HADMÉRNÖK

VIII. Évfolyam 3. szám - 2013. szeptember

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UV PROTECTING CAPABILITY TESTING OF THE SUNSCREEN PRODUCTS MADE FROM NATURAL SUBSTANCES WITH SELF TESTING

Abstract

Both in Hungary and in missions there is an increased risk of high ultraviolet radiation. It is a complex task to prevent UV radiation and primary prevention with an important element of using sunscreen products constitute an important part of it. The advanced sunscreen products, as part of primary and secondary prevention planned by the author, play an important role in military health protection. These substances are characterised by being effective, of natural origin, easily producible in large quantities, cheap, having non-toxic and antioxidant properties. Three types of natural sun protection creams were produced by the author, and it was proven by self-experimentation that the products are able to reduce the impact of the artificial UV source causing erythema.

Mind itthon , mind a missziókban fokozott kockázatot jelent a magas ultraibolya sugárzás. Megelőzése komplex feladat, melynek fontos része a primer prevenció, melynek fontos eleme a napvédő anyagok használata. A katonai egészségvédelemben a szerző által tervezett primer és szekunder prevenciós rendszer részeként fontos szerepet játszanak a korszerű napvédő anyagok. Ezeknek az anyagokra jellemző, hogy hatékonyak, természetes eredetűek, nagy mennyiségben könnyen előállíthatóak, olcsók, nem toxikus, antioxidáns tulajdonságúak. A szerző 3 féle természetes alapú napvédő krémet állított elő és önkísérlettel igazolta, hogy a készítmények képesek csökkenteni a mesterséges UV forrás erythema képző hatását.

Keywords: *UV radiation, personal UV protection, skin cancer, prevention, sunscreen ~ UV sugárzás, személyes UV védelem, bőrrák, misszió, megelőzés, napvédő*

INTRODUCTION

Skin cancer incidence is increasing worldwide in white populations in the last decades. Melanoma incidence increases faster than for any other cancer. Fortunately enough, the main risk factor which is responsible for these trends is known: solar and artificial UV. These circumstances predestine skin cancer as a target cancer for primary prevention. Primary prevention deals with strategies to avoid risk factors by means of changing people's behaviour and/or modifying environmental or artificial exposure conditions. One main recommendation which is always given in primary prevention of skin cancer is the use of sunscreens as a measure to reduce UV-exposure. However, this "simple" message has to be expanded upon in order to be sure that it does not lead to a wrong use of sunscreens and un-intended prolongation of exposure time. Primary prevention can effectively be combined with secondary prevention (early detection, screening) to reduce the burden of skin cancer and to decrease incidence, morbidity and mortality. [1]

Whilst the pathogenesis of skin cancer is multi-factorial, UV exposure is a major contributing factor. Squamous cell carcinomas (SCC) are directly related to chronic UV exposure over a lifetime and cutaneous melanoma seems to be related more to intermittent exposure. [2]

The ability of sunscreens to reduce sunburn is well established, confirmed by "extensive human experience." [1] It is important, particularly for public education, that although erythema is the end point used in the most standard evaluation of sunscreens, the prevention of sunburn does not equal prevention of all UV radiation–induced effects. It should be remembered that sunscreens are recommended for use as part of a "package" of sun protection strategies, including wearing tightly woven clothing, a hat, seeking shade, and avoiding peak exposure times. Sunscreens should not be used as a means of extending the duration of sun exposure. [3]

Safety of sunscreen compounds: Mutagenicity, photochemistry

There is no study to date showing that sunscreens are carcinogenic. However, chemical sunscreen compounds (also known as organic sunscreens) do absorb UV radiation. They then are in an excited state and must reenter the ground state by dissipating the absorbed energy by one of several processes. This energy is probably mostly dissipated harmlessly, but it is possible that the energy may be be involved in chemical reactions in the skin. The energy may be dissipated by fluorescence, phosphorescence, selfquenching, or heat. [3] The compounds may also undergo photofragmentation and photoisomerization or may transfer the energy to other molecules, including oxygen. Reactive oxygen species and other photoproducts may be formed. These highly reactive species could possibly react with a variety of cellular components, including DNA. [3]

