

The Antimelanoma Biological Assessment of Triterpenic Acid Functionalized Gold Nanoparticles



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Triterpene-gold nanoparticle (GNP) conjugates elicit a significant decrease in cell viability vs. control at 25 and 50 μ M concentrations in A375 melanoma cells

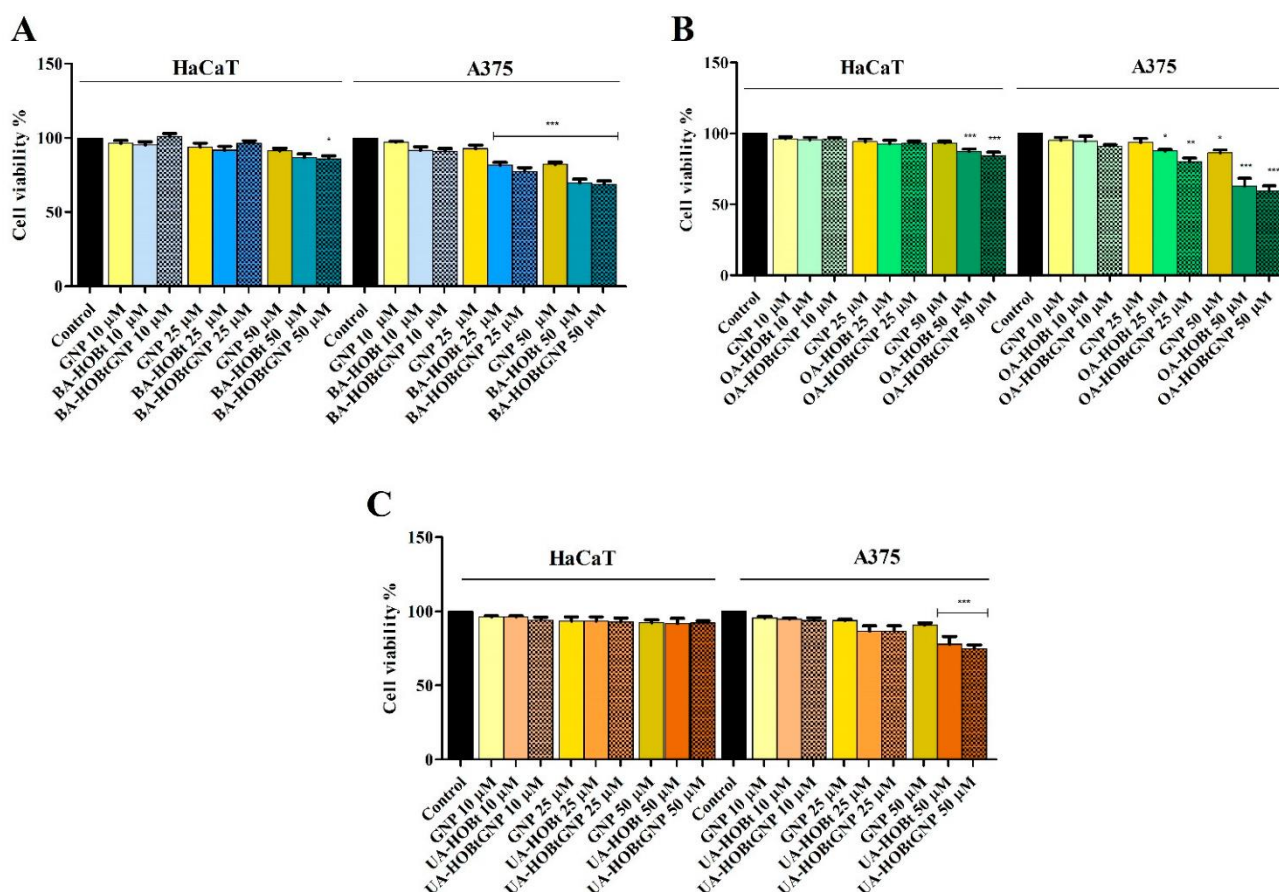


Figure 1. Cell viability of immortalized human keratinocytes (HaCaT) and human melanoma cells (A375) after 24 h of treatment with 10, 25 and 50 μ M of GNP- conjugated benzotriazolyl esters of betulinic acid (BAHOBtGNP) (A), oleanolic acid (OAHOBtGNP) (B) and ursolic acid (UAHOBtGNP)(C) determined using the Alamar Blue assay. The results are expressed as cell viability percentage (%) normalized to control (100 %) and are represented along with previously reported viability data for the unformulated triterpenic acid -benzotriazole esters tested in the same conditions, in order to evaluate the effect of the nanoformulation. The data represent the mean values \pm SD of three independent experiments performed in triplicate. Statistical differences vs. control were determined using one-way ANOVA analysis followed by Bonferroni multiple comparisons post-test (* $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$).

