## Northern England Evaluation and Lipid Intensification guideline

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- **Primary** prevention
- **Secondary** prevention

### Supplementary information
- Lipid Clinic referral criteria
- Common drug interactions
- Regional Lipid clinics
- Lipoprotein (a)
Summary of National Guidance for Lipid Management for Primary and Secondary Prevention of CVD

**Initial Considerations:**
- Measure non-fasting full lipid profile (total cholesterol, HDL-C, non-HDL-C, LDL-C, triglycerides) and HbA1c as part of an initial baseline assessment.
- Consider secondary causes of hyperlipidaemia and manage as needed.
- Ensure appropriate baseline and follow up tests as detailed on page 2.
- Identify and exclude people with contraindications/drug interactions.
- If non-fasting triglyceride > 4.5mmol/L or HbA1c > 56mmol/mol, refer for confirmation of fasting lipid profile.

**Primary Prevention**

**Prevent or delay cardiovascular disease.** Use QRISK risk assessment tool where appropriate (see page 2, Primary Prevention Risk Assessment).

- **Primary Prevention**
  - Age ≥54 & QRISK ≥10% over next 10 years
  - Type 2 diabetes & QRISK ≥10% over next 10 years
  - Type 1 diabetes, if they have one or more of the following:
    - Over 40 years
    - Had diabetes for >10 years
    - Have established nephropathy
    - Have other CVD risk factors
  - CKD eGFR < 60 mL/min/1.73 m² and/or albuminuria
  - Age ≥65 years if appropriate consider comorbidities, frailty & life expectancy

Consider additional risk factors, if present, together with QRISK score (treated for HIV, severe mental illness, taking medicines that cause dyslipidaemia, systemic inflammatory disorder (e.g., SLE), impaired fasting glycaemia, recent change in risk factors).

**Secondary Prevention**

- Identify and address all modifiable risk factors - smoking, diet, obesity, alcohol intake, physical activity, blood pressure and HbA1c.

**Severe Hyperlipidaemia**

- If TC ≥7.5mmol/L and/or LDL-C ≥4.9mmol/L and non-HDL-C ≥5.7mmol/L, a personal and/or family history of confirmed CHD (≥65 years) and with no secondary causes; suspect Familial Hypercholesterolaemia (Possible Heterozygous FH).
- Do not use QRISK risk assessment tool.

**Diagnosis and Referral**

- Take fasting blood for repeat lipid profile to measure LDL-C.
- Use the Simon Broome or Dutch Lipid Clinic Network (DLCN) criteria to make a clinical diagnosis of FH.

Refer to Lipid Clinic for further assessment if clinical diagnosis of FH or if TC ≥9.0mmol/L and/or LDL-C ≥6.5mmol/L and/or non-HDL-C ≥7.5mmol/L or Fasting triglycerides >10mmol/L (regardless of family history) (page 2).

**Treatment Targets in FH**

- If clinical diagnosis of FH and/or other risk factors present follow the recommended treatment management pathway for primary or secondary prevention as for non-FH, BHF.
- Aim to achieve at least a 50% reduction of LDL-C (or non-fasting non-HDL-C) from baseline.
- Consider specialist referral for further treatment and consideration of PCSK9i therapy if:
  - They are at a very high risk of a coronary event (see page 2, ‘Statin Intensity Table’).
  - If maximum tolerated dose of statin does not achieve non-HDL-C reduction > 40% of baseline value after 3 months consider adding Ezetimibe 10mg OD (NICE T5385).
  - If recommended statin therapy is contraindicated or not tolerated.
  - Ezetimibe monotherapy may be considered. Asema response after 3 months.
  - See local statin intolerance guidance/pathway available.

If non-HDL-C reduction remains <40% of baseline despite maximal tolerated lipid lowering therapy (including people with intolerances and contraindications) consider referral to specialist lipid management clinic according to local arrangements.

**Secondary Prevention**

- Do not delay statin treatment in secondary prevention while managing modifiable risk factors.
- Prescribe a high intensity statin. Atorvastatin 80mg OD.
- Use a lower dose of Atorvastatin if there is a potential drug interaction, high risk of or experiencing adverse effects, or patient preference.

- Offer Atorvastatin 20mg OD (people with GFR < 60 mL/min/1.73 m²).

- Measure full lipid profile again after 3 months (non-fasting).
- High intensity statin treatment should achieve reduction of non-HDL-C > 40% from baseline. If not achieved after 3 months:
  - Discuss treatment adherence, timing of dose, diet and lifestyle.
  - If at higher risk (based on comorbidities, risk score or clinical judgement) – see page 2. Additional Risk Factors.
- Aim to achieve at least a 50% reduction of LDL-C (or non-fasting non-HDL-C) from baseline.
- Consider specialist referral for further treatment and consideration of PCSK9i therapy if:
  - They are assessed to be at very high risk of a coronary event (see page 2, ‘Statin Intensity Table’).
  - If maximum tolerated dose of statin does not achieve non-HDL-C reduction > 40% of baseline value after 3 months consider adding Ezetimibe 10mg OD (NICE T5385).
  - If recommended statin therapy is contraindicated or not tolerated.
  - Ezetimibe monotherapy may be considered. Asema response after 3 months.
  - See local statin intolerance guidance/pathway available.

