Innate Immunity Modulates Autoimmunity: Type 1 Interferon-b Treatment in Multiple sclerosis

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Introduction

Type 1 Interferon-β or T1IFN-β for short has been the primary treatment or therapy for patients suffering from multiple sclerosis (MS). T1IFN-β plays an essential role in immunoregulation and recognizing pathogens or tumor cells by stimulating T-cell activity. These interferons affect most cells in the body and stimulate both innate and adaptive immune responses [1] . T1IFN- β influences responses from natural killer (NK) T cells and other co-stimulatory molecules while producing an increase of cytokine secretion to control growth and activity of other immune system cells. There has been confusion regarding the ability of T1IFN-β to counter regulate T cell activity and autoimmunity in MS since its primary function is to promote and increase antiviral T cell efficiency against autoimmune diseases [2]. MS is an autoimmune disease that affects the brain and spinal cord and occurs when responding autoimmune cells attacks and damages the myelin sheath surrounding the nerves interfering with nerve impulses. Most patients suffer from relapse-remitting MS however there is no evidence of T1IFN- β treated patients experiencing more effective immune responses to infections than patients not treated with it.

Hypothesis

Recent studies have indicated that T1IFN- β can prevent autoimmunity in MS by assuming a modulatory and regulatory role. Once inserted in vivo, the T1IFN stimulates the innate immune responses and signals immune cells with regulatory functions such as the invariant NK T-cells (iNKT cells) which intercepts autoimmunity mechanisms present in MS [2]. The authors of this study are investigating if T1IFN- β have regulatory or influencing effects on iNKT cells and if it enhances their activation and function in MS patients who receive this

treatment. It is important that this is investigated because iNKT cells are essential for proper function and cell development [2]. There have been many studies to suggest that T1IFN- β does increase activation and regulatory functions in iNKT cells resulting in a reduction of relapses of MS symptoms.

Aims

The authors intend to prove that patients who receive T1IFN- β treatment experience an enhancement in activation of iNKT cells and an overall improvement of their function. They measured percentages of iNKT cells produced as well as the amount of cytokine secretion in these patients and compared its effectiveness against patients who were not administered the treatment. The experiment consisted of staining the NKT cells with anti-Vα 24 monoclonal antibody (mABs) and analyzing the dendritic cells phenotype using anti-CD11c, anti-CD80, anti-CD40, and anti-CD1d mABs [2]. Monoclonal antibodies have been discovered to combat numerous diseases due to its high specificity, adaptability, and ability to detect and treat the disease [3]. Following the staining, dendritic cells (DCs) were cultured from blood monocytes and some cultures of the DCs and iNKT cells were administered human T1IFN- β while the remaining cultures were a constant in the experiment. After four weeks, iNKT cells were cultured, purified with anti-Vα 24 mABs and the buoyant liquid from the cultures were collected and the concentration of cytokines was measured.

Results

The authors synthesized the data by conducting a statistical analysis of iNKT cells in both treated and untreated MS patients and performed a nonparametric test comparing results between the two independent groups known as the Mann-Whitney test [2]. The Mann-Whitney test is used to calculate the mean of both groups and compare the results. Specifically in this

experiment, the iNKT cell count was calculated [4]. The results in this experiment indicated that there was a significant increase in iNKT cells compared to untreated patients or before treatment. There was an overall improvement of cell cytokine release and a progressive increase of these regulatory T cells as time passed. It was also discovered that T1IFN- β did not directly affect growth and function of iNKT cells and that instead it promoted cell activation by regulating myeloid DCs which is associated with antigen-presenting cells necessary for iNKT maturation [2].

Discussion/Summary

Type 1 interferons were discovered to not directly impact growth and function of iNKT cells, but they are important for the activation and maturation of DCs. T1IFN- β does improve the number of regulatory iNKT cells and costimulatory molecules by enhancing detection of autoimmune diseases and the function of other lymphocytes to combat disease. Successful experiments as this promotes the use of T1IFN- β treatment against other autoimmune diseases such as diabetes and arthritis [2].

References

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