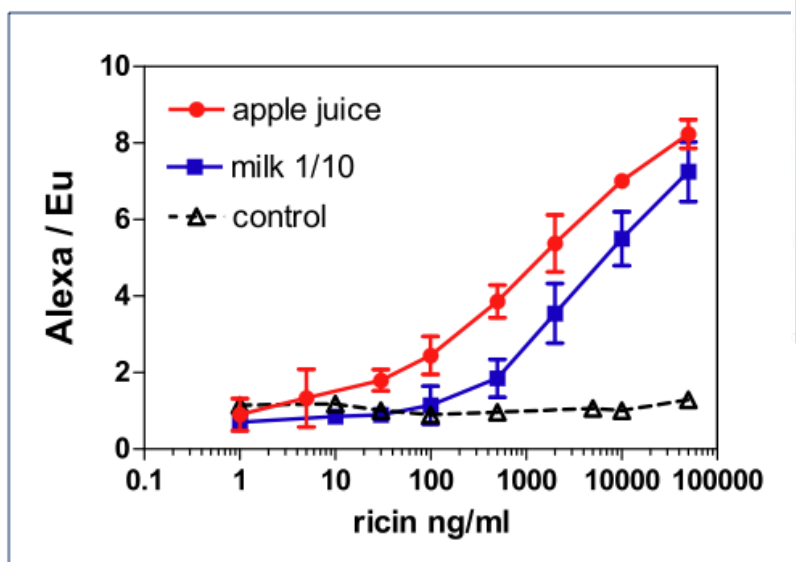


New Nanoscale Materials for the Detection of Bio-terror Agents in Food

Ricin is an easily available toxin which can be used as a bio-terror agent. It is simple to make from the beans of the castor plant and is easy to add to our food supply. Fast and inexpensive methods for its detection in food samples are needed. Dr. Ian Kennedy and his team at University of California, Davis have developed a novel fluorescent biosensor for ricin using magnetic-luminescent nanoparticles as carriers in a very small capillary tube. Antibodies are used to capture the ricin that is present in a food sample. An alternating magnetic field is used to speed up mixing of the particles with the target molecules in the miniature device. An automated system of electromagnets provided the alternating field as well as magnetic manipulation of the particles prior to detection. The total analysis time was reduced to about 10 minutes which is about 8-10 fold improvement in comparison with conventional methods. The sensitivity of the assay was sufficient to detect ricin in a variety of foods at levels at which harm to humans is not expected. This device and method can be manufactured cheaply and simply enough to permit wide-scale screening of our food supply for other bio-terror agents.



Low levels of detection of ricin using novel luminescent and magnetic nanoparticles have been demonstrated in foods like apple juice and milk, in addition to meats.

1. Dosi Dosev, Mikaela Nichkova, Ian M. Kennedy, Inorganic lanthanide nanophosphors in biotechnology, *Journal of Nanoscience and Nanotechnology*, 8, 1052-1067 (2008)
2. Dosi Dosev, Mikaela Nichkova, Zhi-Ya Ma, Shirley J. Gee, Bruce D. Hammock, and Ian M. Kennedy (2008) Magnetic luminescent nanoparticles as internal calibration for an immunoassay for ricin *Proc. SPIE* 6865, 68650H

A startup company has been formed in Davis based on this work. It aims to commercialize a test for pesticides in the raw materials for food flavorings and for infectious diseases. Significant funding has been obtained from multi-national sources.

Contributing Agencies: USDA/CSREES.