NanoInnovation 2024

Preliminary NMR characterization of gold nanorods developed for drug delivery systems in Glioblastoma cells

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Nuclear Magnetic Resonance is a very powerful and non-invasive technique for the study of biological systems *in vitro*. NMR may provide information on cultured tumour cell metabolism, aiming to an increased knowledge of cell response to anti-cancer therapies.[1] In particular, once identified the most relevant metabolic signals (spectroscopic markers), their variations can give insight on the response of tumour cells to different treatments, including drug delivery systems based on gold nanorods (AuNRs).[2] AuNRs have emerged as a promising tools in the field of drug delivery due to their unique optical and physicochemical properties. These nanostructures exhibit a high aspect ratio and tunable surface which can be easily modified via chemical synthesis, with various targeting ligands (e.g. peptides, antibody) and drugs; thanks to these distinctive characteristics, they can be extensively used for cancer treatment in nuclear medicine.[3]

This work focused on the synthesis and characterization of AuNRs, stabilized with cetyltrimethylammonium bromide (AuNRs-CTAB). Moreover, some preliminary results obtained by NMR spectroscopy on the metabolic response of glioblastoma cells line (T98G) to AuNRs treatment at a known concentration, for different times (6 and 24 hours) will be shown. One- and two-dimensional COSY ^{1}H NMR spectra have been acquired at different times after AuNR treatment to characterize the metabolic profile of T98G cells, and to identify the main observable metabolic signals. Understanding how the cell's metabolism is affected by the presence of AuNRs is a fundamental starting point for subsequent investigations on the effects induced in these cells by drug-loaded AuNRs, also in combination with radiation, to study a possible synergetic effect.