
*(If triglycerides
≥1.5 mmol/L
recommend
Non-HDL-c or
Apolipoprotein
B for screening)*

Table 1. Current lipid targets used in the UK and in selected international guidelines

Figure 1. A. Composition of lipoprotein particles. B. Underlying composition of analytes measured or calculated in a lipid profile in a fasting and non-fasting state. *HDL subclasses include HDL-2a, HDL-2b, HDL-3a, HDL-3b, HDL-3c, pre-beta1-HDL, and pre-beta2-HDL. **ApoB48 can cross react with ApoB assay but since the levels of these particles are much lower in concentration than ApoB100 containing lipoproteins, the major contributors to an ApoB result are Lp(a), LDL, VLDL and IDL. *** IDL is not a significant contributor to a standard triglyceride measurement but can be an important particle measured in the hypertriglyceridaemia seen with dysbetalipoproteinaemia. HDL-c – High Density Lipoprotein cholesterol, Lp(a) lipoprotein (a), LDL -c – low density lipoprotein cholesterol, refers to a calculated LDL, IDL intermediate density lipoprotein, VLDL - very low density lipoprotein, CM chylomicron, CM remnants – Chylomicron remnants

Table 4. Secondary causes of dyslipidaemias to be considered when performing a lipid profile

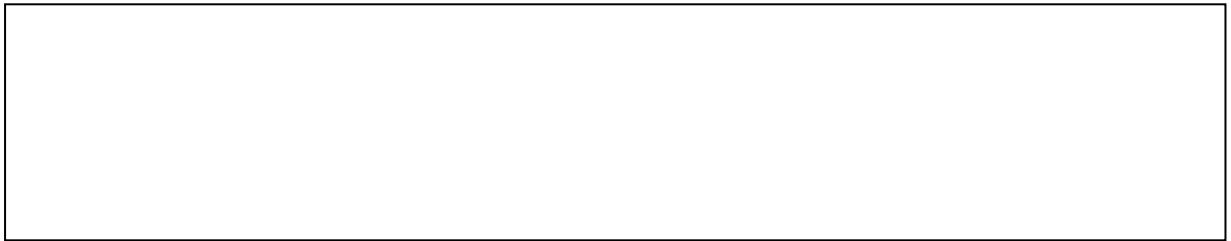
Table 5. Proposed testing intervals for lipid profiles

--

The wording used in the following and subsequent recommendations denotes the current level of evidence to support that recommendation as per the 2016 ACC/AHA Clinical Guideline Recommendation Classification System⁶⁶



Table 6. Clinical decision thresholds for HDL



*Section 3.*⁴⁰

see Table 2 in

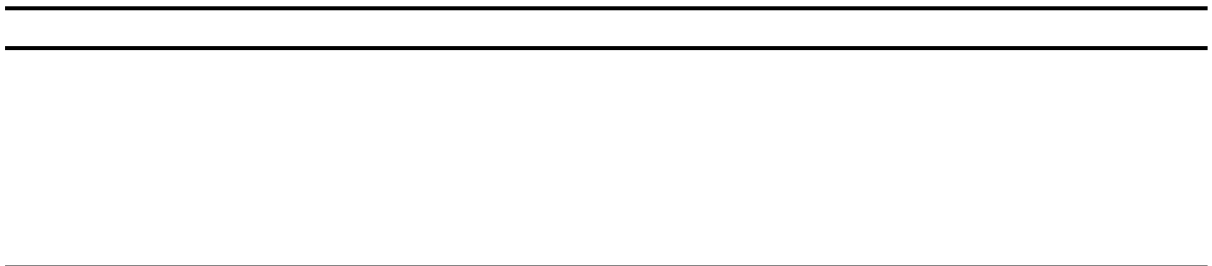


Table 7. Clinical decision thresholds for triglycerides. Fasting target (F), Non-fasting target (NF). In those with diabetes and a typical picture of raised triglycerides and low HDL, there may be benefit to additional triglyceride lowering over and above simply statin therapy alone.¹²