GNP-conjugated benzotriazolyl esters of betulinic (BAHOBtGNP), oleanolic (OAHOBtGNP) and ursolic (UAHOBtGNP) acids inhibit the mitochondrial respiration of A375 melanoma cells

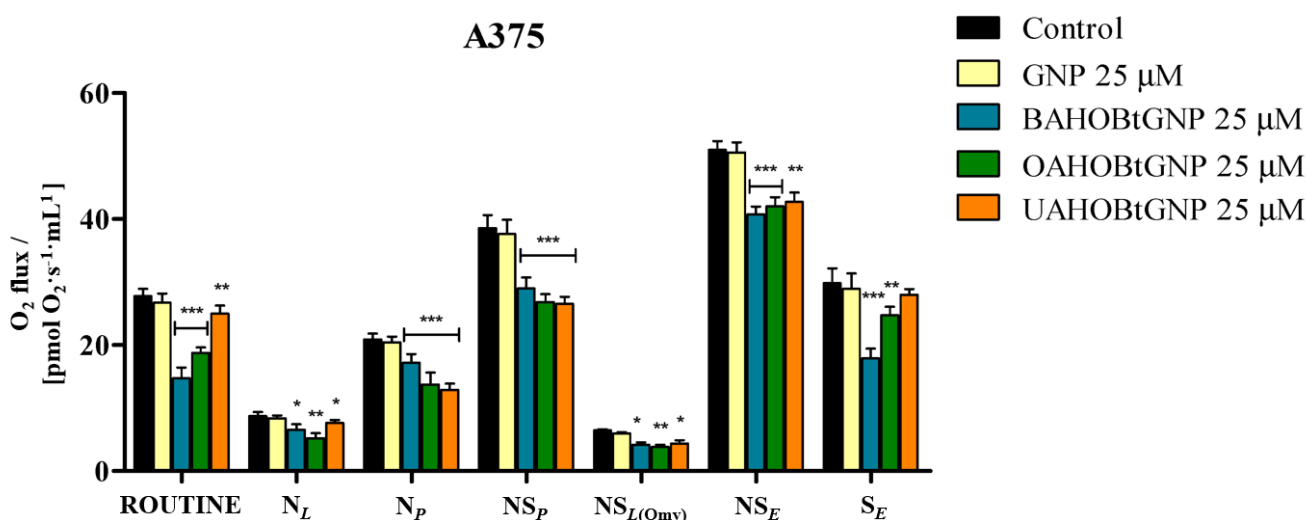


Figure 2. Respiration of permeabilized human melanoma cells (A375) following 24 h stimulation with 25 μM GNP, GNP-conjugated benzotriazolyl esters of betulinic acid (BAHOBtGNP), oleanolic acid (OAHOBtGNP) and ursolic acid (UAHOBtGNP). Data represent the mean ± SD of five individual experiments. Values with $p < 0.05$ were considered to have a statistically significant difference (* $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$). The respiratory states displayed are the following: ROUTINE — respiration of cells suspended in a substrate-free media, supported by endogenous ADP; N_L — LEAK respiration in absence of ADP driven by exogenous N-pathway substrates; N_P — OXPHOS state dependent on N-pathway substrates and exogenous ADP; NS_P — OXPHOS state driven by both N and S-pathways; NS_{L(Omy)} — LEAK respiration induced by oligomycin; NS_E — maximal respiratory capacity of the electron transport system in the fully noncoupled state; S_E — maximal capacity of the electron transport system dependent only on the S-pathway.

Triterpenic acids have strong anticancer properties and the nanoformulations using gold as the carrier significantly improved their bioavailability. In this formulation, three triterpenic compounds proved cytotoxic against melanoma cells with no signs of toxicity against normal human keratinocytes. These antitumoral properties arise from decreasing mitochondrial respiration.

Reference: Mioc M, Mioc A, Racoviceanu R, Ghiulai R, Prodea A, Milan A, Barbu Tudoran L, Oprean C, Ivan V, Șoica C (2023) The antimelanoma biological assessment of triterpenic acid functionalized gold nanoparticles. <https://doi.org/10.3390/molecules28010421>

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