

Cancer immunoediting: Molecular pathways to possible novel therapeutic interventions

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Abstract

Cancer immunoediting is the process by which immunity controls and shapes cancer. We originally envisaged that cancer immunoediting would occur in three phases that we termed Elimination (also known as cancer immunosurveillance, the host protective phase of the process), Equilibrium (a phase in which the outgrowth of tumor cells that survive immune destruction is kept in check resulting in a state of functional tumor dormancy) and Escape (the phase where tumor growth can no longer be immunologically controlled and becomes clinically apparent either because of immune sculpting of the cancer cell population or because the tumor cells have induced in the host a state of immunologic unresponsiveness). Strong experimental data has now been obtained using mouse models of cancer demonstrating the existence of each phase of the process and compelling clinical data suggests that a similar process may also occur during the evolution of certain types of human cancer as well. Our recent work has focused on identifying the molecules and cells that participate in elimination, equilibrium and escape. This work has led to the identification of specific cytokines (such as the interferons) and cytokine receptor signaling pathways (such as the JAK-STAT pathway) that, in some cases, promote immune effector mechanisms that result in cancer control while, in other cases, induce an immunosuppressive state that promotes tumor escape and results in uncontrolled tumor growth. We are currently exploring whether we can influence the eventual outcome of the cancer immunoediting process by therapeutically enhancing or inhibiting the expression and/or action of specific cytokines.