Saccharomyces cerevisiae as a model organism to evaluate the antioxidant potential of dietary phytochemicals: a promising approach for therapeutic discovery

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Consuming natural foods, particularly fruits and vegetables, can help alleviate oxidative stress, a condition characterized by an imbalance between the production of reactive oxygen species (ROS) and the body's ability to neutralize them with antioxidants. Oxidative stress plays a significant role in the development of various acute and chronic diseases as well as the aging process.

Flavonoids such as quercetin, apigenin, luteolin, naringenin, and genistein, along with the stilbene resveratrol, are abundant in fruits and plants and have demonstrated promising antioxidant properties *in vitro*. However, their efficacy *in vivo* remains uncertain due to extensive metabolism.

This study investigated the antioxidant activity and underlying mechanisms of these compounds *in vivo*, using *Saccharomyces cerevisiae* as a eukaryotic model organism. After confirming the non-toxicity of these compounds to yeast cells within a specific concentration range, various assays, including growth curves, spot assays, drug drop tests, and CFU assays, demonstrated the protective effects of polyphenols against H_2O_2-induced oxidative damage.

Polyphenol-treated cells showed reduced intracellular ROS levels and protein carbonylation, indicating effective antioxidant properties. Additionally, treatment with these compounds restored catalase activity and decreased oxidized glutathione levels, thereby supporting the maintenance of redox homeostasis.

These findings suggest that the tested natural compounds effectively protect yeast cells from oxidative stress-induced damage by scavenging intracellular ROS and enhancing cell viability.

This research suggests the potential of these polyphenols as dietary supplements or therapeutic agents in mitigating oxidative stress-related disorders.