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Editorial

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Blood Sampling on Admission in Patients with Acute Coronary Syndrome

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Dyslipidemia is one of the most important risk factors for atherosclerotic disorders. Traditionally, dyslipidemia treatment strategy is decided based on fasting serum lipid profiles. However, recent clinical guidelines in the U.S.A., Europe, and Canada endorse dyslipidemia screening using nonfasting blood samples. It is well known that triglyceride (TG) concentration increases significantly after food intake but declines gradually thereafter[1]. Although the cutoff value for hypertriglyceridemia is set at a higher value for nonfasting samples than for fasting samples in recent guidelines, it is likely that the interval from the last food intake to blood sampling actually affects the sensitivity of dyslipidemia.

Unlike TG, total cholesterol, low-density lipoprotein-cholesterol (LDL-C), and high-density lipoprotein-cholesterol (HDL-C) are stable during the day[2, 3]. In any of these parameters, however, lipid test results are significantly affected by the changes in plasma volume and vascular tone[3]. To minimize such effects, blood samples should be taken in a sitting position after a 15-min rest[2]. Another option is to correct lipid concentrations with simultaneously measured albumin concentrations[3]. Using the data excluding the aforementioned factors, LDL-C and HDL-C concentrations were found to be the highest in the morning; the concentrations decreased significantly by 2%–6% during the day[2, 3]. Homogeneous assays are so reproducible that we can detect such clinically negligible reductions.

Accumulating evidence suggest that small dense LDL is more atherogenic than large buoyant LDL[4]. Small dense LDL can be separated from large buoyant LDL by different factors such as density, electrophoretic mobility, and particle size. However, there is no clear consensus on the definition of small dense LDL[4]. Among various methods, the homogeneous assay for small dense LDL-C is a highly reproducible method. It can be used to measure various samples on an automated analyzer. In this issue, Hayashi *et al.* clearly showed that small dense LDL-C concentration does not exhibit significant within-day variation in both controls and patients with diabetes[5]. Therefore, nonfasting small dense LDL-C concentration can be considered for fasting.

Recent large cohort studies in Japan and the U.S.A. have confirmed that fasting small dense LDL-C concentration is an excellent predictor of coronary heart disease, independent of LDL-C concentration[6, 7]. Moreover, we previously reported that casual small dense LDL-C concentration was significantly higher in patients with acute coronary syndrome (ACS) than in controls although LDL-C and TG concentrations were similar in the two groups[8]. Patients with ACS often receive a bolus injection of heparin and undergo emergent coronary angioplasty. Heparin injection markedly reduces not only TG but also total cholesterol concentrations[9]. Therefore, lipid profiles should be evaluated immediately on admission in patients with ACS. It is highly likely that small LDL-C concentration on admission may reflect the baseline fasting level before the onset of ACS.

Although small dense LDL is a subfraction of LDL, it is closely related to TG metabolism and insulin resistance[4]. Postprandial hypertriglyceridemia is another important risk factor for atherosclerotic disorders. It is diagnosed via serial TG measurement during oral fat loading test. Although fasting concentrations of remnant-like protein-cholesterol (RLP-C) and apolipoprotein B-48 (ApoB48) are significantly correlated with the incremental area under the curve of TG[1, 10], both RLP-C and ApoB48

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concentrations increase significantly after food intake. It is of great interest whether postprandial hypertriglyceridemia can be predicted with nonfasting small dense LDL-C concentration. This question should be addressed in future studies.

Conflict of Interest

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References

1) Nagata T, Sugiyama D, Kise T, Tsuji S, Ohira H, Sato I, Yamamoto M, Kohsaka H, Kawano S, Yamashita S, Ishikawa Y, Fujioka Y. Fasting remnant lipoproteins can predict postprandial hyperlipidemia. Lipids Health Dis, 2012; 11: 146
2) Yang D, Cai Q, Qi X, Zhou Y. Postprandial lipid concentrations and daytime biological variation of lipids in a healthy Chinese population. Ann Lab Med, 2018; 38: 431-439
3) Miida T, Nakamura Y, Mezaki T, Hanyu O, Maruyama S, Horikawa Y, Izawa S, Yamada Y, Matsui H, Okada M. LDL-cholesterol and HDL-cholesterol concentrations decrease during the day. Ann Clin Biochem, 2002; 39: 241-249
4) Hirayama S, Miida T. Small dense LDL: An emerging risk factor for cardiovascular disease. Clin Chim Acta, 2012; 414: 215-224
5) Hayashi T, Ai M, Goto S, Nakamura M, Nagaike H, Suzuki R, Abe Y, Ohta M, Ito Y, Hirano T. Circadian rhythm of subspecies of low-density lipoprotein-cholesterol and high-density lipoprotein-cholesterol in healthy subjects and patients with type 2 diabetes. J Atheroscler Thromb, 2023; 30: 3-14
6) Higashioka M, Sakata S, Honda T, Hata J, Yoshida D, Hirakawa Y, Shibata M, Goto K, Kitazono T, Osawa H, Ninomiya T. Small dense low-density lipoprotein cholesterol and the risk of coronary heart disease in a Japanese Community. J Atheroscler Thromb, 2020; 27: 669-682
7) Ikezaki H, Lim E, Cupples LA, Liu CT, Asztalos BF, Schaefer EJ. Small dense low-density lipoprotein cholesterol is the most atherogenic lipoprotein parameter in the prospective Framingham offspring study. J Am Heart Assoc, 2021; 10: e019140
8) Fukushima Y, Hirayama S, Ueno T, Dohi T, Miyazaki T, Ohmura H, Mokuno H, Miyauchi K, Miida T, Daida H. Small dense LDL cholesterol is a robust therapeutic marker of statin treatment in patients with acute coronary syndrome and metabolic syndrome. Clin Chim Acta, 2011; 412: 1423-1427
9) Miida T, Otsuka H, Tsuchiya A, Okada M. Plasma lipoprotein profiles change significantly during cardiac catheterization. Clin Chem, 1998; 44: 517-521
10) Masuda D, Yamashita S. Postprandial hyperlipidemia and remnant lipoproteins. J Atheroscler Thromb, 2017; 24: 95-109