Limitation and inaccuracy of recommended mean conversion factor 2.4 to calculate Lp(a) values from mg/dL to nmol/L

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OBJECTIVE

Lipoprotein(a) [Lp(a)] is an independent causal genetic risk factor for cardiovascular diseases. The plasma lipoprotein consists of a cholesterol-rich LDL particle associated with an Apolipoprotein B-100 [ApoB-100], which is covalently attached to an Apolipoprotein (a) [Apo(a)]. Lp(a) can be present in more than 30 different isoforms due to size heterogeneity of Apo(a), which are caused by the multiple copies of Kringle IV Type 2. Although IFCC solely recommends the measurement of Lp(a) in nmol/L to correctly reflect the number of Lp(a) particles, several studies still recommend to use a mean conversion factor of 2.4 to convert Lp(a) units from mg/dL to nmol/L. The objective of this study is to examine the precision of the mean conversion factor and the comparability of the calculated results by using the ready to use immunoturbidimetric DiaSys Lp(a) 21 FS reagent with the option to report in mg/dL or nmol/L.

MATERIAL AND METHODS

Assay adaption as well as performance verification has been carried out on Roche Hitachi 917 system. Reagent, calibrators and controls were provided by DiaSys Diagnostic Systems GmbH. 140 samples were measured with DiaSys TruCal Lp(a) 21 calibrator value assignment in nmol/L (traceable to WHO/IFCC reference material SRM2B) and TruCal Lp(a) 21 calibrator value assignment in mg/dL (traceable to internal reference preparation). Measured results in mg/dL have been converted with the recommended mean factor 2.4 and subsequently compared to values in nmol/L. Data were evaluated by using regression analysis according to Passing and Bablok and have been visualized in a method comparison and a difference plot.

RESULTS

Method comparison of measured and calculated Lp(a) values in nmol/L shows a slope of 1.068 and an intercept of 5.076 for the entire measuring range [Fig. 1]. Further analysis of the difference plot demonstrates a deviation of 35% in the measuring range up to 30 nmol/L and approaches to normalized differences at higher Lp(a) concentrations. However, the measuring range around 75 nmol/L (In Caucasians, values above 75 nmol/L are regarded as cut-off value for the presence of an increased risk) still shows a deviation of 13. 5% [Fig. 2].

