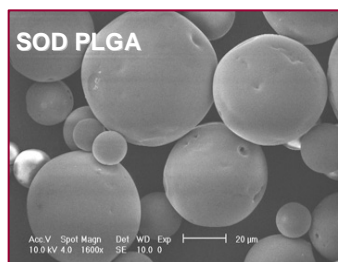


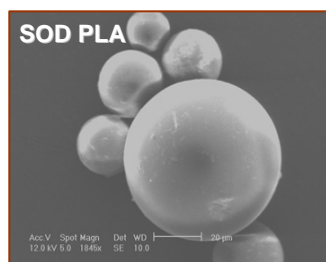
Antioxidant active enzyme delivery

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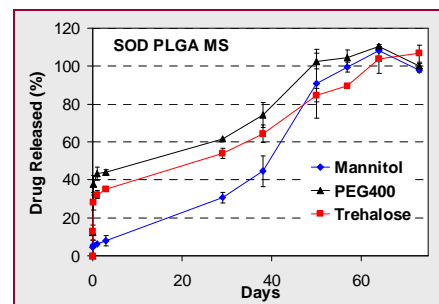
Enzyme and peptide delivery is not an easy task as such molecules possess high susceptibility to environmental modifications. Moreover, their hydrophilicity make their inclusion in pharmaceutical systems even more difficult when using conventional methods. These molecules have great impact in the treatment of several pathologies. This project aims at developing microparticle formulations for the delivery of enzymes such as Superoxide dismutase (SOD) and Catalase (CAT) by ensuring preservation of their structure and activity.



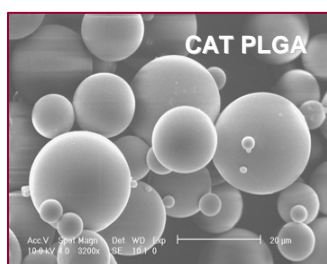
SOD loaded PLGA microspheres



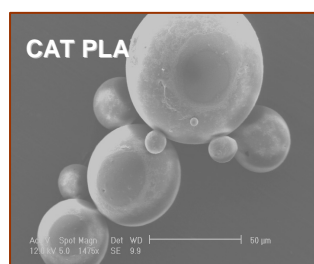
SOD loaded PLA microspheres



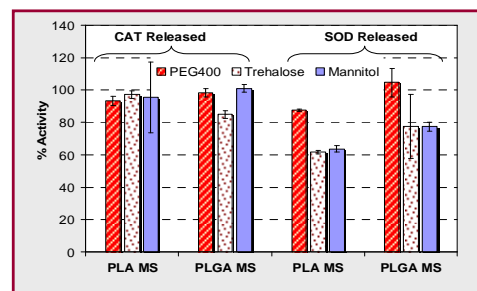
SOD Release profile from PLGA microspheres prepared with different stabilizers



CAT loaded PLGA microspheres



CAT loaded PLA microspheres



Activity preservation of SOD and CAT within PLGA and PLA microspheres prepared with different stabilizers

1. Description of the product

SOD and CAT are natural occurring antioxidant enzymes involved into biological cellular processes. Thanks to their activity they can be employed for the treatment of a number of pathologies correlated to oxidative stress. However, their high instability limits their employment and the possibility of being safely delivered.

Polymeric microspheres may represent suitable carriers to overcome this problem. Due to the low compatibility between polymers and solvents employed for microspheres preparation and the enzymes an appropriate stabilizing strategy is required. This may

allow to deliver in a controlled manner molecules difficult to manage but potentially useful in the treatment of different serious pathologies.

2. Innovative aspects of the product

The product is applicable to both pharmaceutical and biomedical fields. Its peculiarity resides in the high antioxidant activity of the encapsulated proteins. In fact, this product can grant a complete maintenance of enzymatic activity of incorporated molecules. Such system provides a long-term sustained release of the enzymes and it is able to preserve enzyme activity over time.

3. Main advantages of the offer

Proteins usually possess adverse pharmacokinetics which impairs their delivery through most administration routes. The use of carriers able to protect them from unwanted interactions as well as metabolic processes and providing a sustained release over a long period of time, may allow their wide application in the treatment of several different pathologies and disorders. Moreover if properly manufactured, these enzyme loaded microparticles may be assembled into more complex systems.

4. Technology keywords

Microspheres; Superoxide dismutase; katalase; Sustained release; Radical scavenger

5. Current stage of development

Development phase – laboratory tested

6. Intellectual property rights

Copyright protected

Technical and scientific publications

S. Giovagnoli, P. Blasi, M. Ricci, C. Rossi, Biodegradable Microspheres As Carriers For Native Superoxide Dismutase and Catalase Delivery, *AAPS PharmSciTech* (2004) 5 (4) article 51.

S. Giovagnoli, G. Luca, I. Casaburi, P. Blasi, G. Macchiarulo, M. Ricci, M. Calvitti, G. Basta, R. Calafiore, C. Rossi, Long-term delivery of superoxide dismutase and catalase entrapped in poly(lactide-co-glycolide) microspheres: in vitro effects on isolated neonatal porcine pancreatic cell clusters. *Journal of Controlled Release*, 107 (2005) 65-77.

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