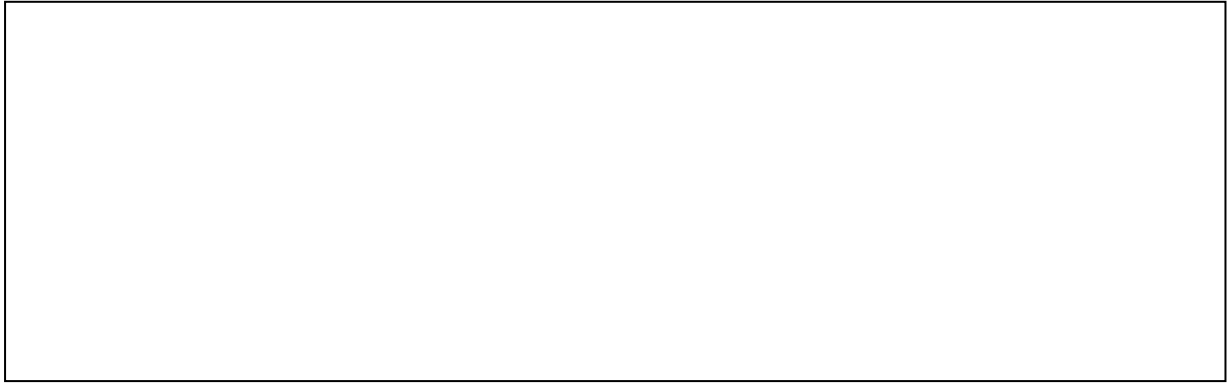
--

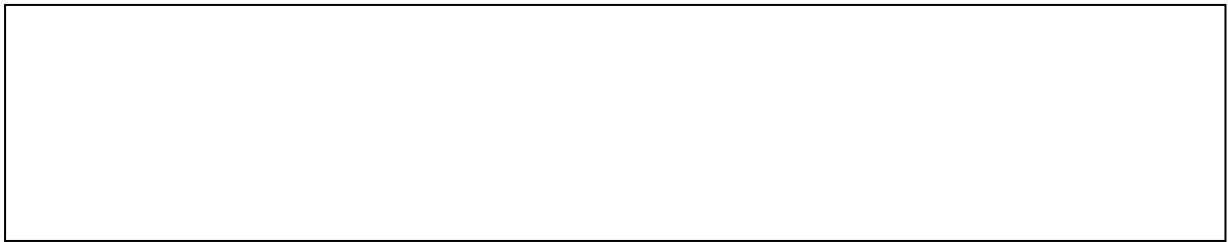
—

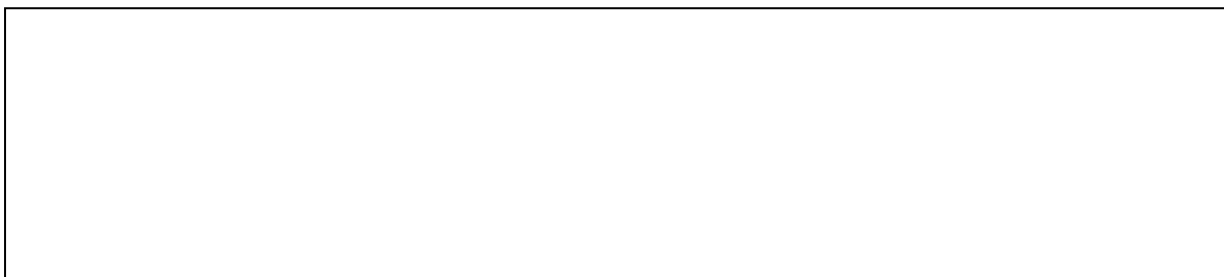
LDL - c =

$$\frac{\text{Total cholesterol}}{0.948} - \frac{\text{HDL-c}}{0.971} \left(\frac{\text{triglycerides}}{3.74} + \frac{\text{triglycerides} \times \text{non-HDL-c}}{24.16} - \frac{\text{triglycerides}^2}{79.36} \right) - 0.244$$

Box 1 – Sampson-NIH equation (mmol/L)





