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Regular Article

Levels of the adipocyte-derived plasma protein, adiponectin, have a close relationship with atheroma

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KEYWORDS
Adiponectin;
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Abstract

Introduction: Inflammation is a key process in atherosclerotic formation. Structural changes in the carotid arterial wall including detection of focal plaques are measured as the intima-media thickness (IMT) providing an index of atheroma. Coronary arterial plaques may be considered as vascular structural changes. Distensibility of the arteries can be assessed by functional changes in pulse wave velocity (PWV) providing an index of sclerosis. Adiponectin has potential antiatherosclerotic properties. We hypothesized that adiponectin was associated with atherosclerotic vascular changes involved in inflammation.
Materials and methods: We enrolled 142 patients with coronary artery disease (CAD) and 108 control patients, matched for age, sex, and body mass index (BMI) with CAD

Abbreviations: ABPI, ankle/brachial pressure index; apo, apolipoprotein; baPWV, brachial and ankle pulse wave velocity; BMI, body mass index; CAD, coronary artery disease; CRP, C-reactive protein; ELISA, enzyme-linked immunosorbent assay; HDL-C, high-density lipoprotein cholesterol; IGT, impaired glucose tolerance; IMT, intima-media thickness; PAI-1, plasminogen activator inhibitor type 1; TC, total cholesterol; TG, triglyceride.

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patients. We investigated the relationship between adiponectin, C-reactive protein (CRP), and atherosclerotic vascular changes.
Results: CRP (p=0.0009), high-density lipoprotein cholesterol (HDL-C; p=0.02), and IMTmax (p=0.02) were determinants of adiponectin independent of glucose intolerance (p=0.0001), BMI (p=0.002), and CAD (p=0.03), all of which have been significantly associated with adiponectin (r=0.38). Adiponectin was not correlated with PWV. CRP, glucose intolerance, and HDL-C that correlated with adiponectin were inversely correlated with IMTmax and CAD. CRP was negatively correlated with HDL-C (r=−0.24, p=0.0002) and positively correlated with glucose intolerance (r=0.15, p=0.01).
Conclusions: Adiponectin has a close relationship with CRP, IMTmax, CAD, HDL-C, and other established risk factors. CRP, glucose intolerance, and HDL-C are common mediators between adiponectin and atheromatous vascular changes, which are contrary to each other. The exacerbation of atherogenesis may be involved in a decrease of adiponectin through abnormal glyco- and lipid-metabolism by promoting inflammation.

Introduction

Atherosclerosis involves a combination of fatty degeneration (atheroma) and vessel stiffening (sclerosis) of the arterial wall [1]. Atheroma is closely associated with high levels of cholesterol with lipid-rich atheromatous plaques contributing to vascular obstruction and end-organ damage [2,3], and it is well established that lipid lowering therapy reduces the progression of the vascular lesions [4]. In contrast, the role of sclerosis in coronary artery diseases (CAD) is less clear and has attracted considerably less attention mainly as a result of there being little evidence of end-organ damage due to sclerosis alone. In addition, it is relatively difficult to obtain an assessment of sclerosis [2], as it is influenced by a diverse number of factors including age, blood pressure, diabetes, and renal function [5–8].

Adiponectin is an adipocyte-specific protein abundantly present in human plasma, which has been proposed to play an important role in the development of atherosclerosis [9–12]. There is evidence that physiological concentrations of adiponectin dose-dependently inhibit tumor necrosis factor-α-mediated expression of adhesion molecules produced during the early stage of atherosclerosis that include vascular cell adhesion molecule-1, endothelial–leukocyte adhesion molecule-1, and intracellular adhesion molecule-1 [13]. Adiponectin therefore has potential antiatherosclerotic effects in addition to having a protective role against neointimal formation in humans [14,15].

The development of high-resolution ultrasonography has facilitated the noninvasive evaluation of structural changes in the carotid arterial wall including detection of focal plaques. These changes are measured as the intima-media thickness (IMT) that is considered as an index of atheroma [7]. Recent developments have also enabled simple measurement of brachial and ankle pulse wave velocity (baPWV) by simultaneous monitoring using a phonocardiogram, electrocardiogram, and both sides of brachial and ankle pressure waveforms [16]. Distensibility of the arteries can be assessed by functional changes in PWV, providing an index of sclerosis [17]. Low-grade chronic inflammation is also an important factor in atherosclerosis and is indicated by elevated levels of plasma C-reactive protein (CRP) [18]. In the present study, we hypothesized that plasma adiponectin levels were closely associated with atherosclerotic vascular changes involved in inflammation.

Patients and methods

Study population

We studied 250 patients who underwent diagnostic catheterization (164 men and 86 women, mean age 68±9, range 40–89 years). The group with CAD consisted of 142 patients whose coronary angiography showed 50% or greater narrowing of the major coronary arteries. The control group consisted of 108 patients matched for age, sex, and body mass index (BMI) with the CAD group, who had atypical chest pain at rest, or following minimal exercise associated with coronary spasm or 25% or less narrowing of the major coronary arteries. Patients