

Development of Composition and Technology of Vincristine Nanoparticles Using High-Molecular Carbohydrates of Plant Origin

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Abstract : Current cancer therapy strategies are based on surgery, radiotherapy and chemotherapy. The problems associated with chemotherapy are one of the biggest challenges for clinical medicine. These include: low specificity, broad spectrum of side effects, toxicity and development of cellular resistance. Therefore, anti-cancer drugs need to be developed urgently. Particularly, in order to increase efficiency of anti-cancer drugs and reduce their side effects, scientists work on formulation of nano-drugs. The objective of this study was to develop composition and technology of vincristine nanoparticles using high-molecular carbohydrates of plant origin. Plant polysaccharides, particularly, soy bean seed polysaccharides, flaxseed polysaccharides, citrus pectin, gum arabic, sodium alginate were used as objects. Based on biopharmaceutical research, vincristine containing nanoparticle formulations were prepared. High-energy emulsification and solvent evaporation methods were used for preparation of nanosystems. Polysorbate 80, polysorbate 60, sodium dodecyl sulfate, glycerol, polyvinyl alcohol were used in formulation as emulsifying agent and stabilizer of the system. The ratio of API and polysaccharides, also the type of the stabilizing and emulsifying agents are very effective on the particle size of the final product. The influence of preparation technology, type and concentration of stabilizing agents on the properties of nanoparticles were evaluated. For the next stage of research, nanosystems were characterized. Physicochemical characterization of nanoparticles: their size, shape, distribution was performed using Atomic force microscope and Scanning electron microscope. The present study explored the possibility of production of NPs using plant polysaccharides. Optimal ratio of active pharmaceutical ingredient and plant polysaccharides, the best stabilizer and emulsifying agent was determined. The average range of nanoparticles size and shape was visualized by SEM.

Keywords : nanoparticles, target delivery, natural high molecule carbohydrates, surfactants

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