

PHOTODYNAMIC THERAPY IN THE TREATMENT OF MELANOMA

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INTRODUCTION

Melanoma is a malignant tumor that originates in pigment cells. The most common location of melanoma is the skin, but it can also occur in the mucous membranes and elsewhere (in the eyeball). Melanoma accounts for 5–7% of all skin cancers.

In Poland, in 2018, there were more than 1500 new cases in men and almost 2000 new cases in women.

The incidence is highest in Australia. In Poland, the morbidity and mortality of melanoma are increasing year by year.

The causes of the development of melanoma remain unclear. Both genetic and environmental factors play a role. About 10% of melanomas run in families. For this reason, family members of the 1st degree of melanoma patients should be under constant dermatoscopic monitoring.

Risk factors are for example: family burden - increased risk from 3 times, getting sick in the past for melanoma (8-fold increase in risk), other malignant neoplasm of the skin, pigmented moles, severe sunburn in childhood or adolescence (2-3 times increased risk after ≥ 5 burn episodes), immunosuppression (e.g. in people after organ transplantation, the risk is 3-fold increased).

About 60% of melanomas develop in unchanged skin. Only less than 40% develop on the basis of a pre-existing lesion, such as a pigmented moles.

DIAGNOSIS

Nowadays, the dermatoscope is the basic tool of a dermatologist's work in the early diagnosis of melanoma. In selected centers specializing in the diagnosis of melanoma, videodermatoscopes are used for this purpose. Dermatoscopic examination allows to exclude such non-melanocytic changes as seborrheic warts, pigmented basal cell carcinoma and changes of vascular origin. A detailed medical history collected from the patient in terms of melanoma risk factors is a perfect complement to the dermatoscopic examination. Digital dermatoscopy plays an important role in monitoring patients with multiple moles, in the dysplastic nevus syndrome, and individuals with a family history of melanoma, which enables moles to be assessed over time in terms of size, margins, pigment distribution and symmetry or asymmetry.

Among the new diagnostic methods of nevus, there is laser scanning confocal microscopy, which provides microscopic resolution and allows for an almost histological assessment of skin lesions in vivo, and also assesses the shape of pigment cells, the arrangement of nevus cells and the morphology of the dermal papillae. It is a bloodless, almost histological diagnostic method for dysplastic nevi, melanomas and their atypical varieties, such as pigmented melanoma, which clinically take on a very insidious appearance.

PHOTODYNAMIC THERAPY

One of the most modern therapies that can be used in the treatment of melanoma is photodynamic therapy.

The beginnings of research on the photodynamic effect date back to the end of the 19th century and are associated with Mr. Raab, who noticed a lethal effect on protozoa due to the simultaneous action of two factors: the acridine dye and sunlight. His research was continued in the following years by von Tappeiner, who is considered to be the creator of the term photobiological effect. Despite previous research and reports, the greatest development and practical application of photodynamic effects in medicine took place at the end of the seventies of the 20th century. This is due to the availability of light delivery systems to tissues based on laser and fiber optic technology.

Photodynamic therapy is based on the induction of a photochemical reaction between a non-toxic photosensitizer, light and oxygen. It is a modern method that uses light to heal. In this technique, after systemic administration of a photosensitizing agent, local necrosis of neoplastic cells, inflammatory lesions or cells of microorganisms such as bacteria, viruses and fungi is induced using light of a specific wavelength. The use of photodynamic therapy allows to limit the number of surgical procedures and often successfully complete the treatment process.

The source of autofluorescence are naturally occurring in the cell fluorophore substances. In the photodynamic diagnosis appendage, the spectrum obtained is an overlay of autofluorescence and fluorescence of an exogenous photosensitizer.

The main role in the method of diagnosis and treatment of both oncological and non-oncological changes in cells and tissues is played by photosensitizers - dyes that are activated under the influence of light of the appropriate wavelength.

Unlike chemotherapy and radiotherapy, photodynamic therapy uses a combination of light and photosensitizer, which together determine the end result.

POSSIBLE WAYS OF TREATMENT

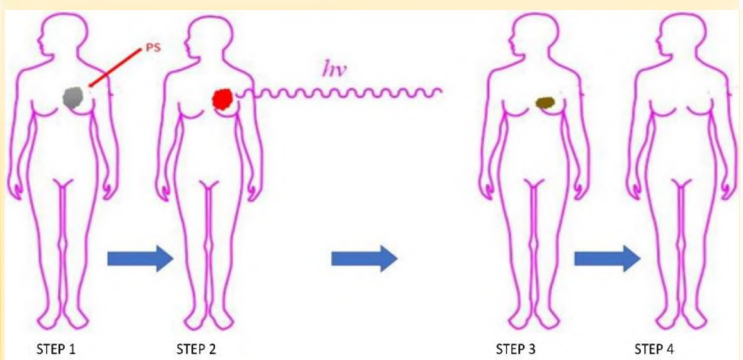
If melanoma is confirmed in a histopathological examination, after the removal of the lesion, the next stage of the procedure is a so-called biopsy-sentinel node (one of the surrounding lymph nodes selected taking into account the location of the primary tumor). Appropriate and complete surgical treatment in the case of locally advanced melanoma is sufficient and requires only observation in accordance with the recommendations of the attending dermatologist. For advanced and disseminated melanoma, the following treatments are used:

-Photodynamic therapy
-Immunotherapy and molecularly targeted treatment are modern and most effective methods of treatment.

-Drugs such as ipilimumab nivolumab (alone or in combination with ipilimumab) and pembrolizumab, vemurafenib, dabrafenib, trametinib, cobimetinib are used.

-Excision of distant metastases of melanoma in justified cases after analyzing the patient's situation (e.g. if the metastases concern only one organ and are few, they appeared one year after melanoma treatment).

-Single cytotoxic chemotherapy (e.g. dacarbazine) → Currently, after the introduction of immunotherapy and molecularly targeted drugs, this treatment is used less frequently



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