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S8. Titanium dioxide nanoparticles inhibits *Saccharomyces cerevisiae* BY4741 proliferation, modifying the profile of antioxidant response

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Abstract

Nanotechnology releases substances into the environment with size below 100 nm whose physicochemical properties are poorly known. In the case of metal nanoparticles, their dimension is often important, since their surface area increases as molecular size decreases, causing alterations in their magnetic and thermodynamic properties. Consequently, the influence they exert on life is an attractive topic of research in biochemical toxicology by the novelty of their behavior. Although titanium dioxide (TiO_2) has been used over the years as inert substance as drugs additive or cosmetics products, there are scarces studies about biological effects of titanium dioxide nanoparticles (TiO_2-NP) in eukaryotic cells. Therefore the aim of this study was to evaluate how TiO_2-NP with molecular size between 50 and 100 nm affect cell proliferation and antioxidant capacity of unicellular eukaryote *Saccharomyces cerevisiae*. *S. cerevisiae* BY4741 belonging to the Eurocast collection growing at mid exponential phase in liquid YEPD medium with 2 % (w/v) glucose, at 25 ºC, were exposed during 200 min to 0.1 or 1.0 µg/mL of TiO_2-NP, previously prepared by sonication, at same temperature conditions. Samples of each treatment were used to obtain the post-12000 *g* supernatant for proteins contents (Lowry, 1951), antioxidant power (DPPH) (Brand-Wiliam, 1995), ALP (Bretaudiere, 1984) and LOX (Gata, 1996) activities determination. The post-12000 *g* pellet has been also used to determine the protein content and CAT A (Lushachak, 2005; Todorova, 2006) activity. The results show that TiO_2-NP caused a significant decrease of antioxidant power (DPPH), ALP and CAT A activities, as well as a significant increase in LOX activity ($p < 0.05$). This response profile suggest that proliferative ability of BY4741 yeast strain, at 25ºC, is strongly disturbed by 0.1 or 1.0 µg/mL TiO_2-NP exposition, probably due a decrease in antioxidant ability to scavenger free radicals estimated by DPPH or glutathione, and peroxisomal catalases.

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