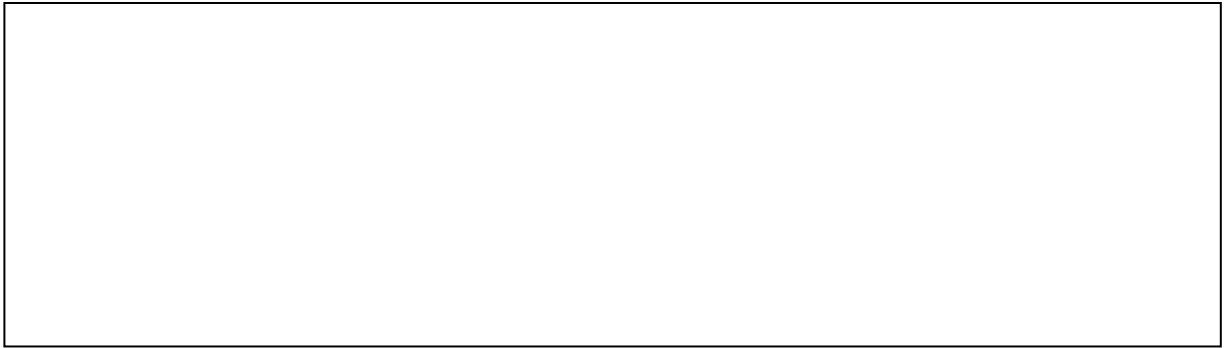


~

Table 8. Adapted from HEART UK recommendation for Lp(a) measurement in those with the following characteristics

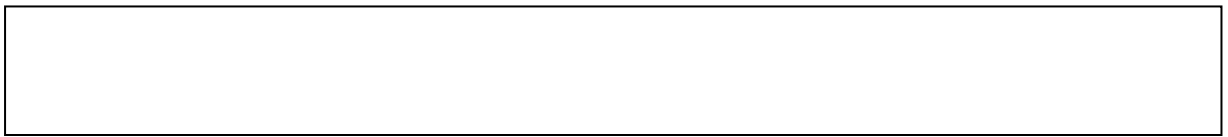
Table 9. The risk of cardiovascular disease based on classified Lp(a) concentration

--



—





—



European heart journal

Circulation

JAMA : the journal of the American Medical Association

JAMA

The Lancet

Eur Heart J

Curr Opin Lipidol

Lancet

Circulation

European heart journal

Annals of Clinical Biochemistry

Medicine

Diabetic

atherosclerosis reports

Current

The Lancet Regional Health – Europe

Clinical chemistry

Heart

The Journal of Clinical Endocrinology & Metabolism

Curr Opin Lipidol

JAMA : the journal of the American Medical Association

JAMA Cardiol

Heart

European heart journal

Canadian Journal of Cardiology

European heart journal

Clinica chimica acta; international journal of clinical chemistry

Circulation

Circulation

JAMA internal medicine

Atherosclerosis

journal

European heart

Bmj

Atherosclerosis

European journal of cardiovascular prevention and rehabilitation : official journal of the European Society of Cardiology, Working Groups on Epidemiology & Prevention and Cardiac Rehabilitation and Exercise Physiology

Atherosclerosis

Annals of clinical biochemistry

European journal of obstetrics, gynecology, and reproductive biology

obstetrics and gynecology

American journal of

Journal of lipid research

Advances in laboratory medicine

EXCLI journal

Annals of clinical biochemistry

Kidney international

Lancet

metabolism: TEM

Trends in endocrinology and

Arterioscler Thromb Vasc Biol

*Journal of research in medical sciences : the
official journal of Isfahan University of Medical Sciences*

