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Novel therapeutic approaches against metastatic melanoma cells

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Introduction: Melanoma, the malignancy of melanocytes, is a serious disease with growing incidence in comparison with almost any other cancer. Despite recent improvements in prevention, diagnosis and treatment of melanoma, the survival rate of patients is low, mainly due to metastasis of cells beyond their primary site. Resection of the lesion, alone or along with chemotherapy and radiotherapy are conventional treatments for metastatic melanoma. Since chemical agents and radiation cause serious side effects, and their efficiency depends on the severity of disease at the time of diagnosis, studies have aimed to introduce novel therapeutic approaches against melanoma.

Description: In search for recent advances in melanoma treatment, published articles including Keywords metastatic melanoma, nanomedicine, immunotherapy and photodynamic therapy were extracted from databases Web of Science, PubMed and Scopus.

Discussion and conclusion: The critical role of nanotechnology in improvement of melanoma drug delivery is not doubtful, since nanostructures act as carriers that promote the cellular uptake of anticancer drugs and also affects their stability, permeability, and hydrophilic adaptations. Interestingly, incorporation of nanoparticles to antibodies promotes drug attachment to melanoma cells, and reduces the overall toxicity in adjacent non-cancerous cells. The other approach is molecular-targeted therapy by which CTLA-4 antibody is used to improve the cancer-fighting ability of innate immune system. However, efficacy of this method is influenced by its immune-related side effects and developed resistance. Last but not least, photodynamic therapy is a new modality involving a particular wavelength of light and a photosensitizing agent, which produces reactive oxygen species to achieve photocytotoxic effects. Beside its less invasiveness, this approach has limited side effects since it induced localized apoptosis, autophagy, and/or necrosis in cancerous tissue. In novel methods, nanoparticles are conjugated to photosynthetic drugs to improve drug delivery, such as conjugation of doxil, a FDA approved drug, to pegylated liposomal nanocarriers.

Keywords: Metastatic melanoma, Nanomedicine, Photodynamic therapy.