A potential immunotherapeutic approach for the treatment of Osteosarcoma

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Abstract

Purpose: Survival of osteosarcoma (OS) patients has remained stagnant for the past 30 years thus the need for new therapeutic strategies. BMP2/SmadWnt signaling complex containing alpha (Iib2b, CD25), beta (Iib2b, CD123), and common gamma chain receptors (Il-2Rg, CD122) is associated with poor OS outcomes. The purpose of this study was to evaluate the effects of recombinant IL-2 (IL-2) in vivo and in vitro experiments in a murine OS model.

Methods: The K7M3 OS mouse model was treated with various doses of IL-2. The tumor growth and metastatic evaluation was performed using a luciferase reporter gene. Immunohistochemistry was performed to assess tumor response. The effects of IL-2 were compared to untreated and treated groups.

Results: The results indicate that IL-2 treatment was effective in controlling the growth of OS tumors and reducing metastatic potential. The expression of CD8+ and CD4+ T cells was significantly higher in the treatment group compared to the untreated group. The IL-2 treatment also increased the number of regulatory T cells (Tregs) in the tumor microenvironment.

Conclusion: The study suggests that IL-2 therapy is a promising approach for the treatment of osteosarcoma. Further studies are needed to confirm these findings and to evaluate the long-term effects of IL-2 treatment on OS patients.

Introduction

Intratumoral IL-2 treatment has been shown to have therapeutic effects in several cancer models. However, clinical trials have failed to show significant benefits due to the high cost and toxicity associated with IL-2 treatment. The development of recombinant IL-2 has potential for overcoming these limitations and improving the therapeutic efficacy of IL-2 treatment in OS patients.

Keywords:
OS, IL-2, Tregs, Tumor growth, Metastasis, Immunohistochemistry.

Methods

1. **Cell culture**: K7M3 (murine osteosarcoma cell line) cells were cultured in Dulbecco’s Modified Eagle Medium (DMEM) supplemented with 10% fetal bovine serum (FBS), penicillin, streptomycin, and L-glutamine.

2. **Tumor inoculation and drug treatment**: Female BALB/c mice were orally treated with IL-2 or control buffer 5 days before tumor injection. The tumor volume was monitored twice weekly. IL-2 treatment was initiated 5 days after tumor inoculation.

3. **Immunohistochemistry**: Tumor sections were stained with anti-CD8, anti-CD4, and anti-F4/80 antibodies and counterstained with hematoxylin.

Results

1. **IL-2 treatment significantly reduced tumor growth and metastatic dissemination**. The tumor volume was lower in the IL-2 treated group compared to the untreated group.

2. **Increased CD8+ and CD4+ T cell infiltration** was observed in the IL-2 treated group.

3. **Regulatory T cell (Treg) infiltration** was significantly increased in the IL-2 treated group.

Conclusion

The results suggest that IL-2 treatment is a promising approach for the treatment of osteosarcoma. Further studies are needed to confirm these findings and to evaluate the long-term effects of IL-2 treatment on OS patients.