Research

Colloquium

A mathematical model of tumor-immune interactions with an immune checkpoint inhibitor

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摘　要：

Blockade of immune checkpoints has recently been shown as a revolutionary strategy in the fight against cancers. Based on recent mouse experiments and clinical trials, large tumors can be completely suppressed with an additional blockade of immune checkpoints. We construct mathematical models capturing key interactions among malignant tumor cells, CD4+ T cells, anti-tumor cytokines, and immune checkpoint inhibitor of CTLA-4 to explore the importance of immune checkpoints on regression of tumor. Our study shows that blockade of immune checkpoints plays essential roles in immune responses. Continuous and one day pulse immune therapies by either T cells, anti-tumor cytokines, anti-CTLA-4 or a joint therapy are administered to exam the effectiveness of immune therapies. Our investigation indicates anti-tumor cytokine is potentially a key factor in determining the future of the malignant tumor. The malignant tumor can be suppressed thoroughly with reasonable dosages of anti-tumor cytokines if pre-radiation along with anti-CTLA-4 therapy are implemented.