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Orally administered beta-glucans enhance anti-tumor effects of monoclonal antibodies

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Abstract

beta-Glucan primes leukocyte CR3 for enhanced cytotoxicity and synergizes with anti-tumor monoclonal antibodies (mAb). We studied readily available (1-->3)-beta- D-glucan using the immune deficient xenograft tumor models, and examined the relationship of its anti-tumor effect and physico-chemical properties. Established subcutaneous (s.c.) human xenografts were treated for 29 days orally with daily beta-glucan by intragastric injection and mAb intravenously (i.v.) twice weekly. Control mice received either mAb alone or beta-glucan alone. Tumor sizes were monitored over time. beta-Glucans were studied by carbohydrate linkage analysis, and high performance size-exclusion chromatography with multiple angle laser scattering detection. Orally administered beta- D-glucan greatly enhanced the anti-tumor effects of mAb against established tumors in mice. We observed this beta-glucan effect irrespective of antigen (GD2, GD3, CD20, epidermal growth factor-receptor, HER-2), human tumor type (neuroblastoma, melanoma, lymphoma, epidermoid carcinoma and breast carcinoma) or tumor sites (s.c. versus systemic). This effect correlated with the molecular size of the (1-->3),(1-->4)-beta- D-glucan. Orally administered (1-->3),(1-->6)-beta- D-glucans also synergized with mAb, although the effect was generally less marked. Given the favorable efficacy and toxicity profile of oral beta- D-glucan treatment, the role of natural products that contain beta-glucan in cancer treatment as an enhancer of the effect of mAb therapy deserves further study.

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