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Enzymatic degradation of chitosan and thiolated chitosan

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The aim of this study was to evaluate the biodegradability of thiolated chitosans in comparison to unmodified chitosan. Mediated by carbodiimide, thioglycolic acid (TGA) and mercaptonicotinic acid (MNA) were covalently attached to chitosan via formation of an amide bond. Applying two different concentrations of carbodiimide 50 mM and 100 mM, two chitosan conjugates (TGA A and TGA B) were obtained. Both chitosan (3% m/v) and thiomer (3% m/v) solutions were prepared and chitosanolytic enzyme solutions were added. Physiological enzymes such as lysozyme, pectinase and cellulose were examined in chitosan degrading activity. The enzymatic degradability of these thiomers was investigated by viscosity measurements with a plate-plate viscometer. The obtained TGA conjugate A displayed 267.7 µmol and the TGA conjugate B displayed 116.3 µmol of immobilized thiol groups. With 325.4 µmol immobilized thiol groups, chitosan MNA conjugate displayed the highest content of thiol groups. In rheological studies subsequently the modification proved that chitosan TGA conjugates with a higher coupling rate of thiol groups were not only degraded to a lesser extent by 20.9% to 26.4% but also more slowly than chitosan. Chitosan mercaptonicotinic acid was degraded by 31.4% to 50.1% and even faster than unmodified chitosan depending on the investigated enzyme.

According to these findings the biodegradability can be influenced by various modifications of the polymer which showed in particular that the rate of biodegradation is increased when MNA is the ligand, whereas the degradation is hampered when TGA is used as ligand for chitosan.

Biography

Flavia Laffleur is completing her Ph.D from University of Innsbruck at the Department of pharmaceutical technology. She has published two papers in reputed journals.

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