If maximum tolerated dose of statin does not achieve non-HDL-C reduction > 40% of baseline value and/or non-HDL-C < 2.5mmol/L, after 3 months consider adding Ezetimibe 10mg OD (NICE T5385).

If recommended statin therapy is contraindicated or not tolerated:
- Ezetimibe monotherapy may be considered. Asema response after 3 months.
- See local statin intolerance guidance/pathway available.

If non-HDL-C > 4.0mmol/L, despite maximal tolerated lipid lowering therapy (including people with intolerances and contraindications), arrange a fasting blood test for LDL-C measurement and if PCSK9i eligibility criteria (see page 2, Specialist Services) are met, refer for confirmation and initiation of PCSK9i (NICE TA 393, 394) according to local arrangements.
This guidance applies to new patients and may also be taken into consideration for those already on statins at their annual review. If 40% reduction of non-HDL-C not achieved, offer high intensity statins. Discuss with people who are on a low- or middle-intensity statin the likely benefits and potential risk of side effects if changed to a high-intensity statin when they have a medication review and agree with the person whether a change is needed.

If statin therapy is contraindicated, not tolerated or not effective, consider ezetimibe. Do not offer a flibans, nicoxs, bile acid binder or omega-3 fatty acid alone or in combination with statin, for the prevention of CVD (Check NICE CG181 for exceptions).

**Primary Prevention Risk Assessment**

**QRSi** is the current version of the QRSi calculator: www.qrisk.org

- Do not use this risk assessment tool for people with established CVD or those who are at high risk of developing CVD because of FH or other inherited disorders of lipid metabolism.
- Do not use a risk assessment tool to assess CVD risk in people with type 1 diabetes, or eGFR less than 60 mL/min/1.73 m² and/or albuminuria.
- Consider people aged 65 or above at increased risk of CVD because of age alone, particularly people who smoke or have raised BP.

**Additional Risk Factors**

Note: standard CVD risk scores including QRSi may underestimate risk in people who have additional risk because of underlying medical conditions or treatments. These groups include the following groups of people;

- severe obesity (BMI>40 Kg/m²) increases CVD risk
- treated for HIV.
- serious mental health problems.
- taking medications that can cause dyslipidaemia such as antipsychotic medication, corticosteroids or immunosuppressive drugs.
- autoimmunity disorders such as systemic lupus erythematosus, and other systemic inflammatory disorders.
- non-diabetic hyperglycaemia.
- significant hypertriglyceridaemia (fasting triglycerides 4.5-9.0mmol/L).
- recent risk factor changes e.g. quit smoking. BP or lipid treatment

Consider socio-economic status as an additional factor contributing to CVD risk.

If QRSi 20% risk or more; 10 years - Give lifestyle advice and ensure regular review of CVD risk in line with guidance.

### SPECIAL PATIENT POPULATIONS

**Type 1 Diabetes**

While NICE recommends offering statins to patients with Type 1 diabetes as detailed in the algorithm, it also states to consider statins in all adults with type 1 diabetes.

**Chronic Kidney Disease**

Offer atorvastatin 20mg for the primary or secondary prevention of CVD to people with CKD (eGFR less than 60 mL/min/1.73 m² and/or albuminuria) increase the dose if a greater than 40% reduction in non-HDL-C is not achieved and eGFR is 30 mL/min/1.73 m² or more.

Agree the use of higher doses with a renal specialist if eGFR is less than 30 mL/min/1.73 m².

**CVD abbreviations**

CVD: cardiovascular disease

FH: Familial hypercholesterolaemia

ALT: alanine aminotransferase

non-HDL-C: non-high density lipoprotein cholesterol

LDL-C: low density lipoprotein cholesterol

PCSK9i: Proprotein convertase subtilisin/kexin type 9 inhibitor


**Management**

**Statin Intensity Table**

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<th>Statin dose rang</th>
<th>Approximately reduction in LDL-C</th>
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<td>50-100mg</td>
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<td>20-50mg</td>
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<tr>
<td>5-20mg</td>
<td>10-15%</td>
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<tr>
<td>0-5mg</td>
<td>&lt;10%</td>
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**Primary prevention**

- **Intensity lip-lowering therapy**: if non-HDL-C reduction is less than 40%.
- **Ezetimibe**: 10mg daily.
- **Rosuvastatin**: 10-20mg daily.
- **Simvastatin**: 40-80mg daily.

