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Production of Tumor Necrosis Factor-α and Interferon-γ from Human Peripheral Blood Lymphocytes by MGN-3, a Modified Arabinoxylan from Rice Bran, and Its Synergy with Interleukin-2 in Vitro

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Recently, we presented evidence for the role of MGN-3, an enzymatically modified arabinoxylan extracted from rice bran, in potent activation of human natural killer (NK) cell function in vitro. In the current study, we examined the mechanism by which MGN-3 elevated NK cytotoxic activity. We did this by testing the action of MGN-3 on the levels of both tumor necrosis factor-α (TNF-α) and Interferon-γ (IFN-γ) secretions and MGN-3 function on the expression of key cell surface receptors. Peripheral blood lymphocytes were treated with MGN-3 at concentrations of 0.1 mg/ml and 1 mg/ml, and supernatants were subjected to enzymelinked immunosorbant assay. Results showed that MGN-3 is a potent TNF-α inducer. The effect was dose-dependent. MGN-3 concentration at 0.1 and 1 mg/ml increased TNF-α production by 22.8- and 47.1-fold, respectively. MGN-3 also increased production of IFN-γ but at lower levels as compared to TNF-α. With respect to key cell surface receptors, MGN-3 increases the expression of CD69, an early activation antigen at 16 hours after treatment. Furthermore, the interleukin-2 receptor CD25 and the adhesion molecule ICAM-1 (CD54) were upregulated after treatment with MGN-3. Treating highly purified NK cells with MGN-3 also resulted in increased levels of TNF-α and IFN-γ secretion in conjunction with augmentation of NK cell cytotoxic function. Furthermore, addition of MGN-3 to interleukin-2-activated NK cells resulted in a synergistic induction of TNF-α and IFN-γ secretion. Overall, our data suggest that MGN-3, a novel biological response modifier, can be used as a safe alternative or as an adjuvant to the existing immunotherapeutic modalities.