

## The Association between Carotid Atherosclerosis and Glucose

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Carotid intimal-medial thickness (IMT) is used as a surrogate marker for atherosclerosis and can predict future clinical cardiovascular events such as myocardial infarction and ischemic stroke [1]. Furthermore, medications for prevention of cardiovascular events including lipid-lowering [2], anti-hypertensive [3], and anti-platelet drugs [4,5] can decrease carotid IMT, which implicates that carotid IMT can also be used to assess the efficacy of anti-atherosclerotic treatment.

It is well documented that carotid IMT is markedly increased in subjects with high-cardiovascular disease risk such as those with diabetes [6], previous history of stroke [7] or myocardial infarction [8]. However, recent studies showed that subjects in the relatively low-risk group such as young subjects with obesity [9,10] or impaired glucose tolerance [11] also had increased carotid IMT compared to that of normal controls. In those low-risk subjects, glucose level significantly correlated with carotid IMT [10,12]. Non-diabetic subjects with parental history of diabetes or dyslipidemia also showed that disturbed carbohydrate metabolism is associated with carotid atherosclerosis [13,14]. In contrast, control of postprandial hyperglycemia by medication can regress carotid atherosclerosis [15].

Insulin resistance and inflammation might play an important role in the link between glucose abnormalities and carotid atherosclerosis [16,17]. Agewall et al. [18] showed a significant correlation between insulin sensitivity directly-assessed by

clamp-study and carotid IMT in non-diabetic subjects. Inflammatory markers such as C-reactive protein [19,20] and TNF- $\alpha$  [21] are also significantly correlated with carotid IMT. History of gestational diabetes (GDM) is a risk factor of diabetes mellitus and is also characterized by insulin resistance [22,23]. Ku et al. [24] were unable to show a significant difference in carotid IMT according to history of GDM; however, they did show that glucose level in the postpartum period is significantly associated with carotid IMT in subjects with a previous history of GDM. This result shows agreement with previous studies focusing on other risk groups such as subjects with parental history of diabetes, obesity or dyslipidemia [13, 14].

Considering the association between glucose abnormality and carotid atherosclerosis, screening and management of glucose abnormality in subjects with history of GDM is required. In addition, the significantly high risk of cardiovascular disease in subjects with history of GDM [22,23] calls for the concomitant management of other cardiovascular risk factors in such patients. However, considering cost, selection of a high risk group for future cardiovascular events might be required, and carotid IMT can provide such evidence. A prospective study to confirm the longitudinal association between glucose control and carotid IMT in subjects with a history of GDM and usefulness of carotid IMT is required.

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**CONFLICTS OF INTEREST**

No potential conflict of interest relevant to this article was reported.

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