If baseline cholesterol is unknown in the setting of secondary prevention use the Joint British Societies (JBS3) consensus recommendations.

**Tolerance Thresholds**

Primary Prevention

- Intensity lip-lowering therapy: if non-HDL-C reduction is less than 40%.
- Ezetimibe: 10mg daily.
- Rosuvastatin: 10-20mg daily.
- Simvastatin: 40-80mg daily.

**FH**

Optimize lip-lowering therapy to achieve at least 56% reduction in LDL-C (or non-HDL cholesterol).

**Specialist Services**

Scope of specialist service available locally may include: Lipid Clinic, PCSK9i clinic (offering initiation and subsequent follow up), FH Genetic Diagnosis and Cascade testing, Lipoprotein Apheresis service. NICE eligibility criteria for PCSK9i and fasting LDL-C thresholds are summarised below.

**NICE TA295 Aflorocumab**

**NICE TA284 Evolocumab**

**NICE TA283 Alirocumab**

**NICE TA264 Evac forearm**

**NICE TA262 Evac brachial**

**NICE TA258 Evac campbell**

**NICE TA255 Evac forearm**

**NICE TA253 Evac campbell**

**NICE TA251 Evac campbell**

**NICE TA249 Evac campbell**

**NICE TA245 Evac campbell**

**NICE TA243 Evac campbell**

**TRIGLYCERIDES**

- **Triglyceride concentration**
  - **10 - 20mmol/L**: Repeat the TG measurement with a fasting test (after an interval of 5 days, but within 2 weeks) and review for potential secondary causes and/or medications.
  - **4.5 - 9mmol/L**: If non-fasting triglycerides are greater than 4.5mmol/L, repeat with fasting TG measurement. Be aware that the CVD risk may be underestimated by risk assessment tools. Optimise the management of other CVD risk factors present and seek specialist advice if non-HDL-C concentration is ≥ 4.5mmol/L.

**Statin Intolerance**

Statin Intolerance is defined as the presence of clinically significant adverse effects from statin therapy that are considered to represent an unacceptable risk to the patient or that may result in cessation to therapy being compromised. For people who are intolerant of the recommended statin treatment seek advice from the NICE AAG statin intolerance algorithm, available on the NICE AAG page (Click here).
Flow chart for the management of patients with established vascular disease

Patient with coronary artery disease, cerebrovascular disease and or peripheral arterial disease, treated with maximum tolerated statin

Has the patient achieved a 40% reduction in non-HDL-C from baseline and is non-HDL-C ≤ 4mmol/L?

YES

Continue with standard management pathway to maintain > 40% reduction in non-HDL-C

NO

Ensure secondary causes excluded.
Blood and urine samples (request U+E, LFT, TFT, HbA1c, Urine ACR if not recent)
Assess
Current drug treatment and concordance
Lifestyle including diet (including any "fad diets") and physical activity
alcohol history
glycaemic control of diabetes

Correct any secondary causes
Intensify statin potency/dose and add Ezetimibe as required (see box), titrating every 6 to 8 weeks until maximum tolerated or Non HDL-C ≤ 4mmol/L

Is non-HDL-C still > 4mmol/L?

YES

Measure fasting lipid profile which will include a calculated LDL-C

* High risk of CVD and calculated LDL-C > 4mmol/L?
** Very High risk of CVD and calculated LDL-C > 3.5mmol/L?
ARE Triglycerides < 4.5mmol/L?

YES

Refer to clinics providing PCSK9i therapy e.g. lipid or cardiology clinics. Provide comprehensive details of patient history and all management steps tried including drugs used with referral

NO

NO

Repeat fasting (12 hours) blood test for lipid profile PLUS a measured LDL-C (eg. Beta Quant or direct LDL-C assay)

LDL-C > 4mmol/L (*High Risk)
or LDL-C > 3.5mmol/L (**very high risk)

Continue current lipid lowering regime

Notes (Please also refer to the additional notes below):
- If non-HDL-C > 4mmol/L and any secondary causes, including poor concordance have been corrected, consider escalation in statin intensity/dose as tolerated, titrating at 6 to 8 weekly intervals e.g. Ensure Atorvastatin 80mg OD or maximum tolerated dose.
- If fail to achieve non-HDL-C ≤ 4mmol/L, consider:
  - Switching to Rosuvastin 20mg or 40mg OD (or lower dose to start and titrate up if concerns about tolerability)
  - If treated with optimal statin as tolerated, the addition of Ezetimibe 10mg OD.
- The response should be assessed at 6 to 8 weekly intervals and treatment intensified as required
- If non-HDL-C does not fall with change in treatment review concordance, ensure secondary causes excluded, consider a different agent.

* High risk of CVD i.e. history of any of the following: acