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Stimulation and Suppression of Innate Immune Function by American Ginseng Polysaccharides: Biological Relevance and Identification of Bioactives

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Abstract

Background

Polysaccharides constituting about 10% by weight of ginseng root are known to stimulate the immune system but have recently been shown to also suppress induced proinflammatory responses. Our study aims to determine whether American ginseng root polysaccharides (AGRPS) stimulates basal innate immune function and at the same time can suppress response to lipopolysaccharide (LPS) induced proinflammatory response. An *in vitro* mechanistic study was used to identify the bioactive fraction(s) responsible for AGRPS immunomodulatory effects.

Methods

The *ex vivo* and *in vivo* immunomodulatory effects after oral administration of AGRPS extract was studied in adult rats by measuring cultured alveolar macrophage production of NO and changes of plasma cytokine level, modification of LPS proinflammatory immune response by AGRPS extract was also examined. To identify the bioactive fraction(s) responsible for AGRPS extract immunomodulatory effects, the immunobioactivities of the extract fractions (isolated by ion exchange and size exclusion chromatography) was investigated in an *in vitro* mechanistic study.

Results

Culture of alveolar macrophages obtained from AGRPS extract treated rats resulted in an increase of *ex vivo* production of NO and also reduced alveolar macrophage responsiveness to *ex vivo* LPS challenge. Oral treatment with AGRPS extract elevated plasma TNF- α concentration *in vivo*. This treatment also suppressed LPS induced elevation of plasma TNF- α *in vivo*. AGRPS extract immunostimulatory and immunosuppressive effects were mediated primarily by acid PS and its species with molecular weights ≥ 100 kDa and 50–100 kDa.

Conclusion

: AGRPS extract exerted immunostimulation and suppressed LPS immune response under basal and LPS induced proinflammatory conditions respectively.

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