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BIGELS AS DRUG DELIVERY SYSTEMS

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DESCRIPTION

Bigels are systems that commonly result from mixing a hydrogel and an organogel: the aqueous phase is commonly formed by a hydrophilic biopolymer, whereas the organic phase comprises a gelled vegetable oil because of the presence of an organogelator. The quantity of the corresponding gelling agent in each phase, the organogel/hydrogel ratio, and the mixing temperature and speed all need to be taken into consideration for bigel manufacturing. Bigels, which are particularly useful drug delivery systems, have already been formulated for transdermal, buccal, and vaginal routes. Mechanical assessments and microscopy are the most reported characterization techniques. As we review here, their composition and unique structure confer promising drug delivery attributes, such as mucoadhesion, the ability to control drug release, and the possibility of including both hydrophilic and lipophilic drugs in the same system.

Gels are semi-solid systems comprising a liquid and a solid component in which the solid compound, the 'gelator', forms a 3D network that traps the liquid phase. The gelator is commonly used at concentrations below 15% w/v and increases the surface tension, thus preventing the flow of the solvent. Based on the the polarity of the liquid component, gels are classified into hydrogels and organogels. Hydrogels are gels the continuous stage of which is a polar solvent; usually water, whereas organogels contain apolar liquids, such as organic solvents or vegetable oils or mineral, as their continuous phase.

Hydrogels have some advantages as pharmaceutical forms for topical use, such as their comfort of preparation, non-oily nature, good spreadability, capability to increase stratum corneum hydration, cooling effect, and ease of elimination after application because they can be cleaned with water. All this converts into great acceptance by patients. However, they generally act as transporters of hydrophilic but not hydrophobic drugs and are less able to cross the stratum corneum of the skin. Organogels are also easy to make and their lipophilic nature means that they are able to dissolve hydrophobic drugs and increasing their penetrability through the stratum corneum. The main disadvantage of organogels is their oily nature, which delays their removal from the skin after application because of their stickiness and oily residues, leading to lower patient compliance.

Emulgels or emulsion gels were industrialized to overcome the drawbacks of hydrogels in terms of the release of hydrophobic drugs. They are biphasic systems, usually including a hydrophilic phase and a lipophilic phase, which display emulsion-like behavior and the continuous phase of which is gelled. Therefore, emulgels combine the features of emulsions and gels, and can be either emulsion hydrogels or emulsion. Researchers differentiate between 'bulk gel emulsions' and 'gel-filled emulsions' depending on whether the dispersed or continuous phase, respectively is gelled in the system. When only the dispersed phase is gelled, the system has a suspension-like behavior. In any case, emulgels have little structural stability owing to the different mechanical characteristics of their two phases, which produce systems in which both phases are organized. Although they are usually called 'bigels' or 'biphasic

gels' in the literature, some authors also refer to them as 'hybrid gels'.

CONCLUSION

Based on the structural arrangement of the hydrogel and the organogel, bigels can be classified as organogel-in-hydrogels, hydrogel-in-organogels, and bicontinuous bigels. The first are biphasic systems the oil phase of which is spread into the aqueous phase, and are the most broadly studied, whereas hydrogel-in-organogel bigels are less well known. Bigels have also been detected as complex matrix-in-matrix structures.