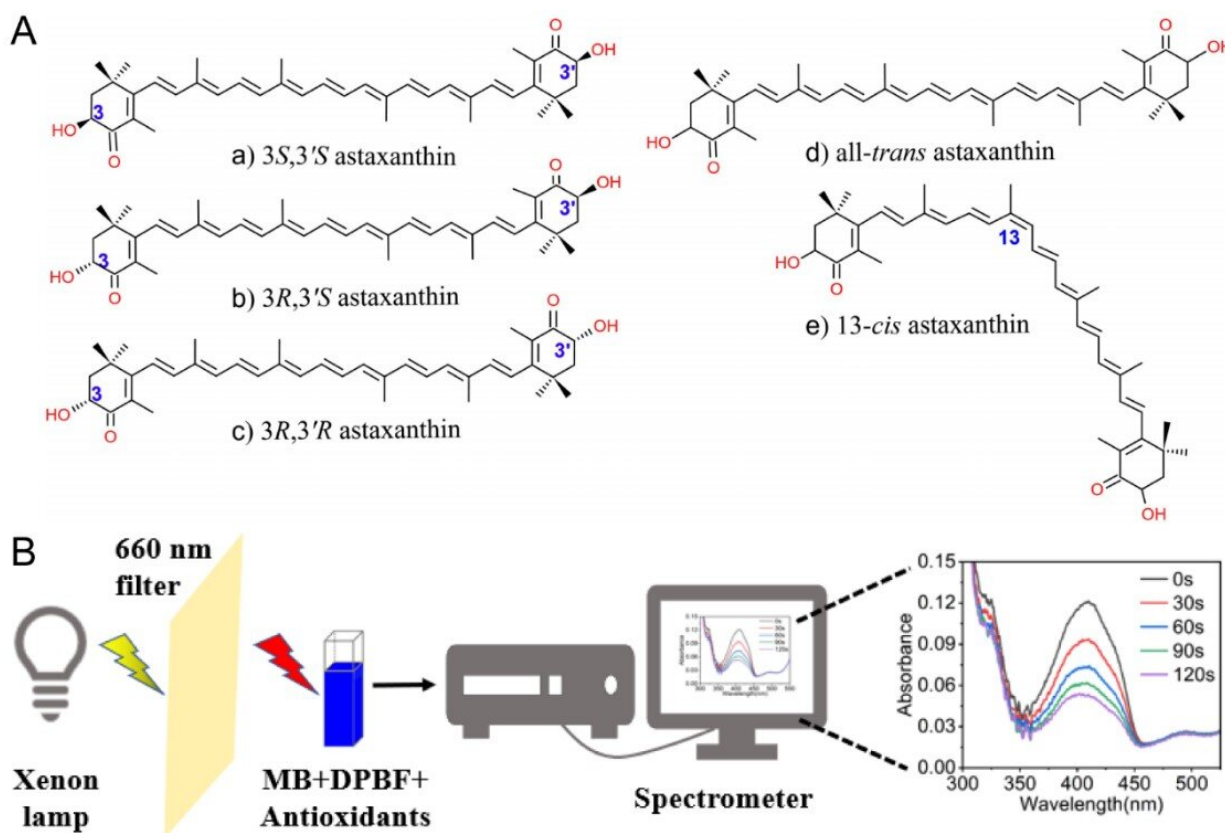


Evaluating antioxidant activities of astaxanthin isomers against singlet oxygen

July 14 2022, by Zhang Nannan



A. Structures of stereoisomers of astaxanthin; B. Measurement of the singlet oxygen quenching capacity of antioxidants. Credit: Zheng Xinxin

Researchers led by Prof. Huang Qing from the Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences have

proposed a new method to evaluate the antioxidant activity of astaxanthin isomers against singlet oxygen. Results were published in *Food Chemistry*.

Astaxanthin has excellent antioxidant properties and is widely used in food supplements. It has many isomers and their physical and [chemical properties](#) are also different.

In this study, the researchers tried a spectroscopic method to investigate the antioxidant activity of isomers of astaxanthin against [singlet oxygen](#) ($^1\text{O}_2$), a kind of reactive oxygen species with long life and strong oxidation capacity. Previous studies on the antioxidant activity of astaxanthin did not specifically distinguish active oxygen species and generally ignored the difference in antioxidant activity of astaxanthin's isomers.

Based on previous research, they used [methylene blue](#) (MB) as a photosensitizer to generate $^1\text{O}_2$, and probe 1, 3-diphenyliso-benzofuran (DPBF) was used to detect $^1\text{O}_2$ in the solution. The singlet oxygen quenching capacities of astaxanthin isomers were evaluated by comparing the absorption changes of DPBF at 410 nm under different astaxanthin treatment, and the quenching constants of astaxanthin isomers were compared with that of vitamin E.

The researchers found that the singlet oxygen quenching constant of astaxanthin was three orders of magnitude different from that of vitamin E. The $^1\text{O}_2$ quenching capacities of the optical isomers of astaxanthin were almost identical in extracellular experiments. For the cis-trans geometric isomers of astaxanthin, the $^1\text{O}_2$ quenching capacity of cis-astaxanthin was significantly higher than that of all-trans astaxanthin.

This study offers a simple and facile spectroscopic method to assess the antioxidant activity of different forms of astaxanthin against singlet

oxygen and reveals significant differences between geometric [isomers](#), providing a new basis for practical application of astaxanthin in [food industry](#) and the development of future biological functions.

More information: Xinxin Zheng et al, Assessment of the antioxidant activities of representative optical and geometric isomers of astaxanthin against singlet oxygen in solution by a spectroscopic approach, *Food Chemistry* (2022). [DOI: 10.1016/j.foodchem.2022.133584](https://doi.org/10.1016/j.foodchem.2022.133584)

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