REISHI AND POLYSACCHARIDE-KRESTIN AS IMMUNE MODULATORS: DIFFERENTIAL EFFECTS OF MUSHROOM EXTRACTS ON BOTH CYTOKINE SECRETION AND INDUCTION OF T REGULATORY CELLS FROM HUMAN PERIPHERAL BLOOD.

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A Reishi mushroom extract (Ganoderma lucidum) and polysaccharide-krestin (PSK, a well-studied extract of the mushroom Trametes versicolor) have been used in traditional Chinese medicine to treat various diseases by modifying immune functions. We investigated the immune response to these mushroom extracts in human blood cells. Human peripheral blood mononuclear cells (PBMCs) were isolated from whole blood, either left unstimulated or stimulated with phytohemagluttinin (PHA), and either left untreated or treated with extracts of Reishi and PSK. Cytokine levels in the cell supernatants were measured using ELISA. The PSK-treated cells had increased TNF-α, IFN-γ, and IL-4 secretion compared to control. Reishi extract-treated PBMCs had decreased TNF-α and IFN-γ secretion, and IL-4 production. These results led us to test for the differential induction or suppression of regulatory T cells (Tregs) by these extracts. Human PBMCs left unstimulated or stimulated with PHA and either untreated or treated with Reishi extract and PSK were stained with anti-CD4, anti-CD25, and anti-Foxp3 antibodies. The cells were analyzed using flow cytometry, and the percent of CD4+/CD25+/Foxp3+ cells was measured. Reishi alone enhances CD4+/CD25+/Foxp3+ cell populations (Tregs). PSK alone did not significantly enhance T regs but did enhance Tregs in PHA-stimulated PBMCs, but to a lesser extent than the Reishi extract. Further research is needed to determine the mechanisms of T reg induction and to examine the in vivo role of these extracts in cancer and autoimmunity.