



## Sirius Red/Fast Green Collagen Analysis

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**Tradename:** Phytofuse Rejuvenate®

**Code:** 16882

**CAS #:** 93384-40-8

**Test Request Form #:** 898

**Lot #:** NC140813-H

**Sponsor:** Active Concepts, LLC; 107 Technology Drive Lincolnton, NC 28092

**Study Director:** Erica Segura

**Principle Investigator:** Meghan Darley

**Test Performed:**

Sirius Red/Fast Green Collagen Assay

### Introduction

Collagen is the main protein of connective tissues, such as skin, bone, tendon and ligament, and the most abundant protein in mammals. Collagen accounts for nearly 25% to 35% of the total human protein content. Collagen is a long, fibrous protein that forms bundles called fibers giving structure and support to cells and tissues. Collagen has great tensile strength and is responsible for skin's elasticity and, therefore, its degradation leads to wrinkles that accompany aging.

Sirius Red/Fast Green Collagen Assay was conducted to assess the changes in collagen synthesis by **Phytofuse Rejuvenate®**-treated *in vitro* cultured human dermal fibroblasts.

### Assay Principle

Sirius Red is a unique dye that binds specifically to the helical structure of types I through V collagen, while Fast Green binds to non-collagenous proteins. These two dyes work in conjunction to provide a semi-quantitative method of determining amounts of collagen and non-collagenous proteins in a sample. After staining a sample the dyes are easily extracted and have optical density (OD) absorptions at 540nm (Sirius Red) and 605nm (Fast Green). Protein concentrations are calculated through equations with OD values.

<p>This information is presented in good faith but is not warranted as to accuracy of results. Also, freedom from patent infringement is not implied. This information is offered solely for your investigation, verification, and consideration.</p>
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### Materials

<b>A. Kit:</b>	Sirius Red/Fast Green Collagen Kit (Chondrex; 9046)
<b>B. Incubation Conditions:</b>	37°C at 5% CO <sub>2</sub> and 95% Relative Humidity (RH)
<b>C. Equipment:</b>	Forma Humidified Incubator, ESCO Biosafety Laminar Flow Hood, Synergy HT Microplate Reader; Pipettes
<b>D. Cell Line:</b>	Normal Human Dermal Fibroblasts (Invitrogen; C-004-5C)
<b>E. Media/Buffers:</b>	Complete and Serum-Free Dulbecco's Modified Eagle Medium (DMEM); Phosphate Buffered Saline (PBS)
<b>F. Culture Plate:</b>	Falcon Flat Bottom 24-Well Tissue Culture Treated Plates
<b>G. Reagents:</b>	Ascorbic Acid-2-Glucose(AA2G) (100µM); Insulin Growth Factor-1 (IGF-1) (50ng/mL); Glacial Acetic Acid, Ethanol
<b>H. Other:</b>	Sterile Disposable Pipette Tips; Wash Bottles

### Methods

Human dermal fibroblasts were seeded into 24-well tissue culture plates and allowed to grow to confluency in complete DMEM. 1%, 0.1%, and 0.01% concentrations of **Phytofuse Rejuvenate**<sup>®</sup> were added to the serum-free DMEM and incubated with fibroblasts for 24 hours. AA2G and IGF-1 were used as positive controls.

Media was removed from wells containing adherent fibroblasts and the cells were washed with PBS. 500µl of a cooled 95% ethanol/5% glacial acetic acid solution was added to the wells and incubated for 10 minutes at room temperature. 200µL of the Sirius Red/Fast Green dye solution was added to the fixed cell layer and incubated at room temperature for 30 minutes. The dye solution was removed from the cell layer and washed with water. 1mL of extraction solution was added for color extraction. The optical density was read at 540nm and 605nm on the Synergy HT Microplate Reader.

The protein concentrations of **Phytofuse Rejuvenate**<sup>®</sup> treated-fibroblasts were determined by calculations based on the optical density measurements and expressed in µg.

