

## Discontinuation of Grading for Calculated LDL-C Results

LDL-cholesterol (LDL-C) is typically estimated using the Friedewald formula ( $LDL-C = TC - HDL - VLDL$ ) when triglycerides are less than 400 mg/dL. TG/5 is recommended by the National Cholesterol Education Program to estimate VLDL. While other divisors have been used to estimate VLDL, such as TG/6, only TG/5 is recommended.

The Chemistry Resource Committee has evaluated the possibility of grading reported results for calculated LDL-C and has determined that such grading to reliably assess performance is not feasible. The following example will illustrate the problems with grading LDL-C calculated results.

The grading criteria that are used for the lipid challenges in the C survey are as follows:

	<u>Grading Criteria</u>
<b>Cholesterol:</b>	Peer group mean $\pm$ 10%
<b>Triglycerides:</b>	Peer group mean $\pm$ 25%
<b>HDL-C:</b>	Peer group mean $\pm$ 30%
<b>LDL-C: (Calculated/Measured)</b>	Peer group mean $\pm$ 20%

When taken together the different lipid components comprise the Friedewald formula for estimating LDL-C:  $LDL-C (\pm 20\%) = TC (\pm 10\%) - HDL-C (\pm 30\%) - TG/5 (\pm 25\%)$ .

As an example, if we assume a peer group mean of 111.9 mg/dL for calculated LDL-C, the acceptable range would be 89-135 mg/dL.

Now assume that the cholesterol, triglycerides and HDL-C components are all graded acceptable as reported below:

TC = 229 mg/dL (196-240)

HDL = 37 mg/dL (26-50)

TG = 261 mg/dL (202-337)

In this example the laboratory would report a LDL-C calculated value of 139.8 [ $229 - 37 - (261/5)$ ] and would fail the challenge for calculated LDL-C when compared to the acceptable range of 85-135. In fact in this example if the extreme, but acceptable, values for the lipid components were reported the following failed calculated LDL-C results would be reported:

Situation (Highest reported LDL-C)

$240 - 26 - 202/5 = 174$  FAILED for LDL-C

Situation (Lowest reported LDL-C)

$196 - 50 - 337/5 = 79$  FAILED for LDL-C

Thus even though the lipid components used in the Friedewald equation are acceptable the resulting calculated LDL-C is not. This occurs because the criteria limits for two of the components are greater than the acceptable limits for calculated LDL-C and permit too much variability in the LDL-C estimation. In addition the peer group for calculated LDL-C is comprised of a variety of different instrument systems and reagent combinations and thus is not a true peer group. It is not possible to construct appropriate peer groups based on all the possible instrument/reagent combinations for the three lipid components that are used in the Friedewald equation. For these reasons, the decision was made to discontinue grading of LDL-C calculated results.

Gary L. Myers, PhD  
Chemistry Resource Committee