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Glucose-6-phosphate dehydrogenase of *Saccharomyces cervisiae* decreased in presence of titanium dioxide nanoparticles after heat-shock treatment

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The *in vivo* toxicity of titanium nanoparticles is manifested by the induction of inflammatory states or by the occurrence of genotoxic and cytotoxic effects that usually depend on the particle size and, therefore its surface area, photocatalytic activity and their tendency to aggregate. However we not found studies in the literature on the importance of temperature on the biological effects of nanoparticles in unicellular eukaryotes. Consequently, the main purpose of this work was to evaluate the effect of temperature in *Saccharomyces cerevisiae* growth, when exposed to nanoparticles of titanium dioxide. *S. cerevisiae* UE-ME3, wild-type yeast, belonging to the enology laboratory collection of University of Évora, and BY4741, a Invitrogenese strain, growing at mid exponential phase in liquid YEPD medium with 2% (w/v) glucose, at 25, 28, 30 or 40°C, were exposed during 200 minutes, to 0.1 or 1.0 micg/ml of titanium dioxide nanoparticles, prepared by sonication, at same temperature conditions, except in case of cells grown at 28°C that were also further exposed to 40 Celsius degrees, during the same range time (200 minutes). Samples of each treatment were used to obtain the post-12000 g supernatant, which were used for protein content and glucose-6-P dehydrogenase (EC 1.1.1.49) activity determinations. The results show that UE-ME3 strain exhibit a glucose-6-P dehydrogenase activities levels higher than values expressed by BY4741 strain, growing in the temperature ranging from 25 to 30°C. The titanium dioxide nanoparticles caused a significantly decrease of the same enzymatic activity ($p < 0.01$) in UE-ME3 (10%) and BY4741 (16%) yeast cells growing at 28°C and subject to the heat-shock 28–40 °C. This response can partially block lipogenesis and ribose-5-phosphate synthesis,inhibiting cell proliferation.