

Supporting information for review only

(1) Statement of the problem addressed and originality of the approach

The relief of oxidative stress mainly relies on various antioxidants to inhibit the excessive production of ROS and regulate the activity of antioxidant. α -Tocopherol and γ -oryzanol are typical minor constituents in vegetable oils, exerting great antioxidant activity. However, It remains understudied whether the antioxidant activity will be affected by the internal environment of organisms and how the antioxidant interaction changes in cells. In this manuscript, we utilized the cellular antioxidant evaluation model in HepG2 cells to study the antioxidant interaction between α -tocopherol and γ -oryzanol. We conclude that the antioxidant interaction between binary mixture in cells was related to cellular uptake of minor constituents, and the combination of TO11 (1 $\mu\text{g}/\text{mL}$ α -tocopherol and 10 $\mu\text{g}/\text{mL}$ γ -oryzanol) played a synergistic effect by scavenging ROS and up-regulating GSH-Px enzyme activity, resulting in the strongest cellular antioxidant activity.

(2) Contribution of the work to create new knowledge in the field

This study revealed the mechanism of antioxidant interaction between the binary mixture of α -tocopherol and γ -oryzanol in cells. Meanwhile, it is proved that the concentration of the binary mixture was effective on antioxidant interaction, and the antioxidant interaction between α -tocopherol and γ -oryzanol in cells was related to cellular uptake.

(3) Relevance of the work to advance research and impact to the field of agricultural and food chemistry

α -Tocopherol and γ -oryzanol are widely known for great antioxidant activity. However, minor constituents will go through digestion and absorption after entering the body, and finally exert antioxidant activity in cells. This study explored the antioxidant interaction between the binary mixture in cells and sought for combinations exerting synergistic antioxidant effect at the cellular level to relieve oxidative stress effectively, which can provide a theoretical reference and research basis for the development of related functional foods and collocation of rational dietary.