Gastroenterology

Annals of the New York Academy of Sciences

Cureus

Metabolites

of kidney diseases : the official journal of the National Kidney Foundation

American journal

Journal of lipid research

JAMA : the journal of the American Medical Association

assessment series

Ontario health technology

Ann Intern Med

Circulation

*Jama
Uptodate*

Am J Cardiol

Biochem

Eur J Clin Chem Clin

ACB analyte

Atherosclerosis

Clinica Chimica Acta

Annals of clinical biochemistry

Clinical chemistry

The Lancet

European heart journal

Curr Opin Lipidol

Clinica Chimica Acta

Circulation

Annals of internal medicine

Arterioscler Thromb Vasc Biol

Circulation

Glob

Cardiol Sci Pract

New England Journal of Medicine

New England Journal of Medicine

journal of the American Medical Association

JAMA : the

European heart journal

Journal of the American Heart Association

Journal of Clinical Lipidology

Current Opinion in Lipidology

Circulation

Circulation

Journal of Clinical Endocrinology & Metabolism

The

Progress in cardiovascular diseases

Canadian Journal of Cardiology

Clinical chemistry

Clinical chemistry

Clinical chemistry

Annals of internal medicine

Frontiers in endocrinology

Lancet

Circulation

Circulation

Nature Reviews Genetics

Circulation

New England Journal of Medicine

Cardiovascular

diabetology

Atherosclerosis

JAMA : the journal of the American Medical Association

Medical Association

JAMA : the journal of the American

JAMA internal medicine

Clinical chemistry

Clinica Chimica Acta

Practical Laboratory Medicine

Atherosclerosis Plus

Clinical chemistry

New England Journal of Medicine

The Journal of clinical endocrinology and metabolism

disorders

BMC endocrine

Lipids Health Dis

Endocrine practice : official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists

Arteriosclerosis, Thrombosis, and Vascular Biology

New England Journal of Medicine

PloS one

Atherosclerosis Supplements

chemistry

Clinical

Clinical chemistry

Journal of clinical pathology

JAMA Network Open

Journal of clinical lipidology

Chemistry and Laboratory Medicine (CCLM)