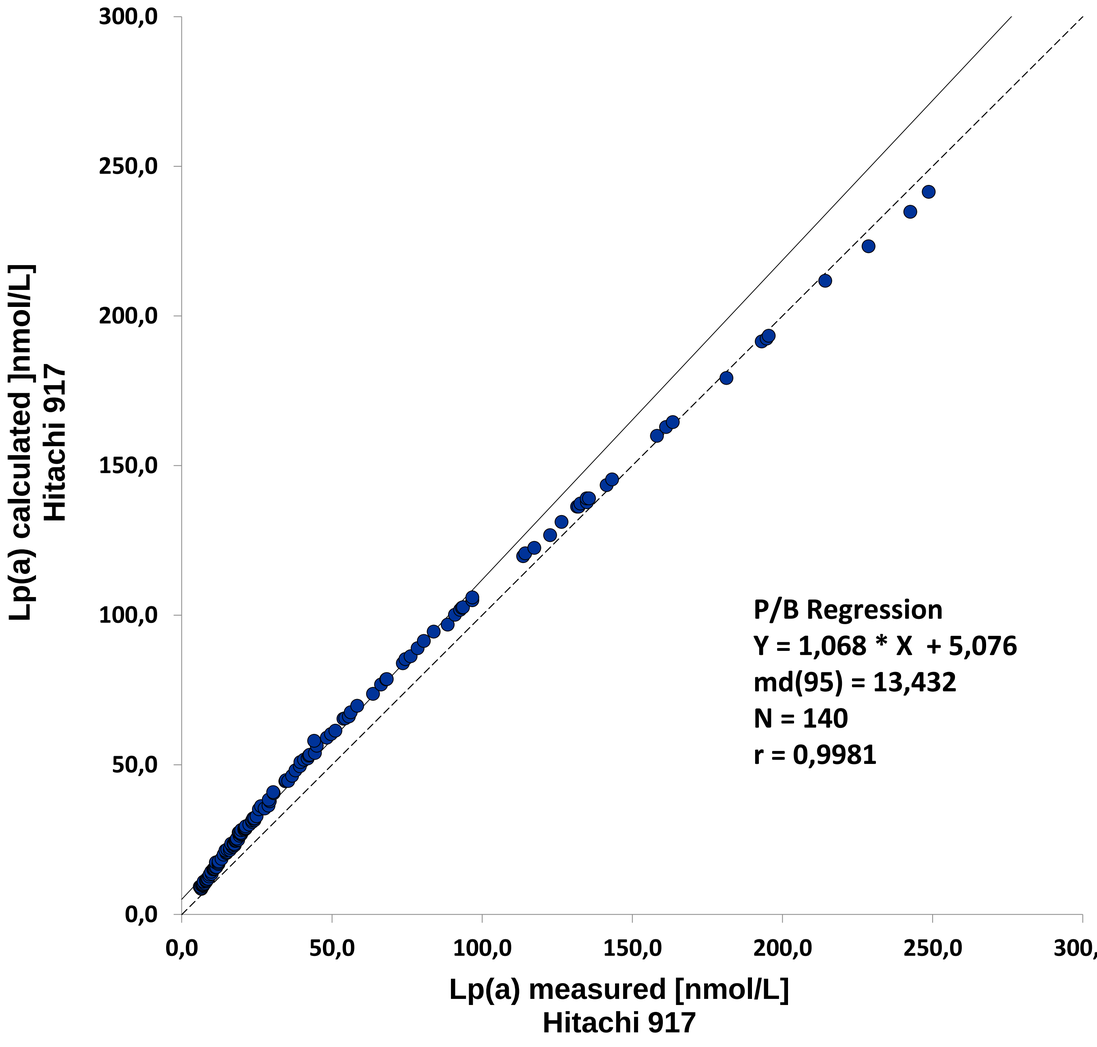

**Figure 1: Method comparison-
Lp(a) values measured in nmol/L
compared to calculated Lp(a) values from mg/dL**

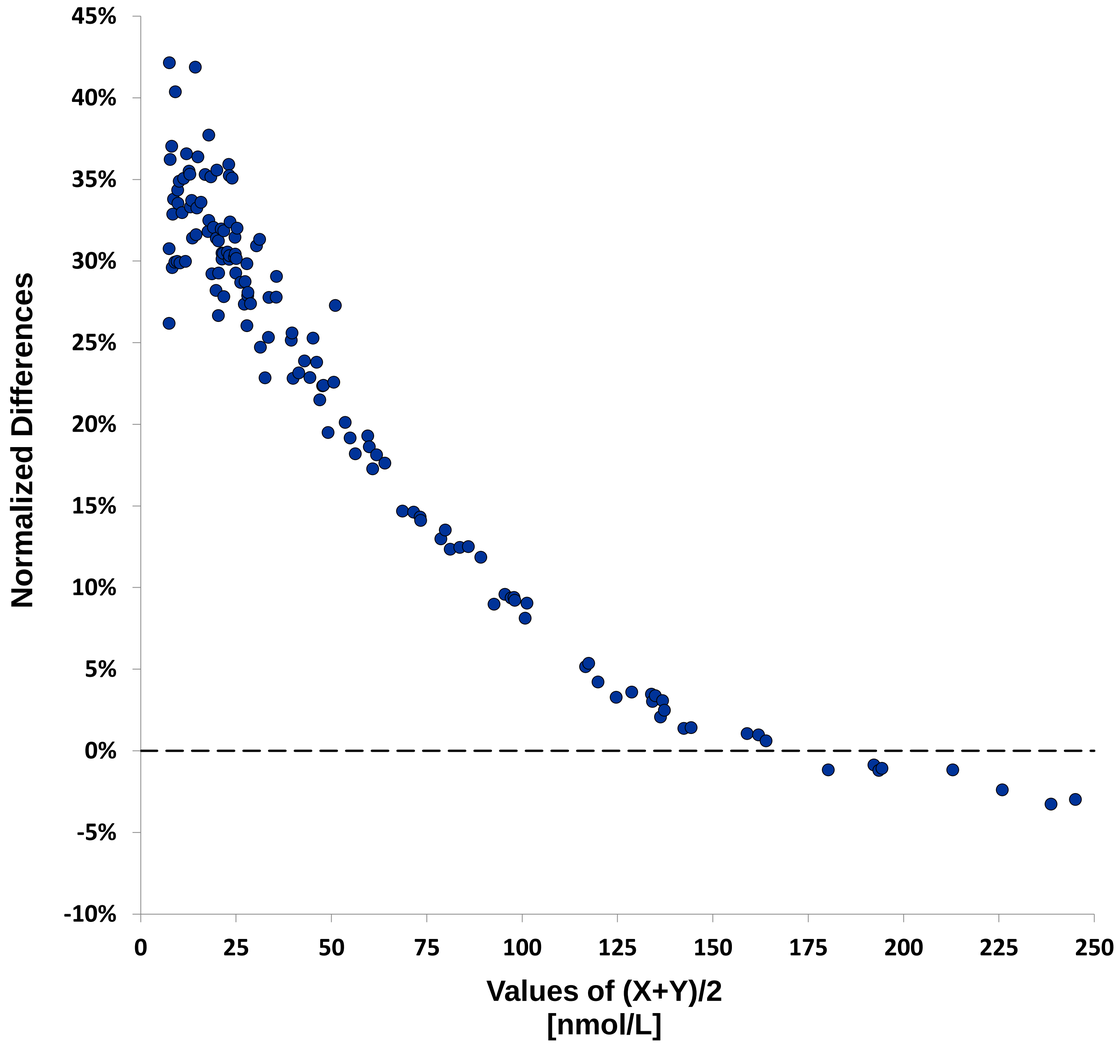

**Figure 2: Difference plot-
Lp(a) values from 7.5 nmol/L up to 245 nmol/L**

CONCLUSION

Based on the presented data a simple conversion from mg/dL to nmol/L by using the mean conversion factor 2.4 is inaccurate and leads to incorrect results, especially in the measuring range up to 30 nmol/L. Thus, if values in nmol/L are required in addition to mg/dL it is strongly recommended to use a reagent which enables the report of Lp(a) values in both units. As shown in the results DiaSys Lp(a) 21 FS is highly suitable for measurements in nmol/L and mg/dL.

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