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GAMMA IRRADIATION-INDUCED SYNTHESIS AND CHARACTERIZATIONS OF POLYMERIC NANOGELS FOR CURCUMIN ENTRAPMENT

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SUMMARY

One of the most important aspect for biomedical nanogels is its purity from cytotoxic agents such as carcinogens and irritants which are normally associated with nanogels through the use of chemical crosslinkers and accelerants such as N,N'-methylenebisacrylamide and tetramethylethylenediamine, respectively. In this study, biocompatible nanogels from N-isopropylacrylamide/polyethylene glycol diacrylate/polyvinyl pyrollidone (NIPAAM/PEGDA/PVP) was synthesized using gamma irradiation-induced copolymerization technique – the novelty of this technique was that it involved no chemical crosslinkers and accelerants. The chemical effects of irradiation dose on the synthesis of the nanogels was studied using Fourier Transform Infra-Red (FTIR) and Nuclear Magnetic Resonance (^{1}H-NMR). Properties such as molecular weight, radius of gyration, radius of hydration, intrinsic viscosity, and generalized factor were studied using static and dynamic light scattering methods. FTIR analysis revealed complete polymerization and monomer depletion. Likewise, ^{1}H-NMR spectra revealed that polymerization and chain saturation occurred. Light scatterings data suggests that highly stable, monodispersed nanogels with size between 60 to 110 nm can be obtained by manipulating irradiation doses. In vitro studies results show that the nanogels enhance the efficacy of the curcurmin in inhibiting breasts cancer and liver cancer cells growth.