Clinical

chemistry

Clinical

Atherosclerosis

Opin Lipidol

Curr

Journal of Clinical Lipidology

European heart journal

European heart journal

J Am Coll Cardiol

chemistry

Clinical

Jama

J Lipid Res

journal

European heart

European Journal of Preventive Cardiology

rheumatology

International journal of

Thromb Vasc Biol

Arterioscler

journal

European heart

Atherosclerosis

biochemistry

Annals of clinical

JAMA cardiology

Journal of lipid research

Curr Opin Lipidol

Assoc

J Am Heart

JAMA cardiology

J Am Coll Cardiol

of Clinical Lipidology

Journal

Lipids in Health and Disease

J Clin Lipidol

Clinical chemistry

Frontiers in genetics

Clinical chemistry

Clinical Lipidology

Journal of the American Heart Association

The Journal of biological chemistry

Lancet

cardiology

International journal of

Lancet

Clinical chemistry

Biochimica et biophysica acta Molecular and cell biology of lipids

Circulation

Atherosclerosis

Clinical chemistry and laboratory medicine

Ann Intern Med

metabolism

The Journal of clinical endocrinology and

Child Health

Paediatrics and

Journal of Clinical Lipidology

Critical reviews in clinical laboratory sciences

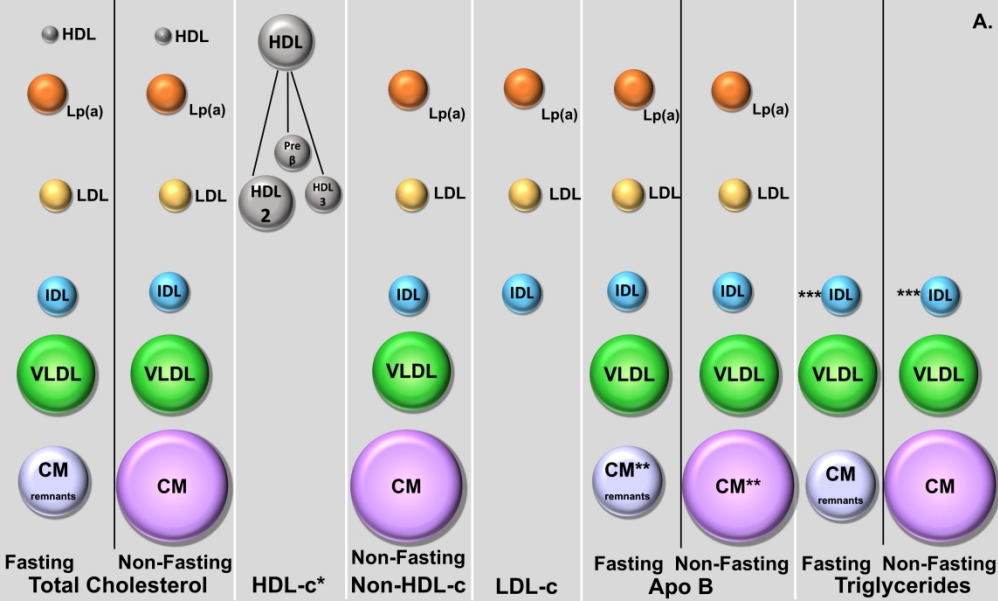
Clinical chemistry

acta; international journal of clinical chemistry

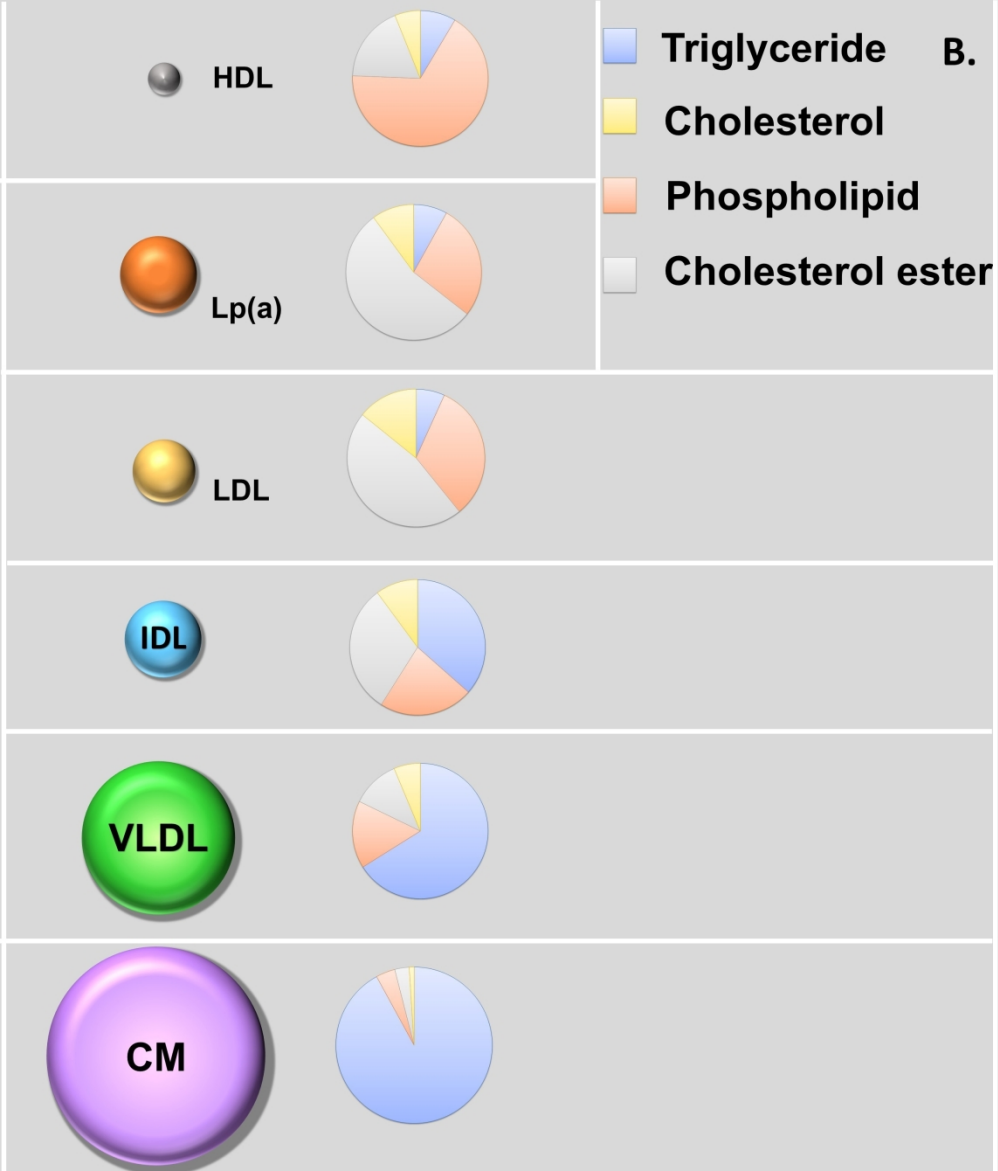
Clinica chimica

and laboratory medicine





Clinical chemistry



1400x841mm (96 x 96 DPI)



