Results





The results of instrumental (photometric) data processing



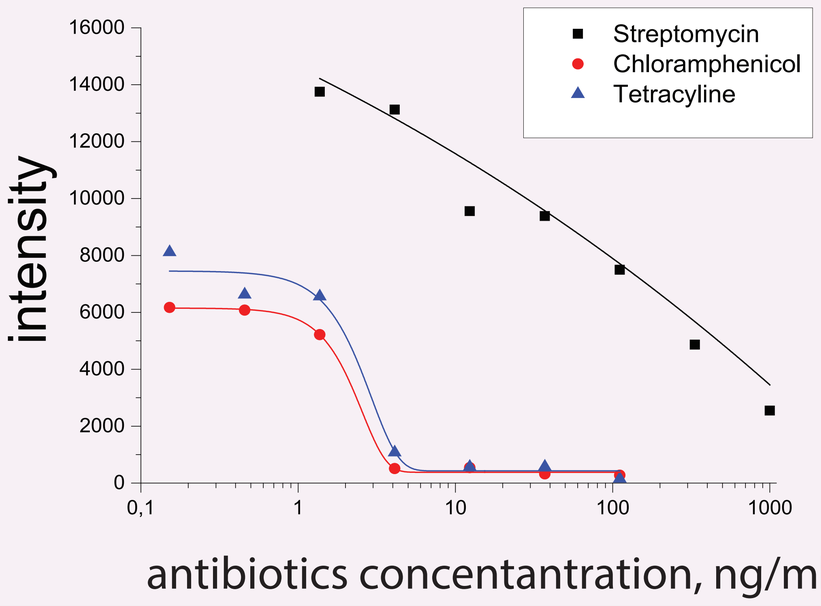
detection limits

mycotoxins:

T-2 toxin - 7 ng/g
Fumonisin B1 -150 ng/g
Zearalenone - 2 ng/g
DON - 50 ng/g
Aflatoxin B1 - 6 ng/g
Ochratoxin A - 6 ng/g

antibiotics:

Tetracycline - 4 ng/ml
Chloramphenicol - 4 ng/ml
Streptomycin - 300 ng/ml



Conclusions

We developed an immunochromatographic assay for the simultaneous rapid determination of six types of mycotoxins and more than three groups of antibiotics in products. New analysis conditions have been proposed that affect the interaction of antigen - antibody and the conditions for the binding of antibodies conjugated to gold nanoparticles with the analyte to be determined in food samples. The suitability of the proposed approach for monitoring changes in the level of antibiotics in the food samples is shown.

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