Translational Medicine

OPEN ACCESS Freely available online

Short Communication

Food Safety Relevancy of Nanoparticles

Humera Shaik

Department of Pharmacy, Azad College of Pharmacy, Hyderabad, India

ABSTRACT

Foodborne transmission of Salmonella has been well documented for several meat-, poultry-, and egg-related outbreaks. Many of these recalls for pathogen contaminations are related to ready-to-eat (RTE) poultry and meat products. There are a number of chemicals, physical methods, and natural antimicrobials that have been examined for potential to reduce or eliminate microbial contamination in meats. However, the recalls and outbreaks from RTE meat products are still a major problem for the meat industry. The requirements of new standards for safer food supplies include improvement of existing methods as well as introducing new technologies.

Keywords: Nanocomposites; Anti-microbials; Food Safety

Combinations of antimicrobial substances referred to as multiple-hurdle technologies can provide added barriers against the growth of foodborne pathogens in meat products. However, conventional applications such as spraying still represent an inefficient delivery approach for application of multiple antimicrobials, which in turn can lead to inconsistent efficacy as well as limited long-term control during storage [1]. A much more effective delivery system for these antimicrobials in the form of polymer-nanocomposites would serve as a means to deliver any antimicrobial combination as a single application and could potentially allow for use of lower concentrations of individual antimicrobial compounds.

A wide variety of approaches to sanitize meat and poultry products after harvesting have been developed. However, they are still an inefficient delivery approach for application of multiple antimicrobials. This review explored the potential of nanoparticle-based composite systems for practical and economical antimicrobial interventions to inhibit and decontaminate pathogens on meat products, including RTE poultry and red-meat products. Development of chitosan nanoparticle-based nano composite systems containing generally recognized as safe (GRAS) antimicrobials such as acids are potential candidates [2]. A much more effective nano carrier system for these antimicrobials in the form of polymer-nano composite dispersed in organic acid could serve as a means to deliver any antimicrobial combination as a single application. The long-term goal of future research would be to develop and implement such novel economical delivery systems for multiple-hurdle antimicrobial intervention using nanoengineering principles to control major food borne illness by controlling pathogens [3]. This research could be achieved by developing new and efficient mitigation measures through the combination of the nanoscience with multiple-antimicrobial-hurdle technology to control major foodborne pathogens such as S. Typhimurium in poultry and meat during post-harvest processing and increase the shelf life for distribution and storage by not only eliminating S. Typhimurium and other pathogens but limiting spoilage as well. Nanotechnology holds considerable promise for several potential applications for food and meat processing, particularly as part of food packaging materials and serving as a stable platform for mounting several mechanistically distinct antimicrobials. Of particular promise is the idea of using nanocomposites to deliver a more targeted set of antimicrobials simultaneously to synergistically inhibit foodborne pathogens [4]. This, coupled with the fact that many of the more newly discovered plant botanicals and other exotic sources of antimicrobials may be somewhat difficult to scale up production to generate bulk quantities, makes the idea of using smaller quantities in a more efficient delivery system highly attractive [5]. As research progresses, one could anticipate more complex nanocomposites, such as combinations that involve a chemical-based antimicrobial such as an acid along with a biological agent that might consist of previously generated multiple protective antibodies or an active bacteriophage cocktail that is able to target multiple Salmonella serotypes. One could anticipate that certain combinations, in conjunction with a more active nanocarrier, could even be programmed to only become active when in contact with the foodborne pathogen target and thus remain biologically inactive or neutral otherwise [6]. This could potentially allow for additional biohazard safety precautions to be incorporated if needed into the nanoparticle systems employed in a food matrix as well stabilizing any environmentally fragile active components over longer periods of time. Recent examples include the use of

***Correspondence to:** Humera Shaik, Department of Pharmacy, Azad college of Pharmacy, Hyderabad, India, Tel: 8759461542, Email: shaikhum@yahoo.com

Received: October 9, 2020, **Accepted:** October 26, 2020, **Published:** November 2, 2020

Citation: Humera S (2020) Food Safety relevancy of Nanoparticles. Trans Med 10:216. DOI:10.24105/2161-1025.10.216

nanoparticles to stabilize volatile oils derived from tea-tree products and containment of lipophilic compounds. However, before such intricate combinations become reality in the food and meat industry, regulatory and public perception concerns still need to be alleviated. Once regulations become more standardized and public acceptance grows further, improvements and refinements of nanocomposites will probably find additional applications in the food and meat industries beyond what is currently being proposed.

REFERENCES

1. Tiwari BK, Valdramidis VP, O'Donnell CP, Muthukumarappan K, Bourke P, Cullen PJ. Application of natural antimicrobials for food preservation. Journal of agricultural and food chemistry. 2009; 22;57(14):5987-6000.
2. Hafez HM. Poultry meat and food safety: pre-and post-harvest approaches to reduce foodborne pathogens. World's Poultry Science Journal. 1999; 1;55(3):269-80.
3. Van Huis A. Potential of insects as food and feed in assuring food security. Annual review of entomology. 2013; 7;58:563-83.
4. Ricke SC, Hanning I. Nanotechnology Safety: Food Safety Applications of Nanoparticles. Elsevier Inc. Chapters; 2013; 9;12.
5. Van Giau V, An SS, Hulme J. Recent advances in the treatment of pathogenic infections using antibiotics and nano-drug delivery vehicles. Drug design, development and therapy. 2019; 13:327.
6. Patra JK, Das G, Fraceto LF, Campos EV, del Pilar Rodriguez-Torres M, Acosta-Torres LS, et al. Nano based drug delivery systems: recent developments and future prospects. Journal of nanobiotechnology. 2018;16(1):71.