Rapid and Specific Detection of Hydroxyl Radical Using an Ultraweak Chemiluminescence Analyzer and a Low-Level Chemiluminescence Emitter: Application to Hydroxyl Radical-Scavenging Ability of Aqueous Extracts of Food Constituents

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摘要

Abstract

With the availability of an ultraweak chemiluminescence analyzer, it is possible to monitor the production of a specific oxygen-derived reactive species, such as hydroxyl radical ((*)OH), whenever a suitable chemiluminescent probe is obtainable. Reported herein is the development of a rapid and specific method for detecting (*)OH production using a specific probe, indoxyl-beta-glucuronide (IBG), a low-level chemiluminescence emitter. Using the Fenton reagent as a source of (*)OH, it was shown that IBG could elicit a very strong intensity of chemiluminescence (CL) (16200 +/- 200 photon counts/s). Conversely, IBG was shown to be insensitive to either superoxide radical or hydrogen peroxide with their CL intensities nearly close to the background values (25 +/- 5 and 180 +/- 20 photon counts/s, respectively). Furthermore, it was also shown that this IBG-based CL production could be effectively quenched by the addition of (*)OH scavengers such as sodium salicylate, dimethyl sulfoxide, andpenicillamine to the assay system. Taken together, these data indicate that IBG is a specific CL probe suitable for monitoring the production of (*)OH. This system demonstrated inhibitory activities of various aqueous extracts of food constituents onthe CL of hydroxyl radicals generated by Fenton's reagents with the order of scavenging efficiencies being Prunus mume > Cordyceps sinensin > Lilium lancifolium > Astragalus membranceus.