Increased expression of uncoupling protein in brown adipose tissue of the obese rats with bacterial β-glucan feeding

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Abstract

β-glucan is an insoluble microbial exopolymer and composed almost exclusively of β-(1,3)-glucosidic linkages1). This study was aimed to evaluate the effect on serum lipids, adiposity and uncoupling protein (UCP) expression of bacteria-derived β-glucan fiber in rats. Sprague-Dawley male ratsof weanling rats were given to free access of AIN-76A diet until 4 weeks of age, and feed high fat diet (beef tallow, 40% of calories as fat) for 6 weeks until 10 weeks of age. After high fat diet induced obesity, fed 0% (high fat control group), 1, 5% β-glucan containing diet for 6 weeks. Normal control group fed AIN-76 diet (11.7% fat). Supplementation with either bacterial- or yeast β-glucan resulted in a significant reduction of high fat induced body weight gain, white fat (i.e., epididymal, visceral and peritoneal fat) development, adipocyte hypertrophy and the development of hyperinsulinemia and hyperleptinemia. Serum triglyceride, total cholesterol, and free fatty acid level were greatly reduced, but HDL-cholesterol concentrations were increased by bacterial β-glucan supplementation. Serum leptin level was low in β-glucan groups than high fat group. The UCP expression by 5% bacterial β-glucan containing diet was significantly increased in BAT UCP1, UCP2, and UCP3. This study suggests that anti-obesity effect of bacterial β-glucan attributed to up-regulation of UCP and inefficient energy utilization.

Reference

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