

Topical Effects Of A Novel Blend Of Natural Compounds, Blended In An Anti-Aging Serum, **DermaStem™**, On Human Skin.

Introduction

The objective for this research was to document the effects of **DermaStem™**, both on specific modes of action on primary human dermal fibroblasts (Adult skin Stem Cells) and inflammatory cells in vitro, in order to prepare a formula aimed at increasing skin hydration and elasticity, while achieving wrinkle reduction in healthy human facial skin.

Skin health and protection from premature aging associated with oxidative stress, inflammation and reduced stem cell repair, is a complex interplay of different biological functions. The healthy proliferation and migratory capacity of dermal fibroblasts their matrix deposition and protection from damage by free radicals, are important factors in skin aging, elasticity and hydration, leading to wrinkle formation.

The aim in the development of **DermaStem™** was to identify natural compounds that would have an effect on the proliferation and differentiation of skin stem cells, and would therefore support the actual restructuring of the skin, leading to greater moisture retention, greater elasticity and consequently a reduction in fine lines and wrinkles.

A panel of in vitro tests was performed to document effects on primary adult dermal fibroblasts (Adult skin Stem Cells). The ingredients and the blend supported the proliferation, migration and matrix deposition of primary human dermal fibroblasts.

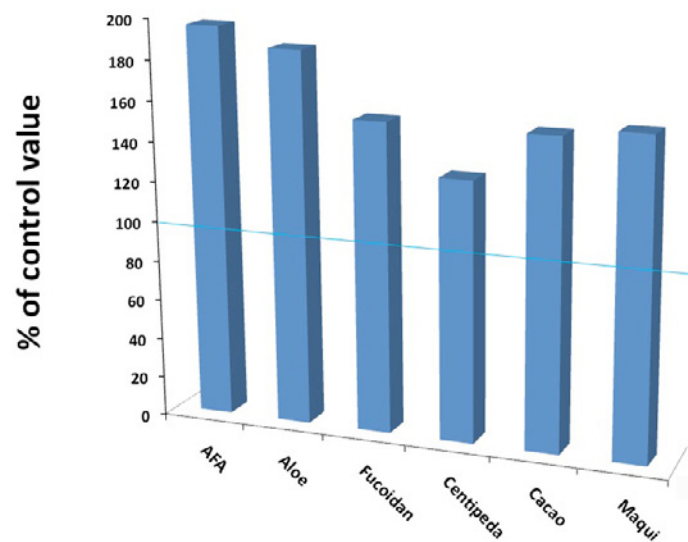
To document antioxidant and anti-inflammatory properties we used additional in vitro bioassays using primary human blood cells.

Methods & Results

A panel of in vitro tests was performed to document effects on primary adult dermal fibroblasts (Adult skin Stem Cells):

A) Support of a skin cell proliferation.

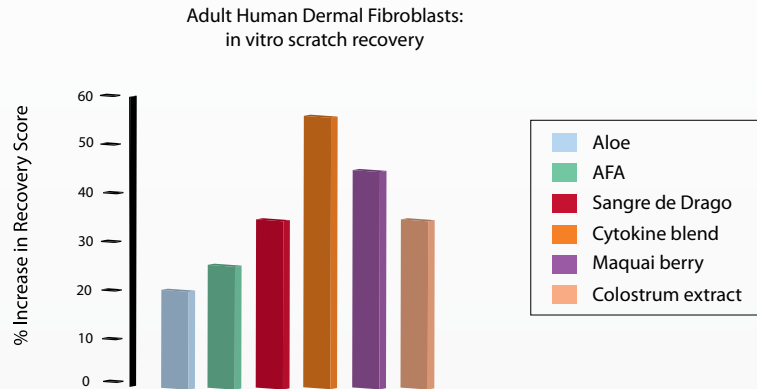
In brief, *Aphanizomenon flos-aquae* (AFA), *Aloe vera*, fucoidan from *Undaria pinnatifida*, *Maqui berry*, *Centipeda cunninghamii*, and *Theobroma cacao* significantly increase dermal fibroblast proliferation by a magnitude ranging between 29% and 96% above baseline. *Vanilla bourbon* and Colostrum did not significantly increase dermal fibroblast proliferation on their own but synergistically potentiated the effect of AFA. A blend of growth factors led to a 225% increase in dermal fibroblast proliferation above baseline.



B) The ingredients in DermaStem had a substantial effect on scratch recovery and wound healing.

