Immobilization of alliinase in polymer microcarriers

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ABSTRACT

One of the most important threats to public health in the 21st century is escalating emergence of secondary infections caused by multi-drug resistant (MDR) bacteria. Antibiotics are losing their beneficial effect, and their persistent residues are gradually polluting drinking water, soil and food products. The omnipresence of antibiotics in very low concentration is the main reason behind the increasing number of MDR bacterial strains. This alarming phenomenon has been caused over the years by the widespread availability of antibiotics in western countries, intensive livestock farming and misuse of antibiotics in the public sector. However, the use of active substances to suppress bacterial infection is not restricted exclusively to humans. It has been shown that some natural antibacterial systems are not significantly affected by the risk of bacterial resistance making them vulnerable. One of the most known examples is garlic, where highly potent but unstable allicin is formed only when the inner cellular structure is compromised. This concept makes allicin everlasting bactericide since it is enzymatically produced when needed for a limited amount of time. We propose to employ spray drying and encapsulation techniques to develop polymer-carriers where purified and stabilised enzyme and substrate (alliin) are physically separated into two different types of carriers or in one carrier simultaneously. Additionally, we want to study the influence of polymer composition, molecular weight and crosslinking ratio on the transport of substrate and products and the overall enzymatic activity of the immobilized enzyme.

Keywords: antibiotics; cross-linking; encapsulation; garlic; spray drying;