New Publication - LipoSEARCH

S. Yamashita et al, Department of Cardiology, Rinku General Medical Center, Osaka, Japan has reported their research results which is a comparison between GP-HPLC (LipoSEARCH®) and NMR method by lipoprotein particle numbers (PNs) of 212 dyslipidemia patients who were given pemafibrate (selective PPARα Modulator) in phase II clinical study.

Distinct Differences in Lipoprotein Particle Number Evaluation between GP-HPLC and NMR: Analysis in Dyslipidemic Patients Administered a Selective PPARalpha Modulator, Pemafibrate.   Yamashita S, et al. J Atheroscler Thromb. 2021 Feb 2. doi: 10.5551/jat.60764. Online ahead of print. PMID: 33536398

Importance of PNs analysis

Recently, it has been recommended to analyze PNs of lipoprotein not only cholesterol (Cho) and triglyceride (TG) concentration. In general, Cho concentration and PNs are highly correlated, but in certain clinical conditions, Cho concentration and PNs can become discordant as a result of altered balance of Cho and TG (*1). It has been reported that PNs is a stronger predictor of incident cardiovascular events than Cho concentration (*2). Nuclear Magnetic Resonance (NMR) has been widely used for analyzing PNs of lipoprotein subclasses, however, PNs analysis based on actual Cho and TG concentration detected by enzymatic reactions can be also calculated by gel permeation chromatography (GP-HPLC) with newly developed algorithm called LipoSEARCH.

Highlights of the publication

Comparison between GP-HPLC and NMR

PNs in three major lipoprotein classes, total CM&VLDL, total LDL and total HDL was positively correlated between NMR and GP-HPLC analysis while variations were shown in each subclasses. **(refer to Fig.1)**.

Validation of PNs

The number of ApoB per one ApoB-containing particle（CM&VLDL, LDL）and ApoA-I per one HDL particle by GP-HPLC was 1.10±0.05 and 3.40±0.17 and they were considered as reasonable and proper as same as previous reports while it was verified that the number of ApoA-I per HDL particle by NMR was much lower. **(refer to Fig.5 and Tab2)**.

Effects of Pemafibrate on PNs

In the phase 2 clinical trial of pemafibrate, it was observed that small LDL and large HDL were deceased while large LDL and small HDL were increased by a dose-dependent administration by GP-HPLC analysis. By contrast, it was not observed such dose dependent change while it was observed significant variations on the results by NMR analysis. **(refer to Fig.6)**.

GP-HPLC detects directly the concentration of Cho and TG by consecutive enzymatic reactions after separation by particle size of lipoprotein, which are presented as chromatograms. It makes it possible to visualize the lipoprotein profile in serum and viscerally perceive clinical conditions and/or abnormality intuitively **(refer to suppl Fig.4)**.

In conclusion, GP-HPLC can evaluate PNs and natures of lipoprotein subclasses more accurately than NMR, and it has been suggested that it is useful tool for evaluation of effects of lipid-lowering drugs on lipoprotein subclasses in details.

References
*1：Ference BA, et al. Eur Heart J. 2017 Aug 21;38(32):2459-2472.
*2：Khera AV, et al. Circulation. 2017 Jun 20;135(25):2494-2504.

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