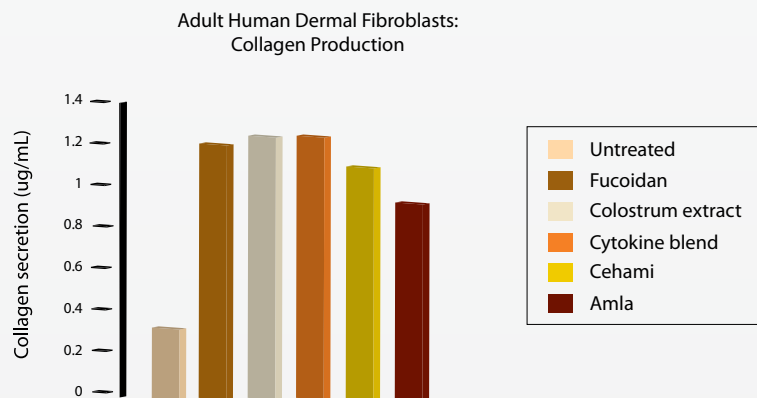
An “in vitro scratch” is a model for wound healing where adult human skin cells are cultivated until they have formed a dense film. A scratch is created through the film.

A blend of Cytokines (growth factors) led to substantial increase in dermal fibroblasts migration and accelerated recovery of the in vitro scratch. In addition, *Aphanizomenon flos-aquae* (AFA), *Aloe vera*, *Sangre de Drago*, *Maqui berry* and fractionated *Bovine Colostrum* further supported accelerated recovery.



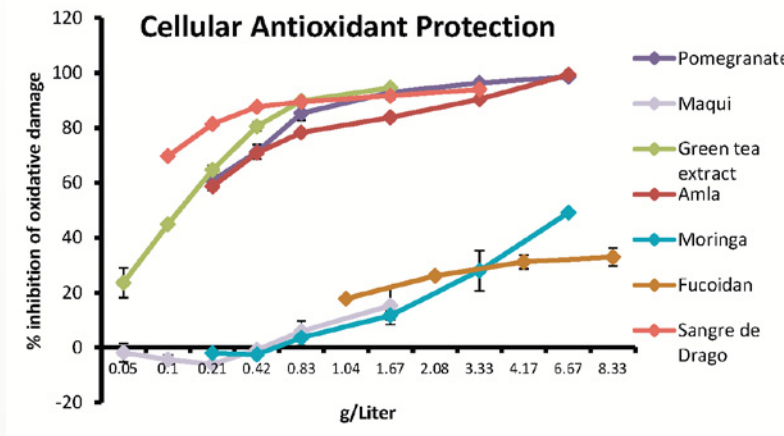
C) Matrix deposition (collagen production).

Collagen production by primary human Dermoblasts in culture was increased by fucoidan from *Undaria pinnatifida*, colostrum, cytokines, and *Vanilla bourbon*.



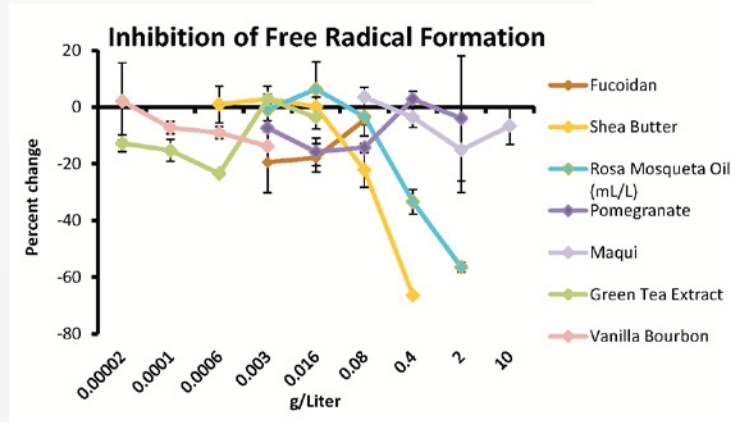
To document antioxidant and anti-inflammatory properties were used additional *in vitro* bioassays using primary human blood cells:

- D) **Cellular antioxidant protection Capacity** of each ingredient in **DermaStem™** was tested in the CAP-e bioassay, which tests intracellular antioxidant protection under oxidative stress. The *in vitro* data showed potent antioxidant bioavailability at the cellular level by *Indian gooseberry* (AMLA), *Pomegranate*, *Sangre de Drago* and *Green tea extract*.



- E) **Inhibition of free radical formation by inflammatory cells.**

The ingredients were also evaluated for the ability to inhibit free radical formation by inflammatory cells placed under oxidative stress conditions. The data showed reduced free radical production by ingredients in **DermaStem™** included fucoidan from *Undaria pinnatifida*, *Shea butter*, *Rosa mosqueta*, *Maqui berry*, *Pomegranate*, *Vanilla bourbon*, and *Green tea extract*.



Conclusions:

The data from these series of *in vitro* tests backed up the Hypothesis that several specific mechanisms of actions including: cellular antioxidant protection, inhibition of free radical formation, stem cell proliferation and differentiation as well as Collagen production were supported by this novel blend of ingredients blended in **DermaStem™ Renewal Serum**.