Editorial

Optimal Management Target for Non-High-Density Lipoprotein Cholesterol

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What is Non-High-Density Lipoprotein Cholesterol?

Low-density lipoprotein (LDL) cholesterol is the best validated cardiovascular risk factor. On the other hand, non-high-density lipoprotein (non-HDL) cholesterol is estimated from the total and HDL cholesterol without any influence of triglyceride. Several epidemiological studies have shown that non-HDL cholesterol is a better predictor of cardiovascular events than LDL cholesterol¹, ². The Japan Atherosclerosis Society Guidelines for the Diagnosis and Prevention of Atherosclerotic Cardiovascular Diseases 2012 (JAS Guidelines 2012) recommend using the non-HDL cholesterol level as a secondary management target³ based on several advantages such as follows: (1) It can be assessed even when the triglyceride level is greater than 400 mg/dl, where the Friedewald formula cannot be used, (2) It can represent all apolipoprotein B containing atherogenic lipoproteins such as remnant cholesterol and small, dense LDL cholesterol, and (3) It can be assessed even under the nonfasting state. The management target for non-HDL cholesterol level has been determined to be 30 mg/dL higher than that for LDL cholesterol level based on the statement in the US National Cholesterol Education Program Adult Treatment Panel III⁴ and the Japanese studies focusing on patients with dyslipidemia⁵, ⁶. In the current issue of The Journal of Atherosclerosis and Thrombosis, Saiki et al. questioned whether this equation is applicable to subjects at a low risk of cardiovascular disease, using a much larger sample size⁷. They found that the management target for non-HDL cholesterol level is recommended to be set at 20 mg/dL higher than that for LDL cholesterol level in non-hospital-based Japanese subjects at a low risk. In the setting of preventive cardiology, risk assessment is vitally important. Among a number of risk factors, plasma lipid levels have been important for the risk prediction of cardiovascular disease³, ⁸, ⁹. Blood sampling in the fasting state has been recommended to assess the lipid profiles; however, it is sometimes hard to stick to the fasting state in clinical medicine. In such cases, JAS Guidelines 2012 recommend to assess non-HDL cholesterol instead of LDL cholesterol, which can be calculated using the Friedewald formula.

Impact of the Acceptance of Blood Samples from Individuals in a Non-Fasting State at Japanese Specific Health Check-ups

As mentioned in the study by Saiki et al., most of the community-based health check-up programs in Japan such as “specific health check-ups” started by the Japanese government in 2008 accept blood samples from individuals in a non-fasting state. According to this policy, larger number of Japanese individuals are now checking their lipid levels without fasting. Among the individuals who underwent specific health check-ups at Kanazawa city in 2011 (N=44,083), we investigated the proportion of the individuals whose target for lipid management needed be considered using non-HDL cholesterol, namely, the individuals who gave blood samples without fasting or whose fasting triglyceride levels were ≥400 mg/dL. We found that more than half of the individuals were classified into the groups who should be evaluated by non-HDL cholesterol.
cholesterol (Fig. 1). Among them, only a small portion of individuals exhibited triglyceride levels of ≥ 400 mg/dL, suggesting that LDL cholesterol level using the Friedewald formula can be used in most of the cases in the fasting state.

**Fig. 1.** Target for lipid management during specific health check-ups at Kanazawa city in 2011 (N = 44,083)

The total number of individuals who underwent specific health check-ups at Kanazawa city in 2011 was 44,083. Among them, 22,625 individuals gave their samples in the nonfasting state. A total of 102 individuals exhibited triglyceride levels of ≥ 400 mg/dL among 21,458 individuals who had given blood samples in the fasting state.

The Institutional Review Committee of Kanazawa Medical University for Ethical Issues approved the present study.

**LDL or Non-HDL Cholesterol?**

It should be noted that LDL cholesterol, but not non-HDL cholesterol, is the primary management target according to the current JAS Guideline 2012. Although non-HDL cholesterol can be established as a better marker for risk prediction based on the advantages mentioned above, it cannot be used for the clinical diagnosis of dyslipidemia, which is critical for the risk assessment of an individual. Accordingly, physicians need to keep in mind that measuring total cholesterol, triglyceride, and HDL cholesterol in the fasting state followed by calculating LDL cholesterol using the Friedewald formula should be the primary assessment strategy not only for the risk chart of the management target but also for the comprehensive risk assessment of cardiovascular disease.

**Conclusion**

Non-HDL cholesterol level is a useful marker for the risk assessment of cardiovascular disease, particularly, when blood sampling is conducted without fasting or for the individuals whose triglyceride levels are ≥ 400 mg/dL. Using a management target for non-HDL cholesterol, careful attention should be paid at the risk assessment of cardiovascular disease for individuals at low risk.

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**Conflict of Interest**

None.

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**References**


3) Executive summary of the Japan Atherosclerosis Society (JAS) guidelines for the diagnosis and prevention of ath-

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*N = 44,083 (100%)

Fasting ?

Triglyceride ≥ 400 mg/dL?

- YES
- NO

Non-HDL cholesterol

- N = 102 (0.2%)

LDL cholesterol (Friedewald formula)

- N = 22,625 (51.3 %)

- N = 21,356 (48.4 %)