

DATE:	30 October 2023
TO:	All Zones: All Healthcare Professionals and Providers
FROM:	Clinical Biochemistry, Alberta Precision Laboratories (APL)
RE:	Lipid panel and individual lipid test reporting changes in adults and a new equation to calculate LDL-C in pediatrics and adults

PLEASE POST OR DISTRIBUTE AS WIDELY AS APPROPRIATE

Key Message

- Effective November 5, 2023, changes will be made to reporting of the lipid panel and individual lipid tests. The changes align with the recent recommendations by the Canadian Society of Clinical Chemists (CSCC)¹. These changes will include new flagging limits, laboratory comments and LDL-C equation (changing from the Friedewald to National Institutes of Health [NIH] equation).

Background

- The CSCC recently published recommendations for lipid reporting¹ in alignment with the 2021 Canadian Cardiovascular Society (CCS) Guidelines for the Management of Dyslipidemia for the Prevention of Cardiovascular Disease in Adults² to promote harmonization across Canada
- The new flagging limits for LDL-C, non-HDL-C, and apolipoprotein B (apoB) are based on decision thresholds for lipid screening in the primary prevention setting for intermediate-risk patients and select low-risk patients
- The updated flagging limits for total cholesterol, HDL-C, and triglycerides will alert health care providers to assess the patient's cardiovascular disease risk
- New reporting lab comments refer to the 2021 CCS guidelines² for additional thresholds, state limitations of LDL-C concentration when triglycerides are elevated, and include specific lab methods for apoB
- New laboratory comments will also include a link to an online cholesterol management tool, 'Let's Talk Cholesterol' (<http://cholesterol-tool.ucalgary.ca>),
- The new NIH LDL-C was validated in the Canadian (and specifically Albertan) population^{3,4,5}.
 - It more accurately estimates LDL-C when patients are non-fasting and when triglycerides are up to 9.04 mmol/L, but should not be used for patients with type III hyperlipoproteinemia and/or when LDL-C <0.50 mmol/L
 - The previously used Friedewald LDL-C equation is not valid in patients who have triglycerides >4.52 mmol/L or type III hyperlipoproteinemia; it is inaccurate when LDL-C <1.50 mmol/L
 - The NIH LDL-C equation correlates well with the Friedewald equation for most patients, but correlates better with β -quantification (LDL-C reference method) when triglycerides are high (between 4.52-9.04 mmol/L) and when LDL-C is low (between 0.50-1.50 mmol/L)
 - The use of non-HDL cholesterol or apoB levels may still more accurately estimate risk in patients with hypertriglyceridemia
- Note: Lipoprotein (a) [Lp(a)] reporting was recently updated: [Change in Lp\(a\) Reporting Units to nmol/L](#)

How this will impact you

- Lipid flagging limits and laboratory comments will be changing for adult patients (≥ 18 years)
 - No change is currently being made for patients <18 years to these parameters
 - Changes are also reflected in the *Cardiovascular Disease Risk Assessment* test order



- The LDL-C equation will be changing for pediatric and adult patients
- The LDL-C lower reporting limit will be 0.50 mmol/L

Action Required

- Be aware of the lipid reporting changes and the updated LDL-C equation. Changes are also reflected in the *Cardiovascular Disease Risk Assessment* test order
- Refer to the 2021 Canadian Cardiovascular Society dyslipidemia guidelines¹ and the CSCC lipid reporting recommendations² for more detailed information on the changes to lipid reporting and advice for management
- Refer to Canadian studies that validated the NIH LDL-C equation^{3,4,5} for more information on its performance and how it compares to the Friedewald LDL-C equation

Effective

- 5 November 2023

Questions/Concerns

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Approved by

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References

- 1) White-Al Habeeb, N, et al., *Can J Cardio* 38 (2022); 1180-1188
- 2) Pearson GJ, et al., *Can J Cardio* 37 (2021); 1129-1150
- 3) Higgins V, et al., *Clin Biochem* 99 (2022); 60-68
- 4) Zhao PJ, et al., *CJC Open* 5 (2022):37-42
- 5) Higgins V, et al., *Clin Biochem* (2023) - *accepted*

Effective September 1, 2023, APL has become the sole provider of all public lab services in Alberta. As a result, community lab services formally provided by DynaLIFE Medical Labs will become the responsibility of Alberta Precision Labs (APL). This change impacts all zones.



