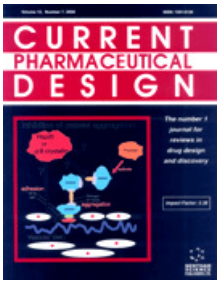

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Nitrogen-Containing Bisphosphonates and Cancer Immunotherapy

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Full Text

Abstract

Bisphosphonates, especially nitrogen-containing bisphosphonates (N-BPs), are widely used to block bone destruction in cancer patients with bone metastasis because they are effective inhibitors of osteoclast-mediated bone resorption. In addition to their antiresorptive effects, preclinical evidence strongly suggests that N-BPs have anticancer activity. Some of the activities associated with N-BPs are observed in human γδ T cells that straddle the interface of innate and adaptive immunity and have potent anti-tumour activity. This review examines the molecular and cellular mechanisms through which N-BPs stimulate the expansion and cytotoxic activity of human γδ T cells. In addition, we discuss the emerging clinical evidence that N-BPs have a role in cancer immunotherapy.

Keywords: Bisphosphonate, zoledronate, IPP, gamma delta T cell, immunotherapy, cancer, Cancer Immunotherapy, nitrogen-containing bisphosphonates (N-BPs), osteoclast-mediated bone resorption, sorptive effects, T cells, mevalonate path-way, isoprenoid lipids, farnesyl pyrophosphate synthase (FPPS), GTPases, monocytes, macrophages, endothelial, tumour cells, adaptive immunity, Innate immunity, macro-phages, antigen-targeted cytotoxic cells, histocompatibil-ity complex (MHC), farnesyl pyrophosphate (FPP), tumour antigen, phosphoantigens, cytokines, Tregs' activity, pa-midronate, risedronate, immunostimulatory properties, antigen-presenting cells, peripheral blood mononuclear cells (PBMC), putative antigen-presenting molecule, nonhuman antigen-presenting, cytolytic granules, anti-tumour activity, chronic myelogenous leukemic cells, autologous, kemia cells, allogeneic, zoledronate-treated, myeloid leukemia, CANCER IMMUNO-THERAPY, antigen-recognition properties, a synthetic phosphoantigen, pleiotropic pharmaceutical agents, tumor-hostile counterpart, goserelin, tamoxifen, anastrozole, endocrine-responsive, multichemotherapy, chemorefractory adrenocortical carcinoma

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