Insights in Analytical Electrochemistry, 3:2
DOI: 10.21767/2470-9867-C1-003

Formulation and evaluation of budesonide nanocapsules for colon targeted drug delivery

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Specific drug delivery to the colon is highly desirable for local treatment of a variety of bowel diseases such as ulcerative colitis, crohn's disease. The use of nanoparticular systems for the delivery of therapeutic agents in inflammatory diseases is receiving considerable attention for medical and pharmaceutical applications. In this study, the novel ex vivo model was developed to ensure the entrapment of nanocapsules in the inflamed areas. Budesonide was used as a model drug because of its therapeutic potential for Crohn's disease. The manufacture and the *in vitro* release characteristics of the nanocapsules were described; especially, the *in vivo* performance in rat was evaluated by examining myeloperoxidase (MPO) enzyme in the inflamed tissue and the histopathology scoring of the same. The particle size analysis of the nanocapsule showed particle size in the range between 480 nm to 780 nm. In this study we got the zeta-potential of all formulation less than 30 mV. The zeta potential value of optimized formulation was 41.2 mV. Percent EE of the nanocapsule dispersion was found to be in the range of 78% to 90%. The intestinal inverted sac method was used to evaluate the effect of nanocapsular budesonide on the entrapment of drug as compared to pure drug. The percent drug entrapped for nanocapsular budesonide and plain budesonide are 21.86±2.52 and 15.90±2.68 respectively. The concentration of drug remaining outside the tissue i.e. in the organ tube was also determined which represents the unentrapped drug and it was found to be 76.48±4.053 and 84.08±2.67 for nanocapsular budesonide and plain budesonide respectively. The SEM images of the surface of the spray dried powder surface showed that nanocapsules remained intact and no change in shape was detected after spray drying process. The study showed decrease in the activity of MPO in tissue is the sign of repair and healing of the tissue.

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