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Rheological approach to develop new mucoadhesive spray formulations

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Mucoadhesion describes the attractive forces between a material and mucous membranes. Mucoadhesive formulations are designed to form specific interactions with mucosal membranes, providing localized drug release, prolonging residence time, reducing dosing frequency and increasing patient compliance.

The aim of this project was to select the better performing polymer to develop a new mucoadhesive spray formulation, containing an anti-inflammatory drug, using a rheological approach. Hassan and Gallo rheological synergism method was chosen. This method is based on the idea that when a mucoadhesive polymer is mixed with mucin, there is a synergistic increase in viscosity. Commercial oral sprays (medical devices), claiming a mucoadhesive effect on the leaflet, were used to assess the method validity and to identify formulation viscosity values compatible with a spray device.

Prototype spray formulations, containing different known mucoadhesive polymers, were prepared. The influence of polymer type and concentration on formulation bioadhesive properties was tested. Formulation prototypes were subjected to pre-stability studies at 4°C, 25°C and 40°C for 1 month (in absence of preservatives). A spraying test was used to investigate the polymer influence on the ability of the device to spray, even in the case of a discontinuous use over time.

All formulations resulted to be physically stable at all temperatures. The mucoadhesive properties changed significantly depending on the polymer type and concentration. Prototypes containing sodium alginate as mucoadhesive agent showed the highest mucoadhesion properties, due to its ability to gel in the presence of Ca²⁺ ions of salivary fluid, which results in a rise in viscosity.

Biography

Leonardo Marchitto is a Vice President of the School of Pharmacy, Biotechnology in university of bologna, Italy. He completed his Master Degree in Industrial Pharmacy (University of Pavia), and Degree: Pharmacy (University of Camerino)

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