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Contribution of visceral fat accumulation to the postprandial lipemia, lipid peroxidation, DNA damage and endothelial dysfunction in non-obese healthy men

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Previous research has shown that adipose tissue distribution, rather than total body fat or body mass index (BMI), is closely associated with the risks of diabetes, hypertension and hyperlipidemia. Adults with visceral fat values above 100-130cm^2 have been suggested to be in these metabolic disturbances. The aim of this study was to examine the effects of visceral fat accumulation on the postprandial lipemia and oxidative stress in non-obese healthy men. After CT scanning, high visceral fat area (VFA) was defined as VFA at L4 vertebra above 100 cm^2. Low VFA group (VFA at L4 <100cm^2, n=18) was selected and matched on the basis of age and BMI of the high VFA group (n=18). High VFA group were characterized by higher blood pressure (P<0.01), higher consumption of cigarettes (P<0.01) and lower levels of thigh muscle area (P<0.05) compared with low VFA group. High VFA group showed significantly higher serum fasting concentrations of total- and LDL-cholesterol and lower serum concentrations of testosterone and IGF-1 than those of low VFA group. Serum fasting concentrations of insulin, free fatty acid, and response areas of glucose and insulin during oral glucose tolerance test were significantly higher in high VFA group than in low VFA group. After a high fat meal, high VFA group showed higher concentrations of triglyceride (TG) at the 0,2,3,4,6-h time points and 82% greater TG area under the curve (AUC) compared with low VFA group (P<0.001). Glucose and insulin concentrations at the 2,3-h time points and AUCs were higher in high VFA group than in low VFA group (P<0.05). Plasma concentrations of malondialdehyde (P<0.05), urinary excretion of 8-epi-prostaglandin $F_{2\alpha}$ (P<0.05) and DNA damage in lymphocytes (P<0.01) were higher in high VFA group than in low VFA group. High VFA group showed lower flow-mediated dilatation (P<0.05), and higher coagulant activities of factor Ⅱ, Ⅴ, Ⅶ (P<0.05) than those of low VFA group. Our data indicate that visceral fat accumulation even in non-obese men can contribute to the postprandial lipemia, lipid peroxidation, DNA damage in lymphocytes and endothelial dysfunction. Therefore, the life-style modification including physical exercise and heart-healthy nutrition guidelines might need to decrease the VFA and to prevent cardiovascular disease.