Fernblock® FC inhibits the production of metalloproteinase-1 induced by Infrared A (IR-A) radiation

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Introduction and Objectives

Intrinsic ageing is genetically determined and it encompasses progressive physiological changes; however, extrinsic ageing, related to sun radiation exposure, has the main role in the pathological process leading to visible ageing signs and malignant disorders. Infrared A radiation (IR-A), a low energy radiation, is able to penetrate in deeper layers of the skin, promoting the generation of reactive oxygen species (ROS) and metalloproteinases (MMPs). It has been scientifically demonstrated that Fernblock® (*Polypodium leucotomos* extract) owns important antioxidant and photoprotective properties against UV radiation.

In this regard, Fernblock® FC, a derivative enriched with additional ferulic and caffeic acids, has been used in these research studies.

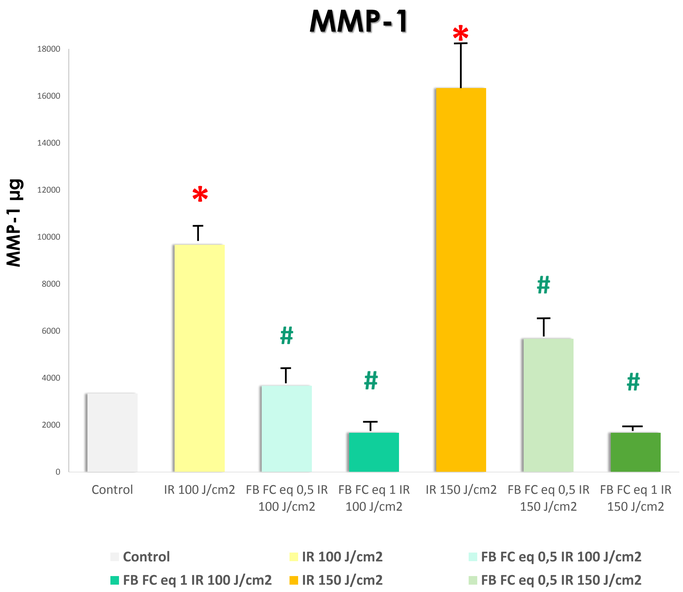
The objective of the following studies was to analyze the protective capacity of Fernblock® FC against IR-A radiation specifically, and to demonstrate the clinical effect in reducing the expression of MMP-1 after IR-A exposure.

Materials and Methods

1 **In vitro study**: human dermal fibroblasts were cultured with and without pretreatment with Fernblock® FC. The levels of MMP-1 were evaluated by ELISA before and after IR-A irradiation.

2 **Pilot clinical trial**: three subjects were included in this study and underwent three biopsies in the buttock: baseline, following irradiation with IR-A, and after applying a topical formula containing Fernblock® FC, 30 minutes prior to irradiation with IR-A. Levels of MMP-1 in each biopsy were analyzed by RT-PCR and immunohistochemistry.

In vitro study: results



In vitro results

A marked reduction of MMP-1 after IR-A irradiation was observed in fibroblast cultures when Fernblock® FC was added to the culture medium.

* **(p<0,01)** between irradiated cultures without treatment and non irradiated control.

\# **(p<0,01)** between irradiated cultures treated with Fernblock® FC and irradiated cultures without treatment.

Conclusions

Treatment with Fernblock® FC has proven to significantly decrease the production of MMP-1 induced by IR-A, thus demonstrating that the product is successful avoiding IR-A induced skin damage.

Clinical experience: results

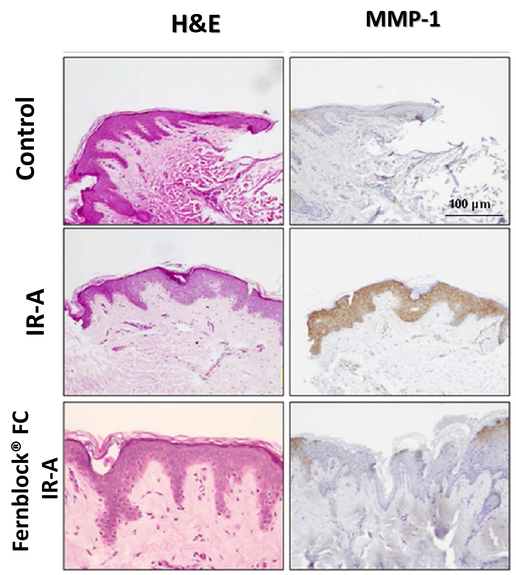


Figure 1

The clinical experience confirmed the results obtained from the *in vitro* studies; after the application of the topical product, a marked decrease in the IR-A induced expression of MMP-1 was observed, showing similar levels to those found in basal biopsies.

Fig.1: Histology (Hematoxilin & Eosin stain) in left panel and MMP-1 expression at right panel. Biopsies obtained from subject 1.

- **Control - Not exposed**
- **IR-A exposition**
- **Fernblock® FC topical treatment + IR-A**

RT-PCR MMP-1 levels

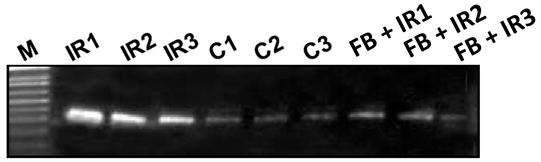


Figure 2

Fig.2: MMP-1 expression evaluated by RT-PCR.

- **M** → Molecular weight markers
- **IR** → Irradiated (IR-A)
- **C**→ Control
- **FB + IR**→ Treated with Fernblock® FC + IR-A

The authors declare that the main subject of this research (Fernblock® FC) is subjected to US patent US5614197 and Spanish patent PCT/2004/000149.
The study was partially supported by a research grant from Industrial Farmaceútica Cantabria, S.A., Madrid, Spain. S.G. is a consultant for IFC SA.