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LIBRO degli ABSTRACT

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Cytotoxic effects of silver nanoparticles (AgNPs) biosynthesized from *Klebsiella Oxytoca* DSM29614 against breast cancer cells

M. Buttacavoli[1], N. N. Albanese[2], G. Gallo[1], A. M. Puglia[1], C. Faleri[3], M. Gallo[4], F. Baldi[4], S. Feo[1], P. Cancemi[1,2]

1. Dipartimento di Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche (STEBICEF), Università degli Studi di Palermo, Italy; 2. Centro di Oncobiologia Sperimentale (C.OB.S.), Oncology Department La Maddalena, Palermo, Italy; 3. Dipartimento Scienze della Vita, Università di Siena, Siena, Italy; 4. Dipartimento di Scienze Molecolari e Nanosistemi, Università Cà Foscari Venezia-Mestre, Italy.

Klebsiella oxytoca DSM29614 (KO) produces a bacterial exopolysaccharides (EPSs), made of four rhamnose (Rha), two glucuronic acids (GlcA) and one galactose (Gal) bound by α and β glycosidic bonds[1,2], with metal-binding properties[3]. In particular, KO in the presence of $AgNO_3$ is able to synthesize silver nanoparticles (AgNPs) incorporated within the EPS (AgNPs-EPS). The AgNPs-EPS, may contain Ag^{+1} when KO growing in the presence of oxygen and Ag° under anaerobic conditions[4]. Currently, AgNPs are preferred to other metal nanoparticles due to its reliability and intrinsic properties such as cytotoxic and antimicrobial effects. Infact, silver is less toxic for humans when compared to other metals. In the present work were checked the cytotoxic effects of AgNPs-EPS, produced under aerobic and anaerobic conditions, on breast cancer cell line SK-BR3, monitoring: the cell proliferation inhibition rate, morphological changes and proteomic modulations. MTT assay showed significant antiproliferative activity with IC_{50} value of 5μg/ml. The most important effects were obtained by aerobically biosynthesized AgNPs-EPS treatment, due to the major release of Ag^{+1}, as verified by voltammetry analysis. Morphological alterations were consistent with apoptotic features. Proteomic analysis performed by 2D-DIGE, showed modulation of several proteins related to oxidative stress and apoptotic and mitochondrial pathways. Taken together, these results provide new important elements in support of the potential antitumoral activity of AgNPs-EPS.

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Biotinylated Reduced Graphene Oxide-Based Nanocomposites for the Photothermal Treatment of Brest Cancer

N. Mauro[1], C. Scialabba[1], M. Licciardi[1,2], A. Li Volsi[1], G. Cavallaro[1] and G. Giammona[1,2]

1. Laboratory of Biocompatible Polymers, Department of "Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche" (STEBICEF), University of Palermo, Via Archirafi, 32 90123 Palermo, Italy; 2. Mediterranean Center for Human Advanced Biotechnologies (Med-Chab), Viale delle Scienze Ed.18, 90128 Palermo, Italy

Among the relevant properties of graphene derivatives, their ability of acting as an energy-converting tool to produce heat (i.e., thermoablation and hyperthermia) was more recently taken into account for the treatment of solid tumors. In this work the in vitro graphene-induced hyperthermia was assessed and combined with the stimuli-sensitive anticancer effect of a biotinylated inulin-doxorubicin conjugate (CJ-PEGBT), hence, getting to a nanosystem endowed with synergic anticancer effects and high specificity. CJ-PEGBT was synthesized by linking pentynoic acid and citraconic acid to inulin. The citraconylamide pendants, used as pH reversible spacer, were employed to conjugate doxorubicin, whereas the alkyne moiety was orthogonally functionalized with a targeting agent (azido PEG-biotin derivative) by copper(II) catalyzed 1,3-dipolar cycloaddition. DSC measures, AFM, and UV spectrophotometry were employed to systematically investigate adsorption of CJ-PEGBT onto reduced graphene oxide (RGO) and its physicochemical stability in aqueous media, demonstrating that a stable π-staked nanosystem can be obtained. In vitro tests using cancer breast cells (MCF-7) showed the ability of the RGO/CJPEGBT of efficiently killing cancer cells both via a selective laser beam thermoablation and hyperthermia-triggered chemotherapy. If compared with the