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Magnetic properties and antitumor effect of nanocomplexes of iron oxide and doxorubicin

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We will be presenting preliminary clinical data demonstrating the effectiveness of our approach in anti cancer treatment. Our protocols are based on electromagnetic irradiation and on magnetic nanotechnology. Our protocols are given as complementary treatment methods and also have the potential to be used as a substitute of chemotherapy. Our data from human studies demonstrate that our protocol can increase the efficacy of chemotherapy by 15% to 20% (mainly for breast cancer patients). The protocol is based on electromagnetic irradiation that induces mild hyperthermia and increases free radical activity. We also present a second generation technology based on magnetic nanocomplexes comprised of magnetic nanoparticles and anticancer drugs such as doxorubicin. We also present a technology and magneto-mechanical milling chamber for the magneto-mechano-chemical synthesis (MMCS) of magnetosensitive complex nanoparticles (MNC) comprising nanoparticles Fe3O4 and anticancer drug doxorubicin (DOXO). Magnetic properties of MNC were studied with vibrating magnetometer and electron paramagnetic resonance. Under the influence of mechano-chemical and MMCS, the complex showed hysteresis curve, which is typical for soft ferromagnetic materials. Combined action of constant magnetic fieldand radio frequency moderate inductive hyperthermia (RFH) below 40 °C and MNC was found to induce greater antitumor and anti-metastatic effects as compared to conventional DOXO.

Biography

Thanos Mitrelias is a Scientist and Entrepreneur based in Cambridge, UK. He has more than 16 years of expertise in scientific and entrepreneurial activities. He is affiliated with the Department of Physics of the University of Cambridge since 2001. He is the Founding CEO of two spin off companies from the University of Cambridge: Cambridge BioMagnetics, developing a platform technology to address needs in healthcare and in the Oil and Gas industries and Cavendish NanoTherapeutics developing technologies and medical systems aimed at increasing the efficacy of chemotherapy for cancer treatment based on magnetic nanotechnology.

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