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## Results

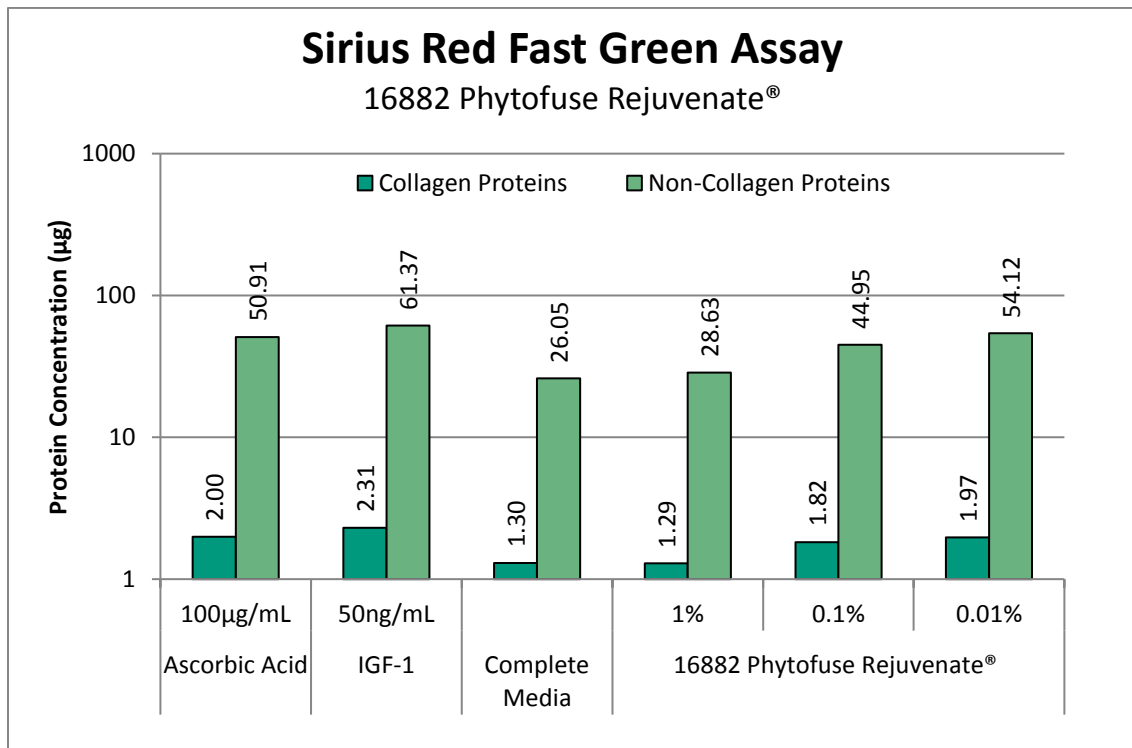
The data obtained from this study met criteria for a valid assay and the positive and negative controls performed as anticipated.

**Phytofuse Rejuvenate®** elicited positive effects on collagen synthesis.

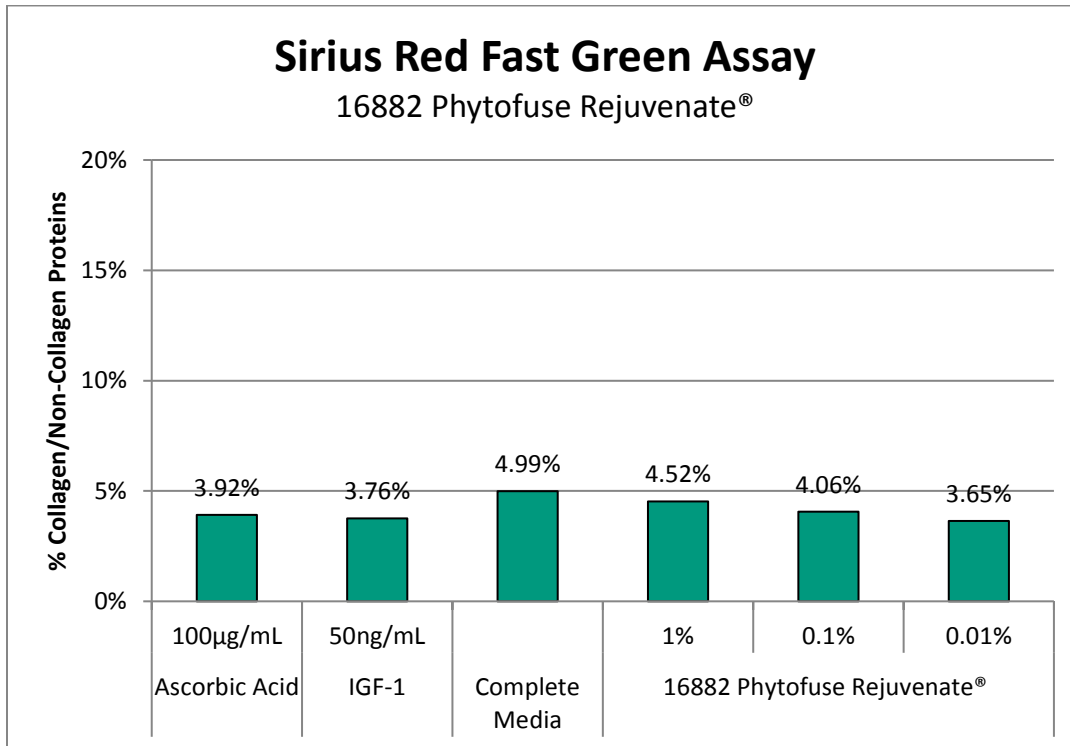
Collagen concentration is calculated by the following formula:

$$\text{Collagen } (\mu\text{g}) = \frac{[OD\ 540 - (OD\ 605 \times 0.291)]}{0.0378}$$

$$\text{Non Collagen Protein } (\mu\text{g}) = \frac{OD\ 605}{0.00204}$$



**Figure 1:** Collagen and non-collagen protein concentrations



**Figure 2:** Percent collagen compared to non-collagen proteins

## Discussion

As shown in figure 1, **Phytofuse Rejuvenate®** (code 16882) exhibited positive collagen synthesis activity. The increase in collagen production may lead to improvement in the dermal-epidermal junction integrity as well as an improved scaffolding matrix. For these reasons, we can assume **Phytofuse Rejuvenate®** is suitable for cosmetic applications designed to boost collagen synthesis to aid in providing a younger and healthier complexion.