By Dr Sydney Sacks
Chemical Pathologist

Lipid Testing: Non-fasting specimens and non-HDL cholesterol

Fasting specimens are no longer mandatory

Non-fasting specimens are now acceptable. Reviews of large population-based studies showed that food intake had a clinically insignificant effect on most individuals. Maximal mean post prandial changes were a rise of 0.3 mmol/L for triglycerides, a drop of 0.2 mmol/L for total and LDL cholesterol, and no change for HDL cholesterol.

Why fasting specimens were used previously. Post-prandial specimens (particularly after a fatty meal) have higher triglycerides and most of the lipid literature references fasting values. Some patients do indeed have significant post prandial elevations of triglycerides; these will require follow-up with a fasting specimen.

Non-fasting vs fasting specimens. Studies of non-fasting vs fasting lipids in fact demonstrate that non-fasting lipids may have better predictive value for cardiovascular disease and that non-fasting specimens are also effective for monitoring statin therapy. Presumably this is due to the non-fasting specimen acting as a "stress test" for lipid metabolism.

In light of these findings the European Atherosclerosis Society and the European Federation of Clinical Chemistry published a joint consensus statement in 2016 recommending non-fasting specimens for routine lipid assessment[1].

Non-HDL cholesterol for CVD risk prediction

Non-HDL cholesterol is calculated by simply subtracting the HDL cholesterol from the total cholesterol. Normally it consists mainly of the LDL cholesterol but in addition other atherogenic fractions such as VLDL cholesterol and IDL cholesterol, which may also be raised particularly in non-fasting specimens, are included. Unsurprisingly non-HDL cholesterol is a very good predictor of CVD risk, particularly in non-fasting specimens.

In light of this, the European consensus statement also recommends that non-HDL cholesterol is used as a marker for predicting CVD, particularly in non-fasting specimens

Implications for Clinipath Pathology patients

Clinipath Pathology now accepts non-fasting and fasting specimens for lipids (remember to specify fasting or non-fasting and to specifically request HDL as well if a full lipid profile is needed, otherwise only cholesterol and triglycerides are performed due to Medicare rules). Patients will have the convenience of not having to fast and being bled whenever it suits them.

Non-HDL cholesterol will also be routinely reported as part of the full lipid profile.

When to test lipids, when to request fasting lipids

Testing should be performed when clinically well, as inflammation (eg post MI) reduces cholesterol. More than one lipid profile is advisable to establish a reliable baseline.

Non-fasting specimens are suitable in most clinical settings including initial baseline lipid testing and monitoring of response to lipid lowering therapy.

Fasting lipids are recommended if the non-fasting triglycerides are greater than 5 mmol/L, if the patient is known to have hypertriglyceridaemia or if on medications that elevate triglycerides eg steroids, retinoic acid and oestrogens, or if a fasting specimen is needed for other tests.

What are the reference limits and target limits?

Reference limits for lipids are not population derived, rather they are "desirable" limits above which CVD risk rises. Lipid reference values are currently being reviewed in Australia with the aim of developing consensus reference intervals and treatment targets. The European consensus reference interval[1] and the National Vascular Disease Prevention Alliance (NVDPA) treatment targets[2] provide a reasonable guide until Australian values are agreed.

Summary

- Non-fasting specimens are suitable in most patients for measuring lipids
- A repeat fasting specimen may be required in patients with elevated non-fasting triglycerides
- Testing should be performed when clinically well as inflammation (eg post MI) reduces cholesterol
- More than one lipid profile is advisable to establish a reliable baseline
- Non-HDL cholesterol is a simple and useful new marker for predicting cardiovascular risk
- Australian consensus lipid reference limits and target levels for treatment are still being developed

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Table 1: European Consensus reference limits[1] for fasting and non-fasting specimens

Total cholesterol	<5.0 mmol/L
HDL cholesterol	>1.0 mmol/L
LDL cholesterol	<3.0 mmol/L
Triglycerides	<2.0 mmol/L
Non-HDL cholesterol	<3.9 mmol/L

Table 2: NVDPA targets[2] for lipid lowering therapy in patients with high risk of CVD

Total cholesterol	<4.0 mmol/L
HDL cholesterol	≥1.0 mmol/L
LDL cholesterol	<2.0 mmol/L
Triglycerides	<2.0 mmol/L
Non-HDL cholesterol	<2.5 mmol/L

References
1. Nordestgaard BG, et al. Fasting Is Not Routinely Required for Determination of a Lipid Profile: -A Joint Consensus Statement from the European Atherosclerosis Society and European Federation of Clinical Chemistry and Laboratory Medicine. Clin Chem 2016; 62: 930-46.
2. National Vascular Disease Prevention Alliance, Absolute cardiovascular disease management, Quick reference guide for health professionals 2012