PRODUCTION OF NATURAL SUN PROTECTION CREAMS

A sun protection cream containing three natural substances was produced. non ionic hydrophilic ointment was used as carrier. An nonionic hydrophilic ointment was prepared and used by the authors that contained grape seed oil and not paraffin oil. The composition per 100g: polysorbate 60 10 g, grape seed oil 10 g, cetylstearylalcohol 30 g, vaseline 70 g) The ointment contains no active substance. The product in not expected to cause any adverse effects, data on adverse effect is not known. Bath ointment for sensitive skin. It can also be used for hair and scalp.

Sunscreen product that contains one active component:

Maximum weight: 100 g
Fulvic acid: 5 %

Fulvic acid 5 g, Sterile distilled water 50 g, Unguentum hydrophilicum nonionicum 45 g. Fulvic acid was dissolved in sterile distilled water, added into the ointment base while stirring and the mixture was homogenized. The product was stored in a tightly closed plastic container. The ointment can be washed off with water, and is an O/W emulsion type.

Maximum weight: 100 g
Polyphenol: 10 %

Sunscreen product that contains two active components:

Maximum weight: 100 g
Fulvic acid: 5 %
Polyphenol: 5 %

SELF-EXPERIMENTATION

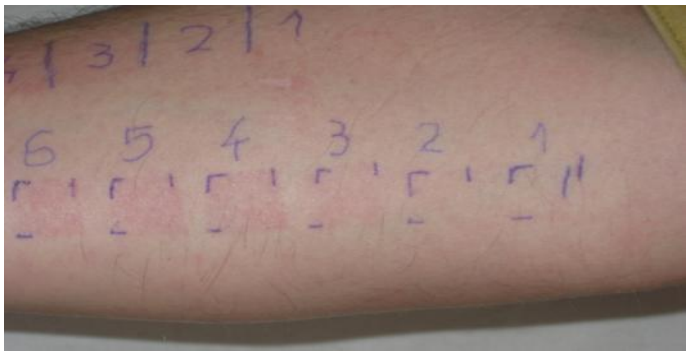
MED classification

For one person, the Minimum Erythema Dose (MED) is the amount of UV radiation that can cause observable erythema 8-24 hours after the irradiation of the skin. [4] In this case, the minimum irradiation time of the given source was examined that can cause mutation.

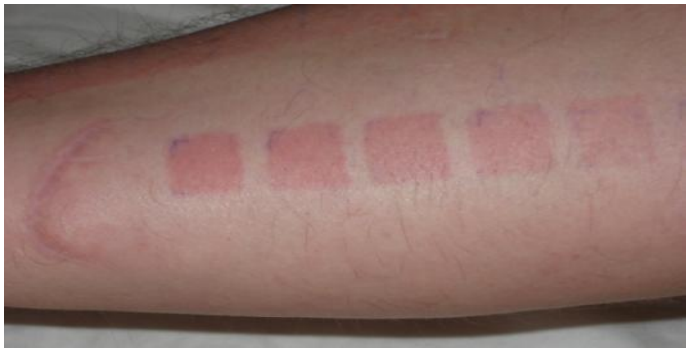
There was a distance of 35 cm kept between the source and the irradiated area. The irradiated area was the author's palmar surface of the right forearm. The skin surface was covered with a perforated cover plate, in which the perforation was divided into 6 parts. It was marked with numbers 1 to 6 in the following figure. The area marked with the number 1 was irradiated for 30 seconds, then each subsequent was irradiated half a minute longer, so the area marked with number 6 was exposed to UV radiation for 3 minutes.

