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Automated High-sensitive Immunoassay System HI-1000 Application Note

No.1 HDL Function Measurement

Based on the accumulation of research results so far, HDL-C (High Density Lipoprotein Cholesterol) concentration is known to be one of the important indicators in the prevention and management of cardiovascular disease[1)–3)]. On the other hand, according to recent clinical studies, there are reports that even if HDL-C concentration is greatly improved by the treatment with CETP (Cholesteryl Ester Transfer Protein) inhibitors and other drugs, cardiovascular events were not reduced[4)–7)]. These research results bring into question the conventional concept that HDL-C is beneficial, and the assessment of function rather than quantity of cholesterol in HDL has attracted attention. An important function of HDL is to reverse cholesterol by the efflux from macrophages in the blood vessel walls and the transportation to the liver[8)]. In addition, recent studies suggest that the capacity of HDL to efflux cholesterol (Cholesterol Efflux Capacity; CEC) may be a more useful prediction factor than HDL-C in the development of cardiovascular disease[9)]. However, in order to assess the capacity of HDL to efflux cholesterol, complicated processes such as labeling by radioisotopes and cultured cells are required, making it difficult to apply in clinical practice[10)].
In order to establish a method to measure HDL function that can be applied at testing sites, we developed a method that can automatically and quickly assess the capacity of HDL to uptake cholesterol (Cholesterol Uptake Capacity; CUC) instead of the conventional HDL CEC.

1) Am J Med. 1977 May;62(5):707-14. Gordon T et al
2) Circulation. 1989 Jan;79(1):8-15. Gordon DJ et al
3) JAMA. 2001 Mar 28;285(12):1585-91. Robins SJ et al
4) N Engl J Med. 2012 Nov 29;367(22):2089-99. AIM-HIGH Investigators
5) N Engl J Med. 2014 Jul 17;371(3):203-12. HPS2-THRIVE Collaborative Group
6) N Engl J Med. 2007 Nov 22;357(21):2109-22. ILLUMINATE Investigators
7) N Engl J Med. 2012 Nov 29;367(22):2089-99. dal-OUTCOMES Investigators
8) J Lipid Res. 2009 Apr;50 Suppl:S189-94. Rader DJ et al
9) N Engl J Med. 2011 Jan 13;364(2):127-35. Khera AV et al
10) J Lipid Res. 1999 May;40(5):781-96. Rothblat GH et al
11) Poster presentation "1-P-6-3. Development of HDL Function (Cholesterol Uptake Capacity) Automatic Measurement Method" of the 51st Annual Scientific Meeting of the Japan Atherosclerosis Society

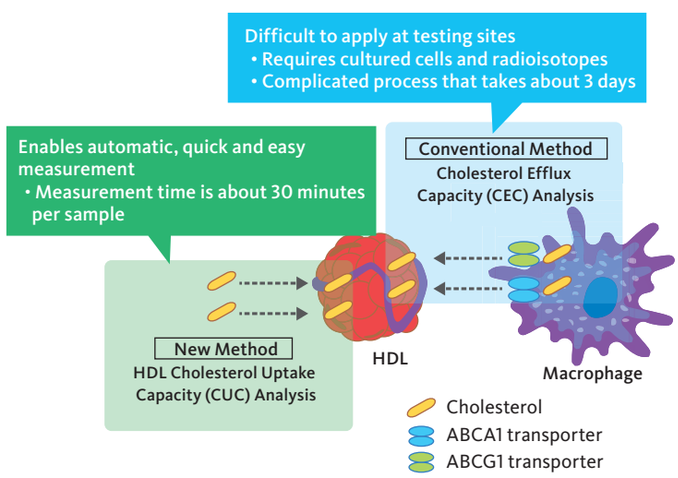


Fig. 1 Comparison of cholesterol efflux and uptake capacity of HDL

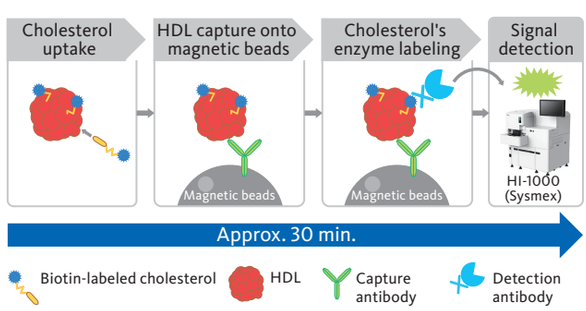
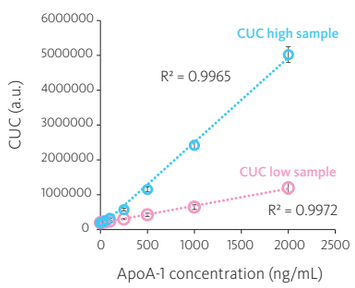


Fig. 2 Measurement scheme of automated CUC method



Measurement range (ng/ml ApoA-1)	200 - 2000
Repeatability	CV < 5%
Day-to-day reproducibility	CV < 10%

Fig. 3 Analytical performance of automated CUC method[11)]

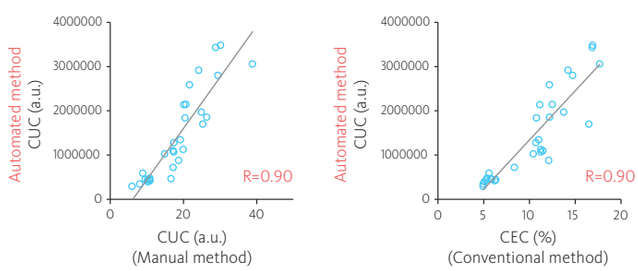


Fig. 4 Correlation between CUC (novel method) and CEC (conventional method)[11)]

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