

Calcitriol Improves Plasma Lipoprotein Profile by Decreasing Plasma Total Cholesterol and Triglyceride in Hypercholesterolemic Golden Syrian Hamsters

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Abstract : Higher plasma total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) are independent risk factors of cardiovascular disease while high-density lipoprotein cholesterol (HDL-C) is protective. Vitamin D is well-known for its regulatory role in calcium homeostasis. Its potential important role in cardiovascular disease has recently attracted much attention. This study was conducted to investigate effects of different dosage of calcitriol on plasma lipoprotein profile and the underlying mechanism. Sixty male Syrian Golden hamsters were randomly divided into 6 groups: no-cholesterol control (NCD), high-cholesterol control (HCD), groups with calcitriol supplementation at 10/20/40/80ng/kg body weight (CA, CB, CC, CD), respectively. Calcitriol in medium-chain triacylglycerol (MCT) oil was delivered to four experimental groups via oral gavage every other day, while NCD and HCD received MCT oil in the equivalent amount. NCD hamsters were fed with non-cholesterol diet while other five groups were maintained on diet containing 0.2% cholesterol to induce a hypercholesterolemic condition. The treatment lasts for 6 weeks followed by sample collection after hamsters sacrificed. Four experimental groups experienced a reduction in average food intake around 11% compared to HCD with slight decrease in body weight (not exceeding 10%). This reduction reflects on the decreased relative weights of testis, epididymal and perirenal adipose tissue in a dose-dependent manner. Plasma calcitriol levels were measured and was corresponding to oral gavage. At the end of week 6, lipoprotein profiles were improved with calcitriol supplementation with TC, non-HDL-C and plasma triglyceride (TG) decreased in a dose-dependent manner (TC: $r=0.373$, $p=0.009$, non-HDL-C: $r=0.479$, $p=0.001$, TG: $r=0.405$, $p=0.004$). Since HDL-C of four experiment groups showed no significant difference compared to HCD, the ratio of nHDL-C to HDL-C and HDL-C to TC had been restored in a dose-dependent manner. For hamsters receiving the highest level of calcitriol (80ng/kg) showed a reduction of TC by 11.5%, nHDL-C by 24.1% and TG by 31.25%. Little difference was found among six groups on the acetylcholine-induced endothelium-dependent relaxation or contraction of thoracic aorta. To summarize, calcitriol supplementation in hamster at maximum 80ng/kg body weight for 6 weeks lead to an overall improvement in plasma lipoprotein profile with decreased TC and TG level. The molecular mechanism of its effects is under investigation.

Keywords : cholesterol, vitamin D, calcitriol, hamster

Conference Title : ICFSNH 2016 : International Conference on Food Science, Nutrition and Health

Conference Location : Amsterdam, Netherlands

Conference Dates : May 12-13, 2016