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Novel detection protocol for radical scavenging and antioxidant activity of lipophilic antioxidants

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Statement of the problem: Lipophilic antioxidants are an important class of chemical species of natural antioxidants that can increase the oxidative stability of food matrices. Common methods to determine the antioxidant activity or oxidative stress of lipophilic antioxidants require time consuming protocols, although those are not vigorously reliable. This work proposes a fast, simple and direct method based on cyclic voltammetry to monitor oxidation in lipid samples.

Methodology & Theoretical Orientation: The oxidative stress during the reaction of AIBN (2, 2′-azobis (20methylpropionitrile)) with lipid soluble antioxidants, such as α-tocopherol, catechin, retinyl acetate, caffeic acid and 3-hydxoxytyrosol was evaluated. 1-propanol was used as a unique solvent, which allowed direct dissolution of a wide range of lipid soluble redox species. Electron transfer (ET) capacity was evaluated by the peak current (ip) and peak potential (E). The kinetic rate of the reactions between laboratory antioxidants and AIBN were measured at 60 °C. Finally, same procedure was also applied to measure the antioxidant activity and oxidative stress of different commercial edible oils: extra virgin olive oil (EVOO), virgin olive oil (VOO) and, olive byproduct; sansa olive oil (SOO).

Findings: The methods demonstrated that antioxidant activity was positively correlated with increased concentrations among the laboratory antioxidants and EVOO, VOO and SOO samples. On the other hand, oxidative stresses were negatively correlated with the duration of reaction periods.

Conclusion & Significance: This method can be the alternative of traditional methods to test lipid soluble antioxidants in lipid matrices rapidly and straigh.