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Effect of dietary fiber on immunoglobulin and cytokine production by mesenteric lymph node lymphocytes and interleukin-2 receptor in rats

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In rat fed some type of dietary fat, class specific increases or decrease of serum immnunoglobulins (Ig), changes in Ig productivity of spleen and mesenteric lymph node (MLN) lymphocytes, changes in T cell populations of splenocytes, and changes in cytokine productivity in MLN lymphocytes have been reported. In this present work, we report that dietary fiber plays an important roe in typical immune indices such as T-cell population, cytokine production and Ig production in rat MLN lymphocytes. Four week-old male Sprague-Dawley rats were divided into 4 and 5 group of 5 rats that were given free access to experimental diets. The diets were prepared according to the recommendation of the AIN-93 diet. After 2 or 3 of feeding, the rats were killed. MLN lymphocytes were isolated from the rats, using Lympholyte-rat, and cultured for 24hr. In comparison with the water-insoluble dietary fiber cellulose, the soluble forms pectin, glucomannan and chitosan enhance the production of IgA and IgG, but inhibit the production of IgE. The proportion of $CD8^+$ cells in rats fed these dietary fibers are significantly lower than rats fed cellulose and the proportion of $CD4^+$ cells is significantly elevated. In addition, production of interferon-gamma and tumor necrosis factor-alpha by MLN lymphocytes is significantly enhanced by pectin compared with cellulose. These results suggest that dietary fibers in the diet affect Ig production by influencing T cell differentiation and cytokine synthesis. Though similar Ig production regulating activity is observed galactomannan guar gum, enzymatically degraded guar gum exerts lower activity. When MLN lymphocytes are cultured in the presence of glucomannan, galactomannan, or their stuructral sugars, no change in the Ig productivity has been observed. These results suggest that the above effects are not due to the direct interaction of dietary fibers or their metabolites on the Ig production system.