Thermoresponsive copolymer: HPMA-CO-(APMA-R) polymer synthesis and physiochemical characterization

A limitation associated with cancer treatment arises from the problems in directing highly cytotoxic agents to the diseased tissues, low solubility in aqueous media and poor bioavailability. Many drug delivery systems have been devised to address this problem, including thermoresponsive polymers which show a change in physical properties in response to a change in surrounded temperature. In this study, a novel HPMA-CO-AMPA-R thermoresponsive copolymer has been prepared, which has the potential to act both drug delivery system and enhance the solubility of some poor water-soluble drug via grafted hydrophobic groups onto the primary amine group of APMA monomers using palmitoyl, dansyl, cholesteryl and 5-(4-chlorophenyl)-1,3,4-oxadiazole to incorporate into the HPMA copolymer at varied molar ratio. The products characterization was carried out by FTIR, NMR and zeta sizer. Drug loading and release abilities of HPMA-CO-AMPA-R copolymers were determined by using HPLC.

The result showed that all the HPMA-CO-APMA-R derivatives (6 mgmL-1, at initial drug:polymer loading ratio of 10:1) were successfully improved the aqueous solubility up to 394-fold in comparison with the aqueous medium method. (Figure 1).

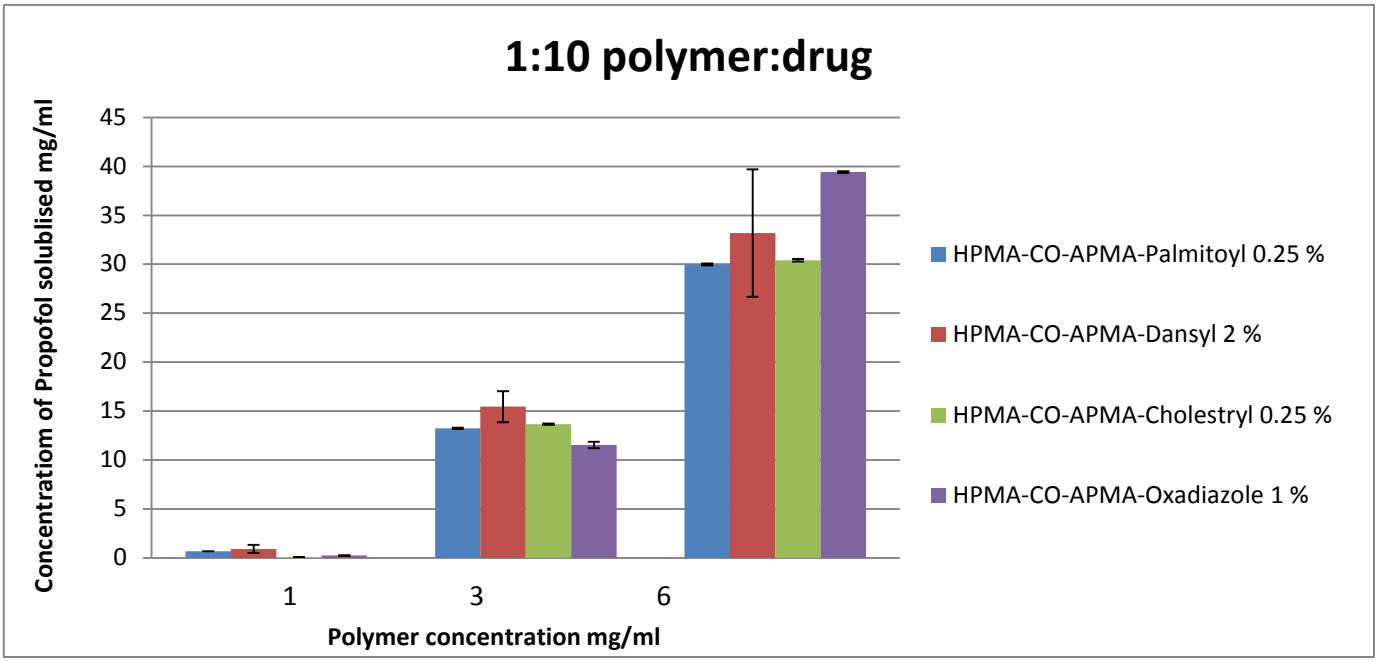

Figure (1): Maximum propofol concentration solubilised by each modified polymer