Abstract

Interactions between the immune system and tumors have been among the highlights of present immunological research. An extensive body of new knowledge recently substantiated the long-presumed concept of cancer immunosurveillance. Immune system searches the organism for cells expressing tumor antigens or cellular stress signals and destroys them. T-cells, NK-cells and dendritic cells, as well as cytokine signaling and direct cell cytotoxicity play dominant role in this process. However, a fraction of nascent tumors can evade these mechanisms and create a dynamic equilibrium, gradually sculpting its phenotype by clonal selection. Eventually, tumor cells escape immune control by concealing themselves from recognition or by actively subjugating local immune response. This immunosubversion results in formation of immunosuppressive tumor microenvironment by recruiting protumorigenic cell populations, such as Treg cells, macrophages and myeloid derived suppressor cells. Soluble signaling molecules, as well as surface-expressed immune checkpoint molecules are exploited by tumor cells for inhibition of anti-tumor immunity. Highly effective therapeutic antibodies blocking these checkpoints have been developed for clinical use, with many more in current trials. Several other promising immunotherapeutic approaches (tumor vaccines, adoptive T-cell therapy with chimeric antigenic receptors) have been used or are in clinical trials.

Keywords

cancer immunity, immunosurveillance, cancer immunoediting, tumor-specific antigens, tumor-associated antigens, NKG2D, TGF-β, CTLA-4, PD-1, cancer immunotherapy, immune checkpoint blockade