718x841mm (96 x 96 DPI)

AT A GLANCE GUIDANCE FOR LIPID TESTING AND REPORTING IN THE UK FOR LABORATORIES											
STANDARD lipid profile = Total cholesterol, HDL-c, triglycerides, calculated Non-HDL-c, LDL-c calculated using Sampson-NIH equation, Total cholesterol/HDL-c ENHANCED lipid profile = May include Lp (a) and ApoB											
Inform clinicians of pre-analytical factors and secondary causes of dyslipidaemia and that may influence lipid result											
Pre-analytical factors											
Fasting not routinely necessary but can be useful <ul style="list-style-type: none"> If hypertriglyceridaemia (TG > 5.0 mmol/L) Patients with triglyceride-related pancreatitis Before starting medications that can cause significant elevation in TG If sample is taken with other tests requiring fasting e.g. Glucose 	 Acute phase may cause ↓ LDL-c, ↓ HDL-c and ↓ TC. Avoid testing until 2-4 weeks following  Measure lipid profile within 24 hours of acute Myocardial infarction, otherwise TC and LDL-c may be lower than what is normal for the patient  Avoid strenuous exercise (↓ TC) / High fat meal (↑ TG) immediately before testing  There are physiological increases in TC, LDL-c and TG in the 2 nd and 3 rd trimester										
Requests should state fasting status (For Hypertriglyceridaemia, TG threshold is different in fasting (≥1.7mmol/L) vs non fasting (≥ 2.0 mmol/L) state)											
Secondary causes of dyslipidaemia											
TC and/or LDL-c <ul style="list-style-type: none"> Untreated hypothyroidism, nephrotic syndrome, cholestatic liver disease, anorexia nervosa, pregnancy, hypopituitarism, drugs e.g. atypical antipsychotics, steroids, ciclosporin, extreme diets such as the ketogenic diet Insulin treatment in type 1 diabetes, alcohol, exercise, hypothyroidism, primary biliary cholangitis, drugs e.g. phenytoin, methotrexate, hydroxychloroquine, prednisolone, oral oestrogens Insulin resistance, obesity, malignancy drugs e.g. steroids, antihypertensives, sepsis, inflammatory conditions, monoclonal gammopathies (antefactual cases), hypopituitarism, chronic renal failure 											
Triglycerides <ul style="list-style-type: none"> Common: Alcohol, uncontrolled hyperglycaemia, insulin resistance, obesity, drugs e.g. atypical antipsychotics, beta-blockers, steroids, ciclosporin, antiretroviral, retinoids, oral oestrogens, untreated hypothyroidism, renal disease, pregnancy, gout Less common: systemic lupus erythematosus, glycogen storage disease, paraproteinaemia, Cushing's syndrome, HIV associated lipodystrophy, hypopituitarism Hypothyroidism, malabsorption 											
Lipoprotein (a) <ul style="list-style-type: none"> Nephrotic syndrome, chronic kidney disease, untreated hypothyroidism, pregnancy 											
LDL-cholesterol (LDL-c) calculation <ul style="list-style-type: none"> Use of the Sampson-NIH equation is preferable in fasting and non-fasted samples. LDL-c should be calculated in all standard lipid profiles where trig < 9mmol/L. Consider Non-HDL-c or Apo B where not possible. 	Analytical and post-analytical considerations <ul style="list-style-type: none"> For children, use paediatric specific reference range http://caliperdatabase.org 										
Total-cholesterol/ HDL-c <ul style="list-style-type: none"> In patients with very high HDL-c (>2.5 mmol/L), interpret normal ratio with caution as it may underestimate risk 	Testing interval of lipid profile <ul style="list-style-type: none"> Initially test at least twice in view of biological variation 										
Lipoprotein(a) measurement <ul style="list-style-type: none"> A single measurement of Lp(a) is adequate in most patients unless secondary cause for elevated Lp(a) is identified. Denka based assays with calibrators traceable in mmol/L to WHO/IFCC reference material are the only recommended assays at present. Results should be reported in mmol/L. Avoid conversion from mass to molar units. 	<table border="1"> <tr> <td>Initiation/change in treatment</td> <td>2-3 months</td> </tr> <tr> <td>High risk patients*</td> <td>3-8 weeks</td> </tr> <tr> <td>Stable on treatment</td> <td>Once a year</td> </tr> <tr> <td>TG > 20 mmol/L</td> <td>Daily</td> </tr> <tr> <td>TG of 10-20mmol/L</td> <td>Within a week</td> </tr> </table>	Initiation/change in treatment	2-3 months	High risk patients*	3-8 weeks	Stable on treatment	Once a year	TG > 20 mmol/L	Daily	TG of 10-20mmol/L	Within a week
Initiation/change in treatment	2-3 months										
High risk patients*	3-8 weeks										
Stable on treatment	Once a year										
TG > 20 mmol/L	Daily										
TG of 10-20mmol/L	Within a week										
<small>*Post acute coronary syndrome, ischaemic stroke or TIA</small>											

