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Non-conventional Approach in the Response against Cancer: Immune Response and Physical Activity

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Editorial

Cancer, currently the second cause of death worldwide, is a major public health problem that soon may overtake heart disease as the leading cause of death [1]. Breast cancer is not a single disease but a diverse set of diseases characterized by heterogeneity in histology, genomic aberrations, and protein expression that influence treatment response and patient outcome [2].

The processes underlying cancer development are still not fully understood, but most of the theories are based on a model composed of two basic events, i.e. a change in the genetic material of cells, and altered cell division and transmission of their genetic material to daughter cells [3].

Numerous factors have been proposed as possible agents involved in the initiation and/or development of tumors. This information stems from a multitude of epidemiological studies, in which a number of common features in the history of subjects with cancer were observed. Among the important contributing factors are diet, smoking, contact with toxic substances, alcohol consumption, infection by different pathogens, various types of radiation and environmental pollution [4].

Throughout the years, researchers have sought to verify other lifestyle aspects that could contribute to reducing the development of cancer. As such, one of the promising tools against cancer is physical activity [5].

Individuals who regularly do physical activity experience numerous health benefits, including reduced incidence of heart and metabolic diseases and increased longevity [6,7]. Thus, the question arises as to whether there is also an association between physical activity and lower cancer incidence; this hypothesis of the cancer-reducing effect of exercise is not new: already in 1922, Cherry found that men with physically active jobs had lower cancer mortality/ incidence rates than men involved in less active jobs. Inactivity levels are disconcerting given substantial epidemiologic evidence showing that physical activity is associated with decreased risks of breast cancers. For example, insufficient physical activity levels are associated with cause 9% of breast cancer cases and 10% of colon cancer cases in Europe. The biologic pathways underlying the association between physical activity and cancer risk are incompletely defined, but potential etiologic pathways include insulin resistance, growth factors, adipocytokines, steroid hormones, and immune function [6,8].

Physical activity might have a positive influence on the immune system. Therefore, multiple studies have explored the role of the immune response in tumorigenesis, which is now known to be either stimulatory or inhibitory. The intercellular interactions and cytokine pathways polarize the tumor microenvironment, resulting in either tumor-promoting or tumor-inhibiting effects.

The tumor microenvironment includes, next to the extracellular matrix and stroma cells, innate immune cells (macrophages, neutrophils, myeloid-derived suppressor cells, natural killer cells, and dendritic cells) and adaptive immune cells (B and T lymphocytes) [9]. It is noteworthy, however, that many specific aspects of the mechanisms that contribute to cancer have unknown properties [10]. In addition, the physical activity-related pathways of the immune system, aimed at preventing and even fighting cancer, have not been fully elucidated, although it already has in the literature studies evidencing a polarization of the antitumor patterns of the immunological response to physical activity [11-14].

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