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Use of Cyclophosphamide Drug in the Treatment of Cancer

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Opinion Article

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DESCRIPTION

Cyclophosphamide (CP), often called cytophosphane, is an anti-immune suppressant and chemotherapeutic drug. It is used as chemotherapy to treat leukaemia, ovarian cancer, breast cancer, small cell lung cancer, neuroblastoma, and sarcoma as well as lymphoma and multiple myeloma. It is used as an immune suppressant, among other disorders, in nephrotic syndrome, granulomatosis with polyangiitis, and after organ transplant. It can be consumed orally or administered intravenously. The drug cyclophosphamide is used to treat autoimmune disorders and malignancies. It is applied to effectively control the illness. It is as soon as feasible replaced by less toxic medications due to its toxicity. To monitor kidney function, avoid drug-induced bladder problems, and check for bone marrow toxicity, regular and routine laboratory examinations are needed. Cyclophosphamide is mostly used in combination with other chemotherapy drugs to treat lymphomas, some types of brain cancer, neuroblastoma, leukaemia, and some solid tumours.

Oncovet C is the first medication of its kind to be approved for veterinary use in Latin America for the treatment of canine and feline cancer, including cancers of the anal sac, bladder, and urethra, as well as hemangiosarcomas, lymphomas, mast cell tumours, osteosarcomas, and soft tissue sarcomas (mammary carcinomas, hemangiosarcomas, lymphomas, plasmacytomas, chronic lymphocytic leukemia, acute myelogenous leukemia, mast cell tumor). It can be given as part of a variety of treatment plans, including metronomic chemotherapy, adjuvant therapy, neoadjuvant therapy, adjuvant, and induction therapy.

Although worries about toxicity limit its usage to patients with severe disease, cyclophosphamide nevertheless plays a crucial role in the treatment of autoimmune disorders that are life-threatening when disease-modifying antirheumatic medications (DMARDs) have failed to provide relief. Pulsed cyclophosphamide, for instance, may be effective for systemic lupus erythematosus patients with severe lupus nephritis. Additionally, multiple sclerosis,

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severe rheumatoid arthritis, granulomatosis with polyangiitis, Goodpasture syndrome, minimum change disease, and rheumatoid arthritis are all treated with cyclophosphamide. As an off-label therapy for AL amyloidosis, cyclophosphamide, thalidomide, or lenalidomide, and dexamethasone have been shown to be effective. In patients who are not candidates for autologous stem cell transplant, it looks to be an alternative to the more conventional therapy with melphalan.

Except in situations where the mother's life is threatened, cyclophosphamide, like other alkylating drugs, is prohibited for use in pregnant women. Lactation, an active infection, neutropenia, or bladder damage are additional relative contraindications to using cyclophosphamide. Cyclophosphamide is a category D pregnancy medication that results in birth abnormalities. When cyclophosphamide is administered during the first trimester to treat lupus or cancer, a pattern of defects known as "cyclophosphamide embryopathy" manifests, including growth restriction, ear and face deformities, digit missing, and hypoplastic limbs.

Alopecia (hair loss or thinning of the hair), hemorrhagic cystitis, diarrhoea, darkening of the skin/nails, changes in the colour and texture of the hair, lethargy, and profound gonadotoxicity are some of the adverse drug reactions from cyclophosphamide that are related to the cumulative medication dose. Other adverse effects include be easy bleeding or bruising, joint pain, mouth ulcers, poor wound healing, unusually low urine output, or extreme fatigue or weakness. Leukopenia, infection, bladder damage, and malignancy are further possible side effects.

When combined with intravenous fluids given to avoid drug-induced cystitis, high dosage intravenous cyclophosphamide can result in the Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH) and a possibly fatal hyponatremia. Even though SIADH has mostly been reported with greater doses of cyclophosphamide, it can also happen with lesser dosages that are used to treat inflammatory conditions.

Acrolein can cause hemorrhage cystitis, which is accompanied by microscopic or extensive hematuria and sporadically dysuria. It is harmful to the bladder epithelium. With enough fluid intake, avoiding evening dose, and mesna , a sulfhydryl donor that binds and detoxifies acrolein, hemorrhagic cystitis risks can be reduced. People who use cyclophosphamide may develop neutropenia or lymphopenia, which increases their risk of contracting various bacterial, fungal, and opportunistic illnesses.

The risk of premature menopause in women and infertility in both sexes has been found to be greatly increased by cyclophosphamide, and this risk rises with cumulative medication dose and patient age. The infertility in question is typically transient but not always. Cyclophosphamide's major impact is brought on by the metabolite phosphoramide mustard. The only cells that produce this molecule are those with low ALDH levels. At guanine N-7 sites, phosphoamide mustard creates DNA crosslinks between and within DNA strands. This results in cell apoptosis and is irreversible.

In adaptive immunotherapy, cyclophosphamide produces advantageous immunomodulatory effects.Several suggested processes include Elimination of T regulatory cells in tumor-bearing and naive hosts, production of growth factors for T cells such type I IFNs, and/or improved grafting of adoptively transplanted, tumor-reactive effector T cells by the development of an immunologic space niche. Thus, adoptive T cell immunotherapy regimens, active vaccination techniques, and cyclophosphamide neural stimulation of recipient hosts (for donor T cells) have all been employed to improve immunity in naive hosts and induce objective anticancer immunity.