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Encapsulation of gastric tumor lysate in PLGA nanoparticles as antigen delivery system for anti-tumor vaccines

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Background and Aims: Gastric cancer is one of the most common cancers in the world despite efforts to treat; it is difficult to control in advanced stages. Nanomaterials and nanotechnologies could provide potential solutions. The aim of this study is the use of poly (lactic-co-glycolic acid) (PLGA) nanoparticles as antigen delivery system. Encapsulation of tumor lysates in PLGA is a promising approach to enhance efficiency of antigen delivery for anti-tumor vaccines.
Methods: For preparation of tumor lysates, fresh tumors were obtained from patients with gastric cancer. The antigens (protein) obtained from tumor lysates were encapsulated in PLGA copolymers (50% lactide: 50% glycolide).PLGA nanoparticles were fabricated by a solvent evaporation method from a water/oil/water. Polyvinyl alcohol (0.5% PVA) was used as stabilizer. The nanoparticles (NPs) were lyophilized and then characterized by Scanning electron microscopy (SEM). For assessment of encapsulation efficiency, NPs were degraded in NaOH-SDS solution and evaluated with protein assay. The rate of protein released was measured during 7 days with Bradford test and for this, NPs was dissolved in PBS.
Results: SEM was used to determine the size and morphology of NPs, following the average size of NPs was in the range of 250-450 nm. Granular and separated morphology of NPs detected. The efficiency of encapsulation was sufficient and rate of protein released increased.
Conclusions: many factors could affect on the size of NPs such as time of sonication, amount and concentration of PVA. Effective size of nanoparticles for biological systems is less than 500 nm.

Keywords: PLGA nanoparticle; Gastric cancer; Tumor lysate; NPs encapsulation