Oxygen Radical Absorbance Capacity (ORAC) Assay

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Tradename: AC Watercress Extract SF

Code: 11907

CAS #: 7732-18-5 & 84775-70-2

Test Request Form #: 8066

Lot #: N210621E

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Principle Investigator: *Daniel Shill*

Test Performed:
Oxygen Radical Absorbance Capacity (ORAC)

Introduction

Reactive oxygen species (ROS) are generated by normal cellular processes, environmental stresses, and UV irradiation. ROS are dangerous to cellular structures and functional molecules (i.e DNA, proteins, lipids) as they act as strong oxidizing agents or free radicals. The oxygen radical absorbance capacity (ORAC) assay is a standard method used to assess antioxidant capacity of physiological fluids, foods, beverages, and natural products. The assay quantitatively measures a sample's ability to quench free radicals that have the potential to react with and damage cellular components.

Oxygen Radical Absorbance Capacity (ORAC) assay was conducted to assess the antioxidant capacity of **AC Watercress Extract SF**.

Assay Principle

This assay is based upon the effect of peroxyl radicals generated from the thermal decomposition of 2, 2'-azobis-2-methyl-propanimidamide dihydrochloride (AAPH) on the signal intensity from the fluorescent probe, fluorescein, in the presence of an oxygen radical absorbing substance. The degree of change is indicative of the amount of radical damage and the presence of antioxidants results in an inhibition in the free radical damage to the fluorescein. The antioxidant protection of the sample can be calculated by comparing it to a set of known standards. Trolox®, a water soluble vitamin E analog, with known antioxidant capabilities is used in this ORAC assay as the standard for measuring the antioxidant capacity of unknown substances. ORAC values, expressed in µM of Trolox® equivalents (TE), are calculated using the area under the curves (AUC) of the test product, Trolox®, and the control materials. Trolox® equivalency is used as the benchmark for antioxidant capacity of mixtures since it is difficult to measure individual components.

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Materials

A. Equipment:	Synergy H1 Microplate reader (BioTek Instruments, Winooski, VT); Gen5 software (BioTek Instuments, Winooski, VT); Pipettes
B. Buffers:	75mM Potassium Phosphate (pH 7.4); Deionized H_2O
C. Reagents:	2,2′-Azobis(2-methylpropionamidine) dihydrochloride (AAPH) (153mM); 6-Hydroxy-2,5,7,8-tetramethylchromane-2-carboxylic acid (Trolox®);Fluorescein Sodium Salt (4nM); Ascorbic Acid (Sigma Aldrich); Ascorbic Acid 2-Glucoside (Sigma Aldrich)
D. Preparation:	Pre-heat (37°C) Synergy H1 Microplate reader; Prepare Trolox® standards, sample dilutions, fluorescein solution, and AAPH.
E. Microtitre Plates:	Corning 96 Well Black Side/Clear Bottom Microplates

Methods

Solutions of **AC Watercress Extract SF,** BV-OSC (INCI: Tetrahexyldecyl Ascorbate), Trolox® (positive control), Ascorbic Acid (AA) and Ascorbic Acid 2-Glucoside (AA2G) (comparative controls) were prepared in 75mM potassium phosphate buffer. Materials were prepared at three different concentrations/dilutions. Trolox® was used as a reference for antioxidant capacity and prepared at a concentrations ranging from 12.5 μM to 200 μM in 75mM potassium phosphate buffer.

For the ORAC assay, 25μL of test material and Trolox® were combined with 150 μL of fluorescein in 75mM potassium phosphate buffer and incubated in the Synergy HT Microplate reader at 37˚C for 30 minutes. At the end of the incubation period, 25μL of AAPH (153mM in 75mM potassium phosphate buffer) were pipetted into each well. Fluorescent measurements were then taken every 2 minutes for approximately 2 hours at an excitation wavelength of 480nm and an emissions wavelength of 520nm.

The AUC and Net AUC values of the standards and samples were determined using Gen5 2.0 Data Reduction Software (BioTek Instruments) using the below equations:

$$AUC = 0.5 + \frac{R2}{R1} + \frac{R3}{R1} + \frac{R4}{R1} + \cdots + \frac{Rn}{R1} \rightarrow Where\ R\ is\ fluorescence\ reading$$

$$Net\ AUC = AUC_{sample} - AUC_{blank}$$

The standard curve was obtained by plotting the Net AUC of different Trolox® concentrations against their concentration. ORAC values of samples were then calculated automatically using the Gen5 software to interpolate the sample's Net AUC values against the Trolox® standard curve. ORAC measurements for the test material were expressed in micro molar Trolox® equivalents (μMTE), where 1 ORAC unit is equal to 1 μMTE.

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Results

AC Watercress Extract SF showed very potent antioxidant activity at 5.0%, 2.5%, and 1.25% concentrations.

