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Introduction

Cancer remains one of the most pressing health challenges worldwide, with conventional treatment modalities o en associated with signi cant side e ects and limited e cacy. In recent years, cytokine therapy has emerged as a promising avenue for cancer treatment, o ering targeted immunomodulatory interventions that aim to harness the body's immune system to recognize and eradicate tumor cells. is article delves into the evolving landscape of cytokine therapy for cancer, exploring its mechanisms of action, clinical applications, and future directions [1].

Understanding cytokine therapy

Cytokines are small proteins secreted by immune cells that play key roles in regulating immune responses and in ammation. In cancer therapy, cytokines can be used to stimulate the immune system, enhance anti-tumor immune responses, and inhibit tumor growth. Interleukins, interferons, Tumor Necrosis Factor-Alpha (TNF-α), and colony-stimulating factors are among the cytokines investigated for their potential in cancer treatment [2].

Mechanisms of action

Cytokine therapy exerts its e ects through various mechanisms, including:

Activation of immune e ector cells:

Cytokines such as Interleukin-2 (IL-2) and Interferon-Alpha (IFN-α) activate cytotoxic T cells and Natural Killer (NK) cells, enhancing their ability to recognize and kill tumor cells.

Anti-angiogenic e ects:

Certain cytokines, such as Interferon-Gamma (IFN-γ) and TNF-α, inhibit the formation of new blood vessels (angiogenesis) required for tumor growth, thereby depriving tumors of nutrients and oxygen [3-5].

Modulation of tumor microenvironment:

Cytokines can alter the tumor microenvironment, promoting an immune-stimulatory environment that facilitates anti-tumor immune responses and inhibits tumor progression [6].

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