

Hybrid magnetic nanoparticles for nano medicine and immune therapies Giovanni BALDI –

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The development of new therapeutic tools that are highly selective, specific, and capable of delivering drug treatments at therapeutic levels while avoiding systemic side effects and immune system clearance is crucial. Achieving targeted and personalized therapy is a mandatory goal in modern medicine. In this study, we developed a reproducible and highly scalable method for preparing stable suspensions of a nanocarrier system composed of magnetic iron oxide nanoparticles embedded in a biocompatible and bio-erodible polymeric matrix and loaded with Curcumin, derived from *Curcuma longa*. This hybrid system is highly suitable for integration into human cytotoxic T lymphocytes specific for A375 melanoma cells. The resulting system is sensitive to exposure to electromagnetic fields (in the range of kHz), making it suitable for Magnetic Fluid Hyperthermia (MFH). The A375-specific cytotoxic T cells loaded with the iron oxide-based nanoparticles were injected systemically and/or intra-tumorally in a human xenograft mouse model of melanoma, in combination with MFH. This anticancer treatment significantly reduced the growth of melanoma tumor mass in mice compared to the control. Our findings present a novel and specific tool for anticancer treatment, offering new perspectives in nanomedicine.