Appendices

A. Current and New Lipid Flagging Limits for Adults (≥ 18 years old)

Lipid Test	Current	New
Total cholesterol	N/A	≥ 5.20 mmol/L
HDL-C	N/A	Male < 1.00 mmol/L Female < 1.30 mmol/L
Non-HDL-C	N/A	≥ 4.20 mmol/L
LDL-C	≥ 3.41 mmol/L	≥ 3.50 mmol/L
Triglycerides	≥ 1.71 mmol/L	≥ 1.70 mmol/L
ApoB	≥ 1.20 g/L	≥ 1.05 g/L

B. New Lipid Laboratory Comments

Lipid Test	Always Comments	Conditional Comments
<i>Lipid Panel Order</i>		
Total cholesterol	Total Cholesterol and HDL-C used for screening, risk assessment and to calculate non-HDL-C. Discover how you can take action at http://cholesterol-tool.ucalgary.ca	
HDL-C	HDL-C limits indicate risk for metabolic syndrome.	
Non-HDL-C	FRS Calculation Resources can be found at www.myhealth.alberta.ca/Alberta/Pages/Heart-Disease-Risk-Calculator.aspx	<i>If non-HDL-C ≥ 4.20 mmol/L: If non-HDL-C ≥ 4.20 mmol/L in primary prevention setting for low-risk patients with FRS 5%-9.9% or intermediate risk patients, consider therapy. Therapy also suggested in low-risk patients with non-HDL-C ≥ 5.8 mmol/L. (2021 CCS Guidelines. Can J Cardiol. 2021; S0828)</i>
LDL-C	LDL-C was calculated using the NIH LDL-C equation	<i>If triglycerides > 9.04 mmol/L then LDL-C cancelled and comment added to LDL-C result: LDL-C cannot be calculated. Triglycerides exceed 9.04 mmol/L. Recollect in a fasting state or refer to non-HDL-C or apoB.</i> <i>If LDL-C ≥ 3.50 mmol/L: If LDL-C ≥ 3.50 mmol/L in primary prevention setting for low-risk patients with FRS 5%-9.9% or intermediate-risk patients, consider therapy. Therapy is also suggested in low-risk patients with LDL-C ≥ 5.00 mmol/L”</i> <i>If triglycerides ≥ 1.50 mmol/L: Triglycerides exceed 1.50 mmol/L. For dyslipidemia assessment, refer to ApoB or non-HDL-C instead of LDL-C.</i>
Triglycerides	If nonfasting, triglycerides < 2.00 mmol/L acceptable.	



<i>Individual Test Order</i>		
Total cholesterol	Total cholesterol used for screening, risk assessment and to calculate non-HDL-C. (2021 CCS Guidelines. Can J Cardiol. 2021; S0828) Discover how you can take action at http://cholesterol-tool.ucalgary.ca	
Triglycerides	If collected in a fasting state, triglyceride decision limit is <1.70 mmol/L. If collected in a nonfasting state, triglyceride decision limit is < 2.00 mmol/L. (2021 CCS Guidelines. Can J Cardiol. 2021; S0828)	
ApoB	Refer to 2021 CCS guidelines for additional ApoB thresholds based on risk stratification. (2021 CCS Guidelines. Can J Cardiol. 2021; S0828)	<i>If ApoB ≥ 1.05 g/L:</i> If ApoB ≥ 1.05 g/L in primary prevention setting for low-risk patients with FRS 5%-9.9% or intermediate-risk patients, consider therapy. Therapy also suggested in low-risk patients with ApoB ≥ 1.45 g/L. <i>One of instrument grouper comments (method-specific):</i> ApoB measured by Binding Site Optilite turbidometry. Apo B measured by Siemens nephelometry.

Current and New LDL-C Equations

Current	New
<i>Friedewald LDL-C equation (mmol/L)</i> $LDL-C = TC - HDL-C - \frac{TG}{2.2}$	<i>NIH LDL-C equation (mmol/L)</i> $LDL - C = \frac{TC}{0.948} - \frac{HDL-C}{0.971} - \left(\frac{TG}{3.74} + \frac{TG \times Non-HDL-C}{24.16} - \frac{TG^2}{79.36} \right) - 0.244$