

## **Yeast can be a biosensor for antioxidants. Ascorbate abolishes auxotrophy caused by the lack of superoxide dismutase in *Saccharomyces cerevisiae***

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Antioxidant production is an important field of biotechnology. Isolation and synthesis of new antioxidants requires a preliminary estimation of their antioxidant properties and, which is even more important, their potential toxicity, before eventual application step. In this study, we propose a simple method allowing for studying both these properties of antioxidants on the basis of a simple yeast growth test.

Yeast (*Saccharomyces cerevisiae*) mutants lacking cytoplasmic superoxide dismutase (CuZnSOD) show Lys and Met auxotrophy under aerobic conditions. This metabolic defect can be ameliorated by exogenous ascorbate as well as other antioxidants (glutathione, cysteine and N-acetylcysteine). Restoration of growth of CuZnSOD<sup>-</sup> yeast mutants on media devoid of Met and/or Lys may be therefore a simple and useful means to detect and quantify antioxidants. The protective effect of antioxidants is oxygen-dependent: the lower the oxygen content of the atmosphere, the lower antioxidant concentrations are required to restore prototrophy. Therefore, the sensitivity of the test can be augmented by growing the yeast under lowered partial oxygen pressure. While 6 mM, 10 mM and 30 mM ascorbate was necessary to restore the growth in the absence of Met, in the absence of Lys, and in the absence of Lys and Met, respectively, under 21% oxygen, 3 and 6 mM ascorbate was sufficient for growth restoration in the absence of Lys and in the absence of Lys and Met, respectively, under 3% oxygen. The protective effects of cysteine and N-acetylcysteine peaked at 0.5 mM and 6 mM, respectively, disappearing at higher concentrations of these compounds, pointing to the detection of not only protective but also toxic cellular effects of the compounds studied by the test proposed.