

VIII. Évfolyam 3. szám - 2013. szeptember

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## MELANOMA RISK ASSESSMENT IS PART OF THE EXAMINATION OF MEDICAL SUITABILITY FOR MILITARY

### *Abstract*

*In this study, authors present a proposal for melanoma risk assessment that has been submitted by them, which will form an integral part of the examination of suitability of soldiers in Annex 16 to the Ministerial Decree 7/2006. (III. 21.). This legislation is under revision these days. The risk assessment is a very important pillar of the complex UV protection authors have supposed. By using it, we will be able to identify and closely monitor the high-risk individuals, and if necessary, we may direct them to special medical care in time.*

*Cikkükben a szerzők ismertetik az általuk benyújtott melanoma kockázatfelmérés javaslatot, amely a napjainkban módosítás, átdolgozás alatt álló 7/2006. (III. 21.) HM rendelet 16. mellékletében iránymutatásként a jövőben a katonák alkalmasság-vizsgálatának szerves részeként szerepel. Ez a kockázatfelmérés egyik nagyon fontos pillére az általuk elképzelt komplex UV védelemnek, segítségével kiemelhetjük, szorosan követhetjük a magas kockázatú egyéneket, szükség esetén időben szakellátásra irányíthatjuk őket.*

**Keywords:** *health protection, UV radiation, examination of suitability, screening test, skin cancer, melanoma, risks, mission, prevention ~ egészségvédelem, UV sugárzás, alkalmasság vizsgálat, szűrővizsgálat, bőrrák, melanoma, kockázat, misszió, megelőzés*

## **INTRODUCTION**

UV radiation is one of the most calculable harmful agents among the extreme external factors for our soldiers serving in missions (e.g. Afghanistan, Cyprus etc.) far from Hungary.[1] The harmful ultraviolet (UV) radiation is an almost constant risk factor with common occurrence and potential damaging effect.[2] Especially the occurrence of melanoma malignum is becoming more common and can cause death. (This tumour may spread rapidly, causing death within months of its recognition. [3]). It influences the serviceability of our soldiers both short- and long-term. The screening examinations of the high-risk individuals and to direct them to special medical care contribute significantly to the prevention of this risk impact.

## **MELANOMA**

Solar radiation induces acute and chronic reactions in human skin. Epidemiological studies suggest that solar UV radiation is responsible for skin tumor development via gene mutations and immunosuppression, and possibly for photoaging. DNA damage caused by direct UV radiation and by indirect stress via reactive oxygen species (ROS) UV induces immunosuppression which may play a crucial role in skin cancer development [4] Ultraviolet B and A radiations (respective wavelength ranges 280-315 and 315-400 nm) are present in sunlight at ground level. The ultraviolet radiation does not penetrate any deeper than the skin and has been associated with various types of human skin cancers. [5] Three types of skin cancers comprise this group: basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and cutaneous melanoma (CM). The first two are often collectively referred to as non-melanoma skin cancer (NMSC). BCC and SCC both result from the malignant transformation of keratinocytes, the major structural cell of the skin. CM, on the other hand, results from the malignant transformation of melanocytes, which are the skin's pigment producing cells. [6]

## **PREVENTION**

The International Agency for the Research on Cancer (IARC) has grouped solar UV (UVB = 280-315 nm and UVA = 315-400 nm) as well as UV-radiation used in sunbeds in Group 1 ("carcinogenic to humans"). This has been reasoned by the overwhelming evidence coming from epidemiological data and invitro and in-vivo experiments which prove a causal connection between UV and skin cancer. Because the main risk factor for induction and development of skin cancer (-natural and artificial UV-) is known so well, and early forms of skin cancer (also malignant melanoma) can be treated very successfully, skin cancer can be prevented by means of primary and secondary prevention.

Primary prevention needs a long time and ongoing activities to achieve changes in behaviour of the soldiers which reduce risks of UV-induced skin cancer. Set against a background of dramatically increasing skin cancer incidences and being aware of the known difficulties in changing the behaviour of people, primary prevention, alone, might not be enough to fight the skin cancer problem. Therefore a combination with methods of secondary prevention seems appropriate. Secondary prevention deals with the early detection of malignancies which are curable in an early stage of their development. Because it is known that skin cancers (and especially MM, the deadliest skin cancer) can be cured with high efficiency in their early stages, skin cancers are also a target for secondary prevention, i.e., early detection and screening [7]

## UV PROTECTION

The complex UV protection is divided into three parts

- education
- prevention - regulation, personal protection
- screening tests (pre- and post-test)

All the three pillars of the protection against UV radiation is substantial, particular emphasis will therefore be placed on finding solutions to the challenges in all three issues. In our previous article, [1] we have proposes an education and regulation system for the UV prevention. The detailed description of our developed new sunscreen products to be used as part of the personal protection will be the subject to later publications.

Furthermore, the risk assessment of melanoma being the third pillar of the UV protection will be described. This was considered feasible for Psychological Examination Institute to build it in its protocol, which was confirmed by the above mentioned regulation.

### Melanoma risk assessment

During our research, we submitted a proposal arising from the summary of many relevant documents to the Institute of Psychological Suitability, aimed at reinforcing the usage of our risk assessment during the examination of suitability, as part of the medical examination.

Risk assessments have the great advantage that they are short and do not require expertise in oncology, and can significantly reduce the risks of melanoma malignum.

The assessment has three parts:

1. Filling the following table on the basis of information obtained by inspection and anamnesis:

Skin type	hair colour	skin colour	trends in sunburns	tanning
I	red	white, summer-freckled	+++	never
II	blond	white	++	mildly, temporary
III	light brown	white	+	brown
IV	brown	brown	seldom	brown
V	dark brown	dark brown	rare	deep brown
VI	black	black	never	black

On the basis of this, a patient in type I-II is identified as high risk for melanoma. [8]

2. The number of birthmarks needs to be determined: [9]
  - If someone has only a few birthmarks that are easily recognisable, it is not a risk factor.
  - If someone has many birthmarks, it must be determined if the number is above 50.

Number of birthmarks	
<50	>50

3. Family anamnesis:

A family history of melanoma	
No	Yes

On the basis of this risk assessment, for patients in type I-II and/or having more than 50 birthmarks and/or melanoma in family history, skin examination (dermatoscopy) is necessary.

When a soldier with melanoma risk applies to other missions, an opinion of a skin examination expert has to be submitted.

### Place of risk assessment in the examination of suitability

When this study is written, the legislation on military suitability (Ministerial Decree 7/2006. (III. 21.) on considering the mental and physical health competence related to professional and contract military service and studies in military establishment, and on the rules for the authorization of sick leave, compensatory time off and reduced daily service) is under modification. Our submitted proposal is used as part of the medical examination in the draft of the law. The risk assessment is part of the examination of soldiers in the draft of Annex 16 to the Ministerial Decree 7/2006. (III. 21.).

### SUMMARY

The complexity, simplicity and efficiency of the melanoma risk assessment we have developed, enabled it to be the part of the examination of suitability in the draft legislation. Thereby, we may reduce the risk of environmental impacts on soldiers. The classification of individuals to risk groups enables the selection, closer monitoring and specialised care of the high risk individuals in time. Time is very important in this case, as melanoma malignum is very invasive and progresses rapidly.

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