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## Differential growth inhibition of Saccharomyces cerevisiae UE-ME3 and BY4741 by titanium dioxide nanoparticles in heat-shock conditions depends on glutathione reductase activity

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Nanoparticles of titanium dioxide, widely used as pigments or cosmetics, are usually found in molecular size $< 100$ nm. Sometimes, their poor thermal stability and large surface area can be correlated with their reactivity to cause changes in gene expression that may be used as biomarkers of exposure and cytotoxicity. Although the nanomaterials may be useful in medicine, their exposition to air or ultraviolet radiation for time periods as short as 30 min, makes them redox actives agents that induce lipid peroxidation and glutathione depletion, cytotoxic responses, that cause changes in permeability or conductivity of biological membranes. The main purpose of this work was to compare the response of *S. cerevisiae* UE-$ME_3$, a wine wild-type strain and BY4741, an invitrogen strain, to $TiO_2$-NP exposition in heat-shock conditions. Cells growing at mid exponential phase in liquid YEPD medium with 2% (w/v) glucose, at 28°C, were dark-exposed to heat-shock of 40°C and 0.1 or 1.0 μg/ml of $TiO_2$-NP, during 200 min, prepared by sonication, at same temperature conditions. Samples of each treatment were used to obtain the post-12 000 ***g*** supernatant for determination of dry weight, proteins, and glutathione contents as well as GR and GPx activities. The results show that heat-shock (28/40°C) caused a significant decrease in proteins and dry weight of BY4741 and UE-$ME_3$ strains, response that was accompanied by an increase in glutathione content and GSH/GSSG ratio, more pronounced in the BY4741 strain as well as a decrease in GR activity, case more pronounced in wild-type strain. Exposure to titanium dioxide nanoparticles (0.1 and 1 μg/ml) in heat-shock conditions induced a significant decrease in biomass, of UE-$ME_3$ strain followed by a significant decrease of GR and GPx activities. The best survival of BY4741 cells to $TiO_2$-NP seems related with an increase of GR activity, directly dependent of exposure level ($r = 0.9996$). The modeling of GR activity seems critical to regulate the growth inhibition of proliferating cells by heat-shock and titanium dioxide nanoparticles.