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Preparation and tumor-suppressing effects of folic acid-targeted temperature-sensitive magnetoliposomes in ovarian cancer

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Background & Aim: Ovarian cancer is a tumor with a poor prognosis. It is a common gynecological malignancy and because of the heat sensitivity and the unique nature of ovarian cancer development, the development of effective anti-ovarian cancer techniques involving hyperthermia may have clinical value. We prepared folate-targeted thermosensitive liposomes wrapped with 17-AAG chemotherapy drugs and superparamagnetic material (17-AAG/MTSLs-FA) and assessed combined magnetic fluid hyperthermia with ovarian cancer SKOV3 cells *in vitro* and *in vivo*.

Methods: The magnetic thermosensitive liposomes wrapped with 17-AAG chemotherapy drugs and chemically co-precipitated Fe3O4 magnetic nanoparticles were prepared by a rotary evaporation method. The liposome morphology and distribution was observed using TEM, particle size and zeta potential were measured by a dynamic light scattering method, drug encapsulation efficiency was detected by UV spectrophotometry and the temperature- controlled release properties were determined by a dialysis method. Experiments were conducted using the SKOV3 human ovarian cancer cell line and MCF7 human breast carcinoma cells to evaluate anti-tumor effects.

Results: 17-AAG/MTSLs-FA prepared in this study met the basic requirements; the preparation method is simple and the raw materials are readily available. The product exhibited strong magnetic and high encapsulation efficiencies, good performance and low toxicity. The liposomes combined with hyperthermia inhibited the proliferation of human ovarian cancer SKOV3 cells significantly and induced apoptosis. There was an intergroup difference in doubling time *in vitro* and *in vivo* ($P<0.05$).

Conclusions: Folic acid-conjugated 17-AAG magnetic thermosensitive liposomes in combination with an alternating magnetic field for heating can achieve a combined synergistic anti-tumor effect of the chemotherapy and heat treatment, potentially offering a new method for ovarian cancer treatment.

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