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Development of solid self-nanoemulsifying drug delivery systems (s-SNEDDS) for oral delivery of lysozyme

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Self-nanoemulsifying drug delivery systems (SNEDDS) are isotropic mixtures of lipid, surfactants, and cosolvents, that instantly produce ultrafine O/W emulsions upon gentle agitation in GI fluids. SNEDDS can be produced in a very simple and cost-effective manner, but these liquid formulations have many drawbacks. Therefore, different solidification techniques (e.g. adsorption to solid carriers), were used to transform liquid SEEDS into solid powders, which can be further processed into other solid dosage forms and thus obtain better physical and chemical stability. SNEEDS have been widely investigated in recent years to improve the oral bioavailability of poorly water-soluble drugs, but it was also reported that these systems can address challenges associated with the oral delivery of protein drugs. Proteins loaded inside the oil droplets of SNEDDS are effectively protected towards proteolytic activity and SEDDS can also exhibit mucus-permeating properties and/or can act as permeation enhancers leading to improved bioavailability [1].

Despite all of the advantages, incorporating proteins in SNEDDS can be very challenging. To be loaded into the SNEDDS, their lipophilicity should be increased first. Among several techniques that have been adopted to increase the lipid solubility of protein drugs, reversible hydrophobic ion pairing (HIP) complexation is the most commonly used and is based on forming ionic interactions between a charged hydrophilic molecule with an oppositely-charged counterion [2]. To the best of our knowledge, no earlier attempts to use s-SNEDDS for lysozyme oral delivery have been made. Thus, the objectives of the present study will be to develop, optimize, and evaluate s-SNEDDS for oral delivery of lysozyme by applying the QbD approach.

References

1. Leonaviciute, G. Expert Opin. Drug Deliv. 12(11), 1703-16 (2015)
2. Ristroph, K. et al. Nanoscale Adv. 1, 4207 (2019)