Experience:

After 1.5 minutes immediately after the irradiation, erythema was formed (Figure 1). After the completion of the irradiation, 4 hours later, however, the mutation was formed in the total irradiated area. (Figure 2).



1. Figure Untreated surface immediately after the irradiation
Source: author



2. Figure Untreated surface 4 hours later
Source: author

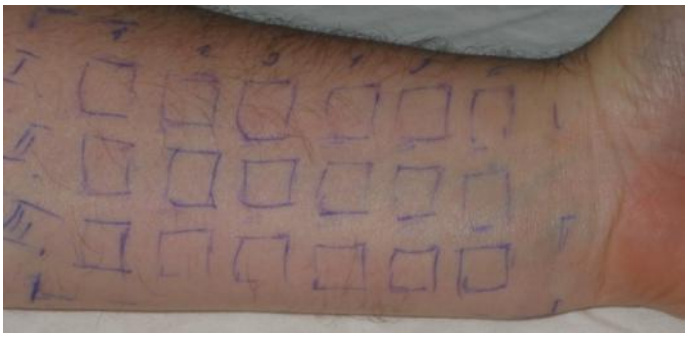
In the erythematous areas, burning sensation and pain occurred. 24 hours later, erythematous mutation was still visible and pain was felt but it slightly eased (Figure 3).

3. Figure Untreated surface the following day
Source: author

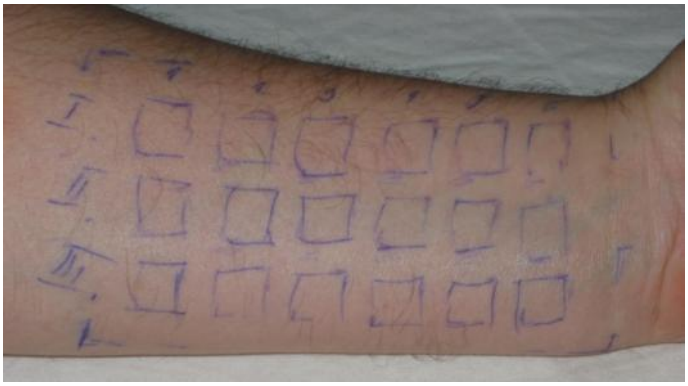
In the case of MED it may be stated that for the given UV source and distance it was less than 30 s.

Skin irradiation treated with one and two component sunscreen product.

The distance between the UV source and the irradiated area is equal to the previous ones. The irradiated area was the author's palmar surface of the left forearm. The skin surface was covered with a perforated cover plate, in which the perforation was divided into 3 x 6 parts. It was marked with numbers 1 to 6 in the following figure in 3 lines (I-II-III).



4. Figure Treated surfaces immediately after the irradiation
Source: author



5. Figure Treated surfaces 3.5 hours later
Source: author

The area marked with the number 1 was irradiated for 30 seconds, then each subsequent was irradiated half a minute longer, so the area marked with number 6 was exposed to UV radiation for 3 minutes.

However, this time the skin was treated with a natural substance product made by the authors before the irradiation. Line I was treated with a one component sunscreen product containing fulvic acid. Line II was treated with a one component sunscreen product containing polyphenol. Line III was treated with a two component sunscreen product containing fulvic acid and polyphenol.

6. Figure Treated surfaces the following day
Source: author

Experience:

Erythema did not occur (Figure 4.) immediately after the irradiation. There was no changes on skin 3.5 hours later (Figure 5.). Erythema still did not occur 24 hours later and the skin surface was undamaged (Figure 6). No pain occurred in any cases.

CONCLUSIONS

The experiments carried out showed that mutations on the untreated surface of the body induced by artificial ultraviolet radiation were prevented by the natural products on the treated surface. This basic experience therefore forms the basis for a series of experiment with the long-term goal of creating a product that can be produced on an industrial scale, which is cheap, natural, harmless to health, has no adverse effects and because of the content of natural active substances, it has positive physiological or possibly precancerous effects.

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