Citroflavonoid Anti-ageing Complex Fades Age Spots and Gives Skin Tone a Youthful Citrus Boost

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Abstract

Based on liposomal-encapsulated citroflavonoids, extracted from citrus fruits, this new cosmetic active fades age spots, brightens skin tone and increases overall skin luminosity. It has been shown to be safe and effective in both *in vivo* and *in vitro* studies.

Introduction

A decade ago anti-ageing products were concentrated mainly on achieving the reduction of wrinkles and the plumping-up of the skin to produce a younger appearance. However today, in addition to wrinkle reduction, there is much more focus on the evening out of the skin tone, which also gives skin its radiance and more youthful appearance. As skin ages it becomes less luminous and brown age spots begin to appear. Research has shown that the evening out of the skin tone has a significant effect on the estimated age of subjects[1,2,3,4]. The citroflavonoid complex described here has been developed specifically to fade age spots, brighten skin tone and increase overall skin luminosity. The citroflavonoid complex used in this study is sold under the trade name Citrolumine 8™.

Skin pigmentation is caused by different levels of melanin in the skin, synthesised in melanosomes in the melanocyte cells by the action of tyrosinase, an enzyme which hydroxylates the amino acid tyrosine to dihydroxyphenylalanine (DOPA) and catalyses its oxidation to DOPA quinone. Raper[5] originally elucidated the biosynthetic pathway of melanin, recently modified by Schallreuter et al[6]. Many products which aim to reduce skin pigmentation, target tyrosinase inhibition, as this is one of the key steps in pigment formation and can block other pigment-forming pathways[7,8,9].

The ideal candidate should have a good safety profile and skin tolerance, something many of the traditional skin lighteners such as hydroquinone do not have, having been associated in the past with many adverse effects[9,10,11,12]. This has led to a search for alternative plant-based skin lighteners which are both safe and effective[13,14,15].

Citroflavonoids

Citroflavonoids have been shown in the literature to have potent anti-inflammatory[16,17,18,19,20,21,22] and antioxidant[16,20,22,23,24,25] activity, additional properties which are also of interest for an anti-ageing cosmetic active. Flavonoids[26] and specifically citroflavonoids, both individually and as a mixture have been shown to inhibit tyrosinase[27,28,29] and to have skin whitening properties[22,30].

Preliminary Analytical Screening

Unripe citrus fruits contain the highest concentration of flavonoids[31]. Citrus extracts from various citrus fruit species were analysed by HPLC for their content of naringin, narirutin, hesperidin and neohesperidin.

Figure 1 shows an HPLC trace of the chosen flavonoid mixture showing peaks for the major citroflavonoids present:

- Naringin (22%)
- Neohesperidin (5.3%)
- Narirutin (4.9%)
- Hesperidin (1.0%)

The chosen flavonoid mixture was then subjected to the following tests:

- *In vitro*: Mushroom tyrosinase inhibition test, cellular human epidermal melanocyte tyrosinase assay
- Preliminary safety tests (cytotoxicity, Ames, eye irritation)
- *In vivo*: The flavonoid mixture (0.4mg/ml) was liposomal-encapsulated (henceforth called citroflavonoid complex) and incorporated into a cosmetic lotion[32] at 1% for *in vivo* tests and human patch testing