

## Thematic Issue: Immuno-Oncology and Immunotherapy

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**Abstract**—Currently, the use of immunotherapeutic approaches for creating new efficient therapeutic agents for cancer treatment is considered as one of the most promising areas in oncology. Despite significant advances in immuno-oncology during the recent years, some unresolved problems remain. The articles included in this thematic issue highlight the topical aspects of cancer immunotherapy by presenting different viewpoints of scientists, physicians, and drug developers.

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Currently, the use of immunotherapeutic approaches in cancer treatment is considered as one of the most promising areas in oncology. Moreover, such approaches have already led to essential clinical results. A significant progress has been achieved in creating and using chimeric receptors for modification of T lymphocytes (CAR T cell techniques) [1] and inhibitors of immune response checkpoints acting on the PD1/PDL1 or CTLA4 receptors [2], as well as in the development of immunotherapeutic vaccines [3]. Nevertheless, a number of problems in immuno-oncology still remain unsolved that are associated with the maximally efficient use of the immune system abilities to make the human body less susceptible to oncogenesis, that in the case of tumor development, would contribute to the most operative mobilization of the entire immune system potential.

By now, it has become obvious that oncogenesis is not limited to pathologic processes in the transformed cells only. A tumor is a conglomerate of cells that include not only transformed cells, but also stromal and immune cells. Although leukocytes were for the first time detected in tumors more than 150 years ago, only recently it became clear that immune cells contribute to the key processes of oncogenesis, in particular, by maintaining the corresponding composition of the tumor microenvironment, which is crucial for the malignant tumor development [4].

Since viral infections cause development of 15-20% tumors [5], the activation of immune response at an

appropriate time can be a prophylaxis of tumor development.

Modern immuno-oncology and immunotherapy combine the knowledge from various research fields. This thematic issue includes reviews that describe the roles of different immune system components in oncogenesis, as well as reviews and original articles devoted to various immunotherapeutic approaches for prevention and treatment of tumors. For us, it is important that this thematic issue includes the studies from the pharmaceutical company BIOCAD, which is one of the largest developers of innovative preparations in Russia that actively introduces its products into clinical practice. The review by Gershkovich et al. [6] presents the views of drug developers on the problems related to the design and application of immune response checkpoint inhibitors and cytokines in the adoptive antitumor immunotherapy using genetically modified T lymphocytes. The experimental article by Doronin et al. [7] presents the studies carried out by BIOCAD and summarizes the results of the development of a test-system using biospecific antibodies for the assessment of functional activity of antibodies against PD-1 and PDL1 [7]. The system proposed by the authors can be useful in the development of new therapeutic agents and approaches for their testing. The review article by Abakushina et al. [8] describes immunotherapeutic approaches approved for the treatment of colorectal cancer patients. The review by

Kapitanova et al. [9] summarized current studies on the classification of macrophages, the mechanisms of their polarization, and the role in the formation of tumor microenvironment, as well as the problems of specific delivery of immunostimulatory signals to tumor macrophages using nanoparticles [9]. The review by Petushkova et al. [10] describes cysteine cathepsins that lend unique properties to the tumor environment and the prospects of using these enzymes as targets and activators of antitumor preparations [10]. The review article by Zavyalova et al. [11] summarizes the data on the involvement of macrophages in metastasis with a special attention to the development of targeted therapeutic strategies preventing the intravasation [11]. In the review by Syrkina and Rubtsov [12], positive and negative outcomes of the use of mucin MUC1 as a target in anticancer immunotherapy are discussed, as well as potential applications of this glycoprotein in the fight against malignant tumors [12]. The last two articles of this thematic issue are reviews by Vonsky et al. [13, 14] that discuss the mechanisms of carcinogenesis associated with human papilloma virus infection and the prospects of using immunotherapy for the treatment of this disease.

It should be admitted that despite abundant information on immuno-oncology and immunotherapy, there are still many challenges facing the researchers. By inviting the authors from different research fields to contribute to this issue, we wanted to highlight the topical problems of immuno-oncology and immunotherapy by presenting different viewpoints of scientists, physicians, and drug developers.

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