In vitro exploration of the synergistic effect of alternating magnetic field mediated thermo-chemotherapy with doxorubicin loaded dual pH- and thermo-responsive magnetic nanocomposite carriers

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Supplementary:

1. Intracellular MNPs quantification

To be able to compare both treatment methods, the concentration of nanoparticles used during the hyperthermia treatment must be the same. In order to determine what is the amount of nanoparticle being internalised by the cells after 24 h, the number of cells at the time of the hyperthermia treatment is essential. Under optimal conditions, a cell population in a culture will increase exponentially. Exponential growth of a cell population N at the growth rate r, as time t goes on in discrete intervals can be expressed by equation:

$$(t) = N_0\,(1 + r)$$

Where N_0 is the number of cells at time 0. The growth rate could be easily determined from counting cells from a passage to the next one. Therefore, the cell number at the time of the hyperthermia treatment could be calculated and was found to be equal to 600,000 cells. Previously cellular uptake of the MNCs using a SQUID magnetometer was quantified in Table 1. Under the same conditions, it was shown that an average of 125 pg (Fe_3O_4)/cell was internalised. Thus, it can be concluded that a total of 75 µg of MNCs is internalised in the cells.

2. The real-time heating curve of intracellular and extracellular thermo-chemotherapy.

The heating curves have been produced by recording the temperature during the AMF application and after the NPs internalisation. The oscillations of the temperature observed in every curve is due to the cooling water running through the inductor coil used to avoid parasitic heating and to maintain the cell sample at physiological temperature 37 °C or other value chosen for the test.

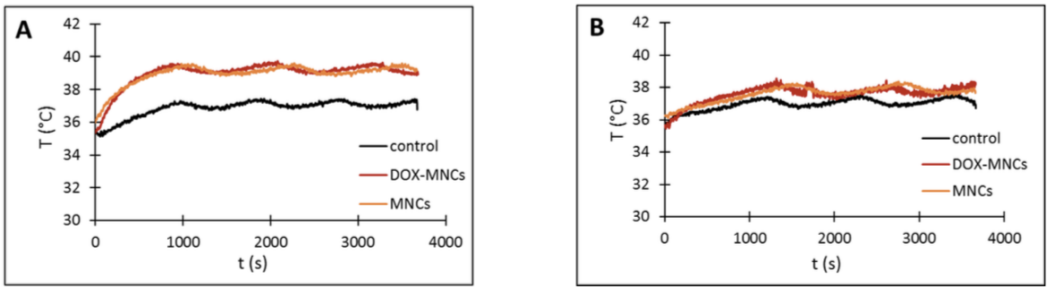

Figure. S1 A) U-87 cells and B) MCF-7 cells suspensions dispersed in DMEM supplemented with 10% FBS after internalisation of MNCs or DOX-MNCs and subjected to an AMF (f = 950 kHz and H = 10.5 kA/m). Control cells were not treated with nanoparticles.

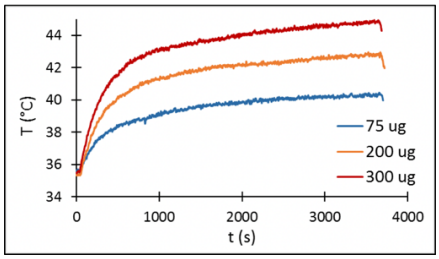

Figure. S2 Local environment temperature of cells suspensions dispersed in DMEM supplemented with 10% FBS containing 75 µg, 200 µg or 300 µg of MNCs and subjected to an AMF (f = 950 kHz and H = 10.5 kA/m).