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Mucolytic enzyme decorated carrier systems (MECS): A promising strategy to overcome the mucus gel barrier

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Amongst the different barrier mechanism in oral drug delivery, the mucus layer is of vital importance in drug carrier design. This robust barrier is capable to effectively trap delivery systems, while avoiding their accessibility to the epithelial surface. One promising approach to facilitate a rapid passage of this barrier and consequently improve drug bioavailability to a considerable extent is the fabrication of mucolytic enzyme decorated carrier systems (MECS). These systems encompass micro- and nanoparticles as well as most recently self-emulsifying drug delivery systems (SEDDS) functionalized with mucin cleaving enzymes such as papain, bromelain or trypsin. The mucolytic activity of such proteases refers to the splitting of peptide bonds within substructures of mucus, thus narrow passages directly in front of the carrier are getting arranged, while the overall macrostructure and protective function is unchanged. MECS have already demonstrated superior mucus permeation performance as well as prolonged mucosal residence time over control carriers without enzymes within various *in vitro* and *in vivo* studies. As an example papain modification of nanoparticles could increase the extent of remaining particles in the rat small intestine 3 hours after oral administration by 2.5-fold. Within the presentation a summary concerning different MECS, suitable enzymes and the applied approaches in order to modify the respective carrier types is given. Furthermore, potential applications of MECS are presented.

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