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Abstract

DABCO-functionalized nanoemulsions with antimicrobial properties for potential treatment of ocular myasthenia gravis

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Abstract: Ocular myasthenia gravis (OMG) is an autoimmune disease in which Ab is produced against proteins at the neuromuscular junction in the ocular district, causing inability to contract extraocular and eyelid muscles and thus leading to muscle weakness, diplopia, ptosis, and therefore difficulty in vision. In cases where treatment with Acetylcholinesterase inhibitors fails, oral corticosteroids are used. One way to avoid the side effects of systemic administration of these drugs is their local administration. However, by topical administration, the percentage of drug absorbed in the eye is less than 5%. The use of oil-in-water nanoemulsions (NEs) to deliver corticosteroids increases their bioavailability and improves their absorption. The use of DABCO as a cationic surfactant for the formulation of the NEs allows a controlled drug release over time, through electrostatic interaction with the negatively charged mucins in the tears. DABCO's antibacterial properties also allow it to act as a preservative, making it possible to avoid the use of preservatives in the formulation, which are often responsible for allergic reactions. In this work, DABCO S2-NEs were produced and characterised, leading to the definition of a delivery system akin to ocular delivery, supporting the hypothesis of their use in the treatment of OMG. It is also possible to consider functionalizing NEs with monoclonal antibodies (one of the latest treatments in the cure of the disease) to achieve a synergistic effect.

Keywords: cationic nanoemulsion, DABCO surfactant, quinuclidine surfactants

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