Experimental treatment of breast cancer-bearing BALB/c mice by artemisinin and transferrin-loaded magnetic nanoliposomes

Amir Gharib1*, Zohreh Faezizadeh1, Seyed Ali Reza Mesbah-Namin2, Ramin Saravani3

1Department of Laboratory Sciences, Borujerd Branch, Islamic Azad University, Borujerd, Iran; amirgharib@gmail.com 2Department of Clinical Biochemistry, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran; 3Department of Biochemistry, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran

The combination of artemisinin and transferrin exhibits versatile anticancer activities. In previous, we successfully prepared artemisinin and transferrin-loaded magnetic nanoliposomes and evaluated their anti-proliferative activity against MCF-7 and MDA-MB-231 cell lines in vitro [1]. In this study, we investigate the in vivo anti-breast cancer activity of artemisinin and transferrin-loaded magnetic nanoliposome against breast transplanted tumors in BALB/c mice model. Artemisinin and transferrin-loaded magnetic nanoliposomes as shown in Figure 1 were prepared and characterized for some physiochemical properties. Pieces of tumor tissue from the breast cancer-bearing BALB/c mice were transplanted subcutaneously to the syngeneic female BALB/c mice. In the presence of the external magnet that placed at the breast tumor site, the tissue distribution and tumor-suppressing effects of prepared nanoliposomes on tumor growth was evaluated. The prepared nanoliposomes have fine spherical shape, rough surface, nano-sized diameter and magnetic properties. At 2h after treatment, the intravenous administration of artemisinin and transferrin-loaded magnetic nanoliposomes followed using the magnetic field approximately produced 10-fold higher levels of artemisinin and transferrin in the tumors, respectively, compared with free artemisinin and transferrin. Moreover, in the presence of an external magnetic field, the prepared nanoliposomes could significantly induce apoptosis in the mice breast cancer cells as well as could reduce tumor volume in tumorized mice at 15 days after treatment.