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Topical drug delivery systems included in poloxamer 407 gel: rheological characterization and release studies of model drug

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Poloxamer 407 copolymer is a well know thermo-reversible material. Hydrogels made up of Poloxamer 407 are characterized by specific rheological features. Among its several applications, the topical use of Poloxamer 407 gels is encouraged because of its non-occlusive behavior at body temperature and safety. To make its topical application more interesting and functional, a strategic approach in topical therapeutic treatments may be the inclusion of drug delivery systems, such as ethosomes, transfersomes and niosomes, into hydrogel poloxamer formulation. The evaluation of the interaction between colloidal carriers and the Poloxamer 407 hydrogel network is essential for a suitable design of an innovative topical dosage form. For this reason, the Rheolaser Master™, based on diffusing wave spectroscopy, and a Kinexus Rotational Rheometer were used to evaluate the influence of nanocarriers on the microrheological features of hydrogels. The results provide evidence that vesicular systems do not influence the rheological features of the gel, supporting the possibility to encapsulate an innovative system into a three-dimensional network. Moreover, we evaluated the influence of poloxamer gel on percutaneous permeation of paclitaxel-loaded nanosystems. Paclitaxel permeation is slowed down in presence of poloxamer gel, but the combination of poloxamer gel with drug delivery systems does not prevent a better partitioning of the drug, in comparison with the hydro-alcoholic solution of paclitaxel, chosen as model drug. These findings suggest that nanosystems included in three-dimensional network of poloxamer gel could be used to achieve a long-time release of lipophilic drugs [1].

[1] Cristiano, M.C. et al. Molecules **2020**, 25(8), 1979.