HYPERTHERMIC NANOPARTICLES TO TRIGGER LIPOLYSIS

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During last years, evidence has been provided on the involvement of obesity in the pathogenesis and aggravation of several life-threatening diseases. In this view, we set up an innovative protocol to induce a nanoparticle-mediated lipolysis in vitro by combining light and electron microscopy, and biochemical approaches. Under appropriate administration conditions, 3T3-L1 mouse adipocytes proved to efficiently and safely internalize superparamagnetic iron oxide nanoparticles (SPIONs), which are able to produce heat when subjected to alternating magnetic field (1-3). Thus, 3T3-L1 adipocytes were submitted to SPIONs-mediated hyperthermia treatment (SMHT), with the aim of modulating their lipid content (4,5). The treatment resulted in a significant delipidation persisting for at least 24 h, in the absence of cell death, damage or dedifferentiation. Interestingly, some factors normally linked with lipolysis event or in lipid metabolism (6) were not modulated upon SMHT, suggesting the involvement of a novel/alternative mechanism in the lipolysis observed. Notably, the same SMHT was able to induce delipidation also in primary cultures of human adipose-derived adult stem cells. The success of this new approach *in vitro* opens promising perspectives for the application of SMHT in different biomedical fields. Next steps could be the use of SPIONs in an animal model of obesity, to analyze the metabolic pathways activated by the SMHT, and the application of SMHT in an experimental model of cancer in obese mice to study the crosstalk between adipose and tumor tissues.

References

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