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Synthesis of poly(methy vinyl ether-alt-maleic acid)/Pluronic F127 co-polymer used in drug delivery

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Background and Aims: The present study has designed to explore synthesis method of poly(methyl vinyl ether–alt-maleic acid)(MVEM)/Pluronic F127(F127) copolymer for drug delivery. Pluronic F127 has been studied extensively as drug delivery vehicle due to its excellent biocompatibility and pronounced micellization behaviors. It can physically encapsulate drugs. To improve the capability of drug loading of Pluronic F127, it was grafted to poly(MVEM). Poly(MVEM) is an acidic polymer used to increase the stability and zeta potential of the micelles. The basic motivation for designing this copolymer is to obtain high drug loading within the designed carrier and controlled release of the drug can be achieved over the physiological pH range of 7.4 and 5. It is estimated that connecting the poly(MVEM) to Pluronic F127 increases drug loading and improved the stability of Pluronic F127 micelles.

Method: In this study, initially, we have synthesized copolymeric backbone of Pluronic F127 and ply(MVEM) in the presence of dicyclohexylcarbodiimide(DCC)/4-Dimethylaminophenol (DMAP) as activators of carboxlic group in dry DMSO under N_2 atmosphere for 24 h and 70 ˚C. After completion of reaction the purification of the resulting product was carried out by freeze-drying of crude product and dialyzing (MW cutoff 12 kDa) against absolute ethanol for 24 h. The purified product was then characterized using FTIR spectroscopy and ^{1}H NMR in DMSO as solvent.

Results: The structure of the synthesized copolymer product was confirmed by FTIR and ^{1}HNMR methods and according to these results two polymeric components are chemically bonded.

Conclusions: The production of Pluronic F127/poly(MVEM) copolymer is possible by DCC/DMAP chemical reaction and the designed copolymer are useful for drug loading by producing colloidal micelles.