

## **Nanoinnovation 2020**

### **Zein nanoparticles as versatile carriers for the delivery of bioactive compounds**

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The increased demand of biocompatible materials for alimentary, medical and pharmaceutical applications promoted the use of natural biopolymers as potential novel candidates. In this context, zein is one of the most promising proteins due to its significant availability, low cost, biocompatibility, biodegradability and versatility. Our research team recently developed and characterized zein nanoparticles as a function of various parameters, i.e. nature of stabilizers, serum incubation, temperature, pH, as well as cryoprotectants used to obtain suitable freeze-dried systems. The most suitable formulation to be proposed as a colloidal drug delivery system was obtained using 2 mg/ml of zein and sodium deoxycholate. Zein nanoparticles were characterized by a mean diameter of ~100 nm, a low polydispersity index and a negative surface charge (~-30 mV) (1). The nanoencapsulation of an anticancer drug such as paclitaxel (PTX) did not compromise the physico-chemical features of zein nanosystems and promoted an increase of the cytotoxic activity of the active compound on various human cancer cells with respect to its free form. Furthermore, the evaluation of the cell interaction rate of tritiated zein nanoparticles evidenced a time-dependent uptake of the nanosystems that occurred after only 1 h incubation (2). The results demonstrated that zein nanoparticles preclude the use of organic solvents to solubilize PTX, which would mean a potential dramatic decrease in the side effects related to their use in human beings.

#### References

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- (2) A. Gagliardi, S. Bonacci, D. Paolino, C. Celia, A. Procopio, M. Fresta, D. Cosco. *Heliyon* 2019, 5, e02422.

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