The influence of ascorbic acid loaded solid lipid nanoparticles on cancer cells

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The current focus in development of cancer therapies is on targeted drug delivery to provide therapeutic concentrations of anticancer agents at the site of action. Nanoparticles are excellent tumour-targeting vehicles on account of a unique inherent feature of solid tumours. Colloidal nanoparticles incorporating anticancer agents can overcome to drug action, rising the selectivity of drugs towards cancer cells and reducing their toxicity towards normal cells [1-2].

SLNs are colloidal carriers developed in the last decade as an alternative system to the existing traditional carriers (emulsions, liposomes and polymeric nanoparticles). SLN are of unique properties; small size, large surface area and high drug loading. Solid lipid nanoparticles (SLN) provide controlled drug release profiles and minimize the adverse side effects [3-4]. The natural antioxidant ascorbic acid was selected as surfactant for the preparation of SLN. Ascorbic acid is a water-soluble, enhance immune system, stimulate collagen formation and inhibition of hyaluronidase [5]. In this study, we were prepared ascorbic acid loaded solid lipid nanoparticles by the hot high pressure homogenization technique in order to determine the cytotoxic effect of these particles as well as the ultrastructural changes of cancer cells.

As a result of this study; we found that ascorbic acid loaded solid lipid nanoparticles have cytotoxic and apoptotic effects on cancer cells while they don't have these effects on normal cells. TEM studies indicate that ascorbic acid loaded solid lipid nanoparticles cause ultrastructural changes of tumor cells. We observed mitochondrial changes, defect a crista membrane as well as increasing the number of lysosomes and vacuoles. Ascorbic acid loaded solid lipid nanoparticles accumulated in cytoplasm especially nucleus membrane.

In this study, ascorbic acid was successfully incorporated into SLN by hot homogenization technique and these nanoparticles have significantly effects on cancer cells. This study may be developed to use different preparation techniques and in vivo studies.

References

[1] N.A. Kshirsagar. Indian Journal of Pharmacology **32** (2000), p.54-61.
[2] K.K. Jain. Technology in Cancer Research & Treatment, **4(4)** (2005), p.311-313.
[3] L.E. Vlerken and M.M. Amiji. Expert Opin. Drug Deliv. **3(2)** (2006), p. 205-216.
[4] M. Uner. Pharmazie **61** (2006), p.375-386.
[5] K.A. Head. Altern Med Rev **3(3)** (1998), p.174-186

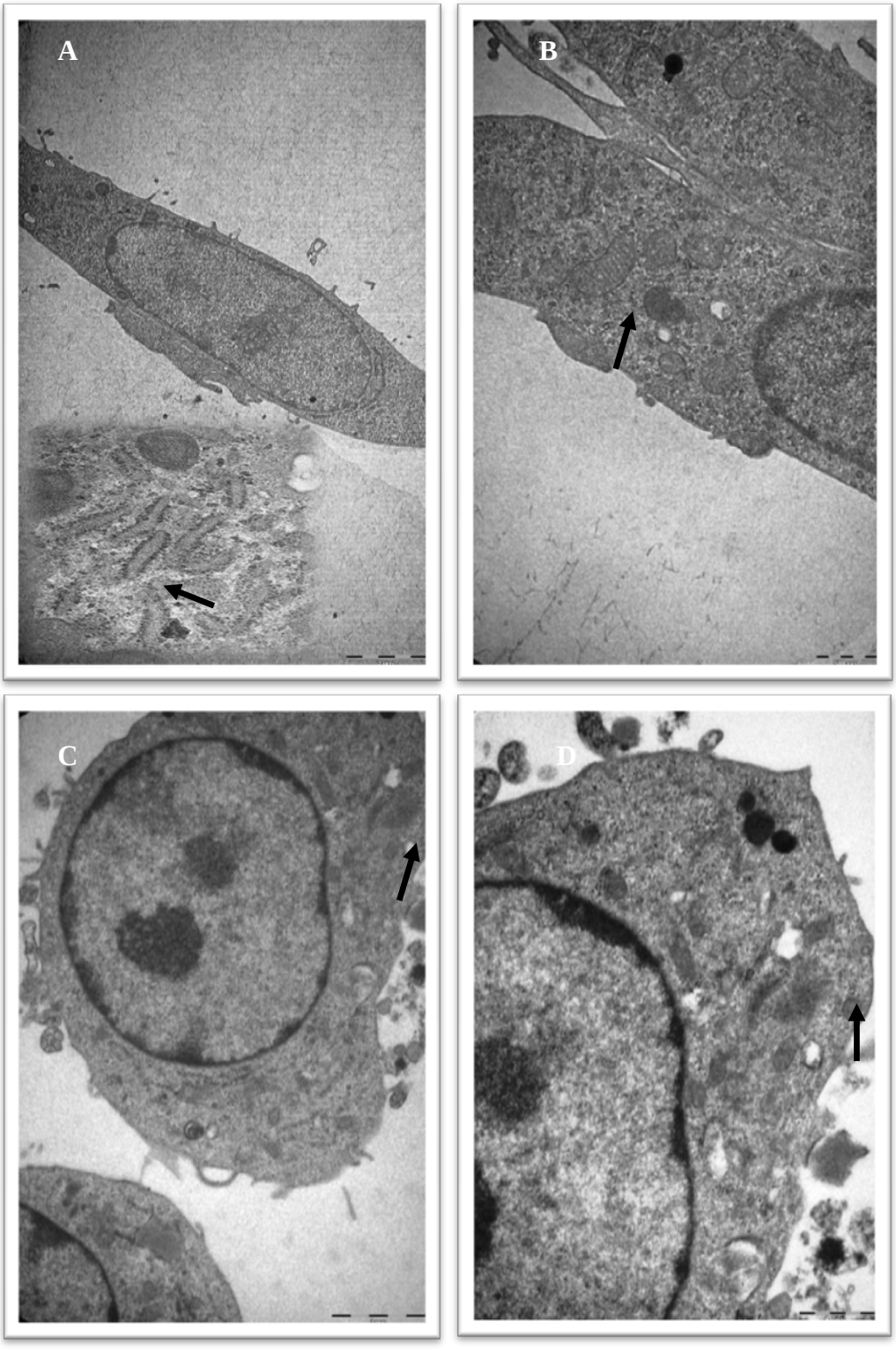

Figure 1. *TEM images of fibroblast cancer. The control group* ***(A)*** *X9900* ***(B)*** *X26500, treated ascorbic acid loaded solid lipid nanoparticles* ***(C)*** *X8200* ***(D)*** *X87000*