INTRODUCTION

If sunscreens protect against UV radiations, several studies point now the deleterious impact of infra-red (IR) and the fact that an IR protection should also be added to the products [1-3]. Indeed, IR is involved in cutaneous ageing and probably in carcinogenesis [4]; it is mainly responsible for the increase in skin temperature and leads to free radicals and matrix metalloproteinase-1 (MMP-1) production deep in the dermis [5-7]. An efficient protection against IR should be obtained via the presence of optical absorbers in the IR range, reflection of photons and scattering and/or free radical scavengers [8]. The aim of this study was to propose simple methodologies in order to evaluate the IR protection enabled by cosmetic products.

MATERIAL AND METHODS

These two tests were open and intra-individual studies. They took place at Laboratoire Dermscan (France) and were conducted in accordance with the applicable regulations.

1. BLOCKING EVALUATION OF TWO SUNSCREEN PRODUCTS

Effects of IR radiation on cutaneous parameters

Immediately after the end of IR radiation, significant increases in RBC concentration (+73.4%), redness (+77.6%) and temperature (8.7%) were recorded (p<0.05; student t test). During time, a mottled redness appeared on the zones under IR radiation (zones C and D). This sign evidences the deep penetration into dermis (and even the subcutis) of IR, heat generation and vasodilatation of vessels from the deep vascular plexus. This effect lasted up to 60 min.

Influence of phototype

Darker skin phototypes (IV) reacted greater than lighter ones (II) and recovered more slowly. They absorbed more heat, leading to higher vasodilation and redness.

Effect of sunscreens X Y

• Just after application and without any IR radiation, sunscreens did not modify any of the 3 cutaneous parameters.
• Sunscreen X had no blocking effect against IR: measures on the D zone were very similar to the unprotected C zone (data not shown).
• Sunscreen Y decreased both vasodilatation and redness, skin surface immediately after the end of IR radiation. The blocking effect of sunscreen Y was still observed one hour after the end of IR radiation: all 3 parameters on D zone were reduced compared to the C zone. As an example, the variations in time obtained for RBC concentration is presented below.

2. EVALUATION OF THE CELLULAR PROTECTION AGAINST IR OF A SUNSCREEN PRODUCT

Evaluation of the cell protection effect of Sunscreen Y and to recruit only phototype IV in order to maximize the heat reaction.

RESULTS & DISCUSSION

1. BLOCKING EVALUATION OF TWO SUNSCREEN PRODUCTS

In the second part of this study, we decided to test the cellular protection effect of sunscreen Y and to recruit only phototype IV in order to maximize the heat reaction.

2. EVALUATION OF THE CELLULAR PROTECTION AGAINST IR OF A SUNSCREEN PRODUCT

The 1st approach takes advantage of the blocking power of sunscreens. All the chosen parameters (cutaneous temperature, color and microcirculation) were obtained before IR radiation, immediately and up to 60 min after IR radiation, inflammation is reduced on the protected zone (D versus C).

CONCLUSION

• The 1st approach takes advantage of the blocking power of sunscreens. All the chosen parameters (cutaneous temperature, color and microcirculation) were increased after IR radiation. Darker skin types reacted more importantly than lighter ones: they absorbed more heat and vasodilation was more important. This approach allowed to discriminate two sunscreens: sunscreen X had no effect on skin heating under IR whereas sunscreen Y reduced the 3 parameters.
• The 2nd approach studied some cellular makers of stress: oxidation and detoxification. We were able to demonstrate that a sunscreen product that limit skin heating also limit the cellular aggression (reduced generation of MDA as well as reduced needs in SOD and CAT).

These two approaches can be used in the future in order to test the IR protection of a cosmetic product.