

News & Comments

Antioxidant Activity by Improving EGCG Bioavailability

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Due to its many health benefits, green tea is the second most popular beverage in the world. The low bioavailability of EGCG (the active phytochemical) in green tea, however, severely restricts its biological activity. Less than 5% of the tea catechins (EGCG) might enter the systemic circulation, according to pharmacokinetic investigations of EGCG in animal models. As a result, several scientists have been working to alter the physical and chemical properties of EGCG to increase its bioavailability by complexing or esterifying it with other substances such as piperine, curcumin, ascorbic acid, and proteins (albumin, lactoglobulin). Numerous studies have shown that EPA and DHA have a wide range of biological effects, including anti-inflammatory, anti-cancer, anti-diabetic, and anti-oxidant qualities.

The previous research, however, did not compare the effects of esterified EGCG with EGCG complex or examine the other favourable efficacy of those esterified substances. Therefore, this innovative study was created to assess the useful effectiveness of esterified EGCG with fish oil (DHA/EPA).

EGCG (98% HPLC grade) was purchased from Hunan Sunfull Biotech Co., Ltd. (Hunan, China). Fish oil (as a capsule) rich in DHA/EPA was provided by Herbalife Nutrition Corp (CA, USA). All the experiments were carried out at Chung Shan Medical University at the School of Nutrition, Taichung, Taiwan. The Free Fatty Acids (FFA) were isolated from the fish oil capsule by a saponification process, followed by a urea complexation process to separate solely DHA and EPA from other FFAs. Esterification of EGCG with isolated FFA high in DHA/EPA. The total antioxidant capacity of various samples (EGCG, EGCG-esters, and EGCG-Fish oil), as well as the Trolox equivalent antioxidant capacity (TEAC), were calculated. The C2BBel cells were grown and treated with various experimental substances to measure the permeability coefficient, which measures the cellular uptake of EGCG. The results are all represented as the Mean Standard Deviation for all cell line investigations, which are all carried out in triplicate (n = 3). (SD).

The study employed ¹³C-NMR and GC-MS techniques to verify the esterification (efficiency) of EGCG with free fatty acids such as DHA and EPA. The esterification of EGCG with DHA and EPA is seen in the NMR and LC-MS spectra. The inclusion of samples such as EGCG, EGCG-Esters, and EGCG-Fish oil lowers the generation of AGEs by trapping MGO and fructose in the C2BBel cells, preventing BSA protein glycation. In contrast to EGCG Esters and EGCG-Fish oil complex groups, EGCG exhibits significant AGEs inhibition action in both MGO and fructose models. By evaluating the esterification



effectiveness and permeability capacity, the current study was designed to examine the positive effects of esterified EGCG with fish oil (holistic impact) (bioavailability of EGCG). The fact that EGCG is very hydrophilic by nature, sensitive to temperature, light, and pH, as well as has a high level of reactivity (particularly with digestive enzymes), makes it a more unstable and quickly oxidizable molecule. As a result, EGCG bioavailability is severely hindered. To address this problem, numerous researchers have begun to esterify EGCG with other compounds to increase its bioavailability. Reducing sugars and amino groups on proteins, nucleic acids, and lipids interact nonenzymatically to create AGEs (Amadori rearrangement). The comparison of EGCG-ester, EGCG-fish oil complex, and parent EGCG's bioavailability effectiveness and positive effects (antioxidant and antiglycation activities) was this study's main strength.

The current study demonstrated the beneficial efficacy of EGCG esters and EGCG-Fish oil complex on C2BBel cells by increasing EGCG permeability (bioavailability of EGCG), anti-glycation activity (MGO and Fructose induced AGEs inhibitory activity), and antioxidant capacity (better TEAC and DPPH scavenging activity).

JOURNAL REFERENCE

Lin, S.C., H.F. Chiu, Y.C. Hsieh, K. Venkatakrisnan, O. Golovinskaia and C.K. Wang, 2022. Enhanced bioavailability of epigallocatechin gallate (EGCG) after esterification and complexation with Fish oil. *Int. J. Pharmacol.*, 18: 623-632.

KEYWORDS

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