11th World Congress on
PHARMACEUTICAL SCIENCES
September 28-29, 2018 | Montreal, Canada

Allium sativum: Sustainable natural self-defense system as an alternative to modern antibiotics

Ondrej Kaspar, Janska P, Knejzlik Z, stepanek F and **Tokarova V**
University of Chemistry and Technology, Prague

Garlic among other plants in genus *Allium* is well-known for its beneficial properties for thousands of years. The favorable effect is attributed to the sulfur-containing substance called allicin. Allicin, volatile compound having typical garlic odor, is produced enzymatically from alliin (a substrate) and alliinase (an enzyme) when inner cell structure is compromised (e.g. by cutting). The system producing active compound "on-demand" is very effective and protects the whole plant only when it is needed. Moreover, high allicin reactivity, short half-time (less than few minutes) and no accumulation in the environment make it very difficult for bacteria to develop effective resistance. The aim of this work is to extract and stabilize enzyme and to prepare antimicrobial particles in a dry and hydrated form based on a similar principle as garlic cell in terms of allicin biosynthesis. Since the enzymatic activity of the isolated enzyme is the most important factor governing allicin production, its stability under different conditions is experimentally investigated. Alliinase was extracted from garlic cloves. The purity of the enzyme was determined by SDS-PAGE. Alliinase activity was assayed using a coupled reaction method, which is based on the reaction of enzymatically produced pyruvate, as a by-product of allicin formation, with NADH. Chitosan and alginate, both biodegradable polymers were used as an enzyme-substrate carrier. Spray drying, co-flow encapsulation, and microfluidic droplet generation were employed to produce particles with different internal structure, mean size and morphology where both substrate and enzyme are separated in different compartments of one or more carriers. We believe, that mimicking of nature-proved sustainable concepts can contribute to the reduction of the annually increasing number of bacterial infections caused by multi-drug resistant bacteria.

Biography

Ondrej Kaspar is an Assistant Professor at the University of Chemistry and Technology (UCT) Prague. He spent two years as a post-doc at McGill University in the research group of Prof. Dan V. Nicolau involved in the newly emerging field of bio-computation and bio-simulation research. After his return to the Czech Republic, he joined the Laboratory of Biomimetic Engineering at UCT Prague. Nowadays, he is involved in research topics focused on mimicking of natural antibacterial solutions, encapsulation of active substances and preparation of nanoparticles via microfluidics.

Notes: