A nebulized gelatin nanoparticle-based CpG formulation is effective in immunotherapy of allergic horses.

Abstract: In the recent years, nanotechnology has boosted the development of potential drug delivery systems and material engineering on nanoscale basis in order to increase drug specificity and reduce side effects. A potential delivery system for immunostimulating agents such as cytosine-phosphate-guanine-oligodeoxynucleotides (CpG-ODN) needs to be developed to maximize the efficacy of immunotherapy against hypersensitivity. In this study, an aerosol formulation of biodegradable, biocompatible and nontoxic gelatin nanoparticle-bound CpG-ODN 2216 was used to treat equine recurrent airway obstruction in a clinical study. Bronchoalveolar lavage fluid was obtained from healthy and allergic horses to quantify Th1/Th2 cytokine levels before and after inhalation regimen. Full clinical examinations were performed to evaluate the therapeutic potential of this nebulized gelatin nanoparticle-based CpG formulation. Most remarkable was that regulatory anti-inflammatory and anti-allergic cytokine IL-10 expression was significantly triggered by five consecutive inhalations. Thorough assessment of clinical parameters following nanoparticle treatment indicated a partial remission of the allergic condition. Thus this study, for the first time, showed effectiveness of colloidal nanocarrier-mediated immunotherapy in food-producing animals with potential future
applicability to other species including humans.