Flagging results			
Analyte	Clinical status	Threshold	Comment
LDL-cholesterol	Secondary prevention	>2.0 mmol/L	This patient is above NICE secondary prevention targets for ASCVD. If clinically appropriate, please consider treatment escalation.
	Adults	>4.9 mmol/L	Consider familial hypercholesterolaemia, exclude secondary causes and seek specialist advice if necessary.
	Paediatrics	>4 mmol/L	
Non-HDL-cholesterol	Adults	>13.0 mmol/L	Consider homozygous familial hypercholesterolaemia, exclude secondary causes and seek specialist advice if necessary.
	Paediatrics	>11.0 mmol/L	
	Secondary prevention	>2.6 mmol/L	This patient is above NICE secondary prevention targets for ASCVD. If clinically appropriate, please consider treatment escalation.
Triglycerides	Paediatrics	≥3.7 mmol/L	This child is above the 95th percentile for Non-HDL-c.
	All samples	>7.5 mmol/L	Consider familial hypercholesterolaemia, exclude secondary causes and seek specialist advice if necessary.
	Fasting Non-fasting	≥1.7 mmol/L ≥2.0 mmol/L	
Total Cholesterol	All samples	>10.0 mmol/L	Increased risk of acute pancreatitis. Repeat fasting in 5-14 days, review secondary causes and seek specialist review if repeat >10.0 mmol/L.
	All samples	>20.0 mmol/L Alert clinician urgently	Increased risk of acute pancreatitis. Arrange urgent specialist review if not due to alcohol excess or poor glycaemic control.
HDL-cholesterol	Adult	>7.5 mmol/L	Consider familial hypercholesterolaemia, exclude secondary causes and seek specialist advice if necessary.
	Paediatrics	>6.7mmol/L	
Lp(a)	Female	≤1.0 mmol/L	Investigate for secondary causes, interpret normal TC:HDL with caution.
	Male	≤1.2 mmol/L	
	Paediatrics	<1.0 mmol/L	
Apo B	All samples	>2.5 mmol/L	Investigate for secondary causes and consider investigation for hypoalphalipoproteinaemia.
	All samples	>1.00 g/L <0.10 g/L	Moderate risk of CVD High risk of CVD Very high risk of CVD
Apo A1	All samples	<0.10g/L	Investigate for secondary causes and consider investigation for hypo/abetaipoproteinaemia.
	All samples	<0.10g/L	Investigate for genetic causes of hypoalphalipoproteinaemia.
TC/HDL-c	All samples		Normal ratios should be flagged if due to very high HDL-C.
Requests should state if lipid profile is for primary or secondary prevention			

1189x841mm (96 x 96 DPI)