

Basal C-peptide Level as a Surrogate Marker of Subclinical Atherosclerosis in Type 2 Diabetic Patients (*Diabetes Metab J* 2011;35:41-9)

Sung-Tae Kim¹, Byung-Joon Kim^{1,2}, Dong-Mee Lim^{1,2}, In-Geol Song¹, Jang-Han Jung¹, Kang-Woo Lee^{1,2}, Keun-Young Park^{1,2}, Youn-Zoo Cho¹, Dae Ho Lee³, Gwan Pyo Koh³

¹Department of Internal Medicine, Konyang University Hospital, Konyang University School of Medicine, Daejeon,

²Konyang University Myunggok Medical Research Institute, Daejeon,

³Department of Internal Medicine, Jeju National University Hospital, Jeju National University School of Medicine, Jeju, Korea

We appreciate the comments on our study “Basal C-peptide level as a surrogate marker of subclinical atherosclerosis in type 2 diabetes patients,” which was published in *Diabetes & Metabolism Journal* 2011;35:41-49 [1].

Many studies have reported that high levels of HbA1c are strongly associated with increased risks of cardiovascular disease and microvascular complications [2]. However, recent studies have reported that while the use of intensive therapy to target glycated hemoglobin levels below 6% reduces 5-year nonfatal myocardial infarctions, it increases 5-year mortality [3]. Other studies have reported that high density lipoprotein cholesterol, but probably not HbA1c, influences cardiovascular outcomes [4]. It is still unknown, however, whether HbA1c levels are associated with macrovascular complications such as stroke, atherosclerosis, cardiovascular disease, and peripheral arterial disease.

In our study [1], the 10-year risk of coronary heart disease (CHD) was calculated according to the United Kingdom Prospective Diabetes Study (UKPDS) risk engine for each patient based on smoking status, total serum cholesterol, age, serum low density lipoprotein cholesterol, and systolic blood pressure. However, the 10-year CHD risk engine does not take levels of glucose or HbA1c into account. Therefore, in the present study,

we show that basal C-peptide is not associated with UKPDS risk engine-related factors and does not independently influence 10-year CHD risk. However, intima media thickness (IMT) can be directly assessed based on arterial vessel wall changes and smooth muscle cell (SMC) proliferation. Insulin resistance and C-peptide are associated with SMC proliferation. Therefore, C-peptide is thought to be an independent factor predicting IMT. In the Atherosclerosis Risk in the Communities (ARIC) study [5], higher levels of endogenous insulin were significantly associated with increased thickness of the carotid artery wall. Reducing the levels of C-peptide and insulin resistance in type 2 diabetic patients, who are especially likely to exhibit many components of metabolic syndrome, may be improved in the outcomes of cases with cardiovascular complications.

REFERENCES

1. Kim ST, Kim BJ, Lim DM, Song IG, Jung JH, Lee KW, Park KY, Cho YZ, Lee DH, Koh GP. Basal C-peptide level as a surrogate marker of subclinical atherosclerosis in type 2 diabetic patients. *Diabetes Metab J* 2011;35:41-9.
2. Khaw KT, Wareham N, Bingham S, Luben R, Welch A, Day N.

Corresponding author: Dong-Mee Lim
Division of Endocrinology and Metabolism, Department of Internal Medicine, Konyang University School of Medicine, 685 Gasuwon-dong, Seo-gu, Daejeon 302-718, Korea
E-mail: mdldm@hanmail.net

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

- Association of hemoglobin A1c with cardiovascular disease and mortality in adults: the European prospective investigation into cancer in Norfolk. *Ann Intern Med* 2004;141:413-20.
3. ACCORD Study Group, Gerstein HC, Miller ME, Genuth S, Ismail-Beigi F, Buse JB, Goff DC Jr, Probstfield JL, Cushman WC, Ginsberg HN, Bigger JT, Grimm RH Jr, Byington RP, Rosenberg YD, Friedewald WT. Long-term effects of intensive glucose lowering on cardiovascular outcomes. *N Engl J Med* 2011;364:818-28.
 4. Ferrannini E, Betteridge DJ, Dormandy JA, Charbonnel B, Wilcox RG, Spanheimer R, Erdmann E, Defronzo RA, Laakso M. HDL-cholesterol and not HbA1c was directly related to cardiovascular outcome in PROactive. *Diabetes Obes Metab*. Epub 2011 Apr 1. DOI: 10.1111/j.1463-1326.2011.01404.x.
 5. Clark PM, Hales CN. How to measure plasma insulin. *Diabetes Metab Rev* 1994;10:79-90.