The ORAC value expressed in µMTE for 5.0%, 2.5%, and 1.25% **AC Watercress Extract SF** are 558, 572, and 585, respectively. The ORAC value expressed in µMTE for 5.0%, 2.5%, and 1.25% BV-OSC are 65, 34, and 16, respectively.

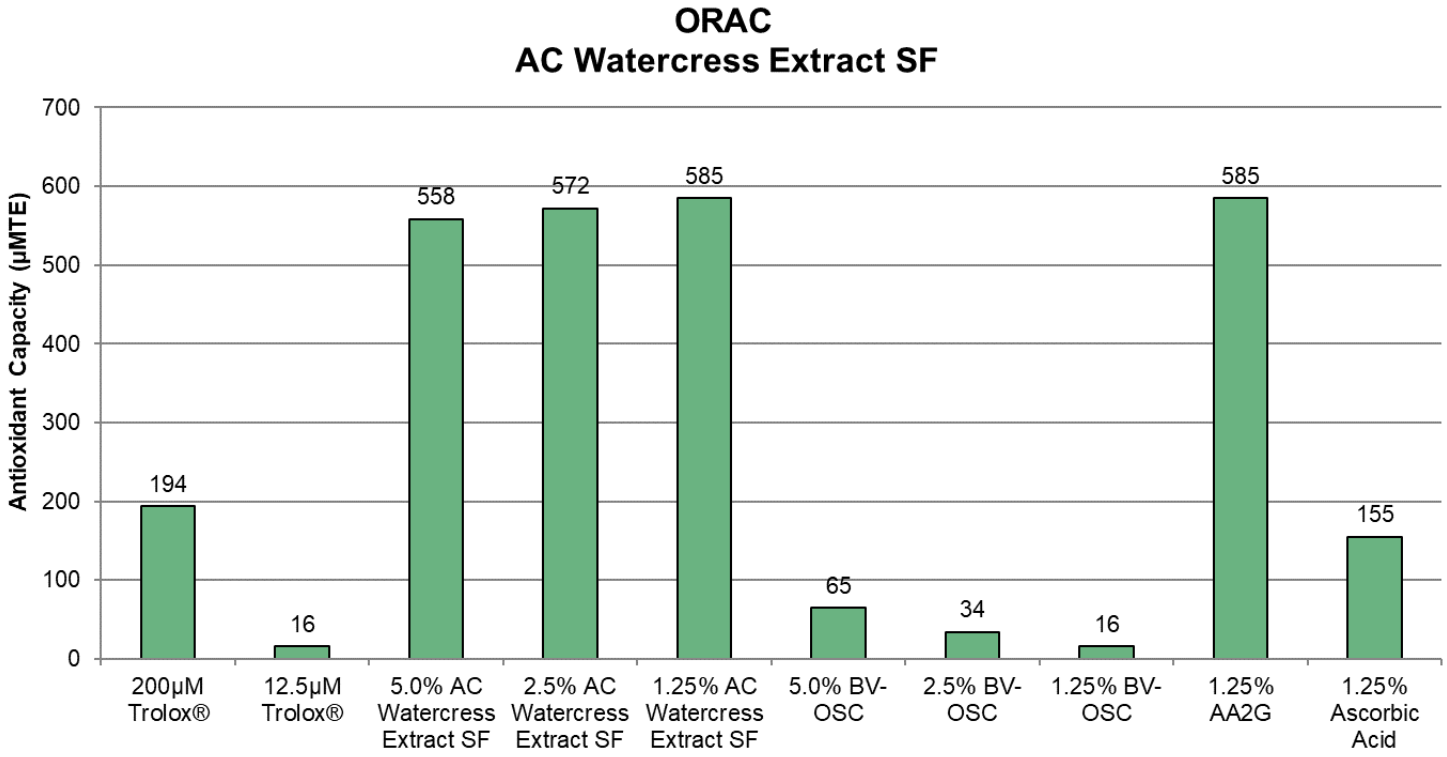

Figure 1: Antioxidant capacities

Discussion

As shown in figure 1, **AC Watercress Extract SF (11907)** at all concentrations exhibited greater antioxidant activity than 200µM Trolox®. As a result, we can assure that the ability of **AC Watercress Extract SF** to minimize oxidative stress is evident at the concentrations examined. Maximizing the antioxidant capacity on a cellular level allows for ROS to be dealt with at a rate that provides protection from cellular damage. This cellular damage can be seen as physical signs of aging such as wrinkles, loss of elasticity, unwanted pigmentation, and skin unevenness with slow regeneration. **AC Watercress Extract SF** outperformed both the BV-OSC and Ascorbic acid control at every concentration. It can therefore be concluded that **AC Watercress Extract SF** is capable of providing antioxidant properties and aids in the anti-aging process through protection at the cellular level.