

## CLINICAL BIOCHEMISTRY

# Lipid Reporting and NIH LDL-C Equation Update by Shared Health and Dynacare Laboratories

**Date: September 14, 2023**

**Effective: September 18, 2023** at Shared Health Laboratories and in late October/November for Dynacare (Manitoba).

In collaborative effort, Shared Health and Dynacare are updating and standardizing lipid reporting across Manitoba to align with current guidelines and recommendations, including decision thresholds, interpretive comments and calculation of LDL-C. Adult and pediatric lipid reporting is updated to reflect recently published Canadian Cardiovascular Society (CCS) guidelines for management of dyslipidemia in adult,<sup>1</sup> the CCS/Canadian Pediatric Cardiology Association recommendations for the management of dyslipidemia in children and adolescents,<sup>2</sup> and the Canadian Society of Clinical Chemists laboratory lipid reporting recommendations.<sup>3</sup>

Calculation of LDL-C will be performed using NIH LDL-equation instead of the Friedewald LDL-C equation.

$$\text{New NIH LDL-C equation (SI units, mmol/L): } LDL-c = \frac{TC}{0.948} - \frac{HDL-c}{0.971} - \left( \frac{TG}{3.74} + \frac{TG \times Non-HDL-c}{24.16} - \frac{TG^2}{79.36} \right) - 0.244$$

### Report Changes:

Test	Adult Report (≥20 y)	Pediatric Report (<20y)
Total Cholesterol	Decision limits updated <sup>1,3</sup>	Decision limits updated <sup>2</sup>
HDL-C	Decision limits updated <sup>1,3</sup>	Decision limits updated <sup>2</sup>
LDL-C	Decision limits and interpretive comments updated as per recommendations for the management of dyslipidemia in adults with low (Framingham Risk Score 5.0-9.9%) and intermediate risk (FRS 10.0-19.9%). <sup>1,3</sup>  In patients with statin indicated conditions ( <b>LDL-C ≥ 5.0 mmol/L, ASCVD, CKD and many patients with diabetes</b> ) therapy is recommended regardless of FRS score. <sup>1</sup>	Decision limits updated <sup>2</sup>
Non-HDL-C	Decision limits and interpretive comments updated as per recommendations for the management of dyslipidemia in adults with low (Framingham Risk Score 5.0-9.9%) and intermediate risk (FRS 10.0-19.9%). <sup>1,3</sup>  In patients with statin indicated conditions ( <b>non-HDL-C ≥5.8 mmol/L, ASCVD, CKD and many patients with diabetes</b> ) therapy is recommended regardless of FRS score. <sup>1</sup>	Decision limits updated <sup>2</sup>
Triglycerides	No change to limits	Decision limits updated <sup>2</sup>

### Background Information on LDL-C Calculation:

- Friedewald equation has traditionally been used to calculate LDL-C. It was developed in 1972 and is not valid in patients who are non-fasting, have triglycerides >4.5 mmol/L or have type III hyperlipoproteinemia; it is inaccurate when LDL-C <1.5 mmol/L
- NIH equation was developed in 2020 and validated in a Canadian population; it accurately estimates LDL-C when patients are non-fasting and when triglycerides are up to 9.0 mmol/L

- NIH equation correlates well with Friedewald equation for most patients, but correlates better with  $\beta$ -quantification (LDL-C reference method) when triglycerides are high and LDL-C is low
- NIH equation should not be used for patients with type III hyperlipoproteinemia and is inaccurate when LDL-C <0.5 mmol/L
- Reporting LDL-C as calculated by the NIH equation is in accordance with the Harmonized Lipid Reporting Recommendations from the CSCC Harmonized Reference Interval Working Group (CSCC hRI-WG)

**Why this is important:**

The NIH equation provides a more accurate estimation than the Friedewald equation for LDL-C:

- In the non-fasting state, which is becoming more common when ordering the lipid panel
- When triglycerides are high (between 4.5 and 9.0 mmol/L), which is becoming more common with the increased prevalence of dyslipidemia
- When LDL-C is low (between 0.5 – 1.5 mmol/L), which is becoming more common with new lipid lowering therapies

**Resources:**

For more information visit [Lab Information Manual](#) see [LIPOPROTEIN PROFILE - \(P\)](#)

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**References:**

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- 7) Chan KK, Dickerson JA. Assessment of LDL-C Calculation Using the Newly Adopted NIH LDL-C Equation in a Pediatric Population. *Clin Chem.* 2022 6;68(10):1338-1339.