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Reply

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Key Words

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Overexercise

The development of malignant melanoma in an individual is caused by exogenous and endogenous factors, of which many are already known. Environmental influences, such as ambient solar radiation, sun exposure, frequent or severe sunburns (especially in childhood) and altitude have been shown to be significantly associated with melanoma risk. Personal risk factors, such as genetic predisposition, skin phototype, amount of nevi and amount of atypical nevi are also known as causative factors. Furthermore, these personal risk factors seem to be influenced by UV-radiation, as sun exposure leads to an increase of common melanocytic nevi (the strongest indicator for the development of malignant melanoma).

In our study, we showed that marathon runners with higher training heart rates, higher training velocities and higher physical strain indices showed more nevi than the other runners. This led us to speculate whether, along with the undoubted effect of UV exposure, immunosuppression may put marathoners at an increased risk of developing malignant melanoma. While regular, moderate exercise is considered to improve health, it is well docu-

mented that overtraining and excessive exercise can have detrimental effects. Overexercising can lead to a transient but broad and metabolically dependent exhaustion of the immune system and other parts of the body, such as the endocrine, hematological and electrolytic compartments.

In addition, the suppression of cell-mediated immunity, up-regulation of humoral immunity and increases in the concentrations of inhibitory cytokines and immunosuppressive hormones are well documented after overexercise.

Immunosuppressive drugs taken as medications after organ transplantation have a more or less selective impact on the immune system, leading to inhibition of certain pathways (e.g. inhibition of DNA biosynthesis or the release of interleukin 2). This immunosuppression is causative in skin cancer development, especially in the development of nonmelanoma skin cancers, but also, to a lesser extent, in the development of malignant melanomas.

As mentioned in the discussion, the role of immunosuppression in facilitating melanoma genesis among marathon runners remains a big question.

We believe that repetitive exhaustion due to increased and long-lasting excessive physical exercise in marathoners might prevent complete restoration of the immune defense and, hence, might favor a sort of immunologic change that leads to the development of malignant melanoma.

This could explain our clinical observation that marathon runners with a higher physical strain index are affected by more factors that put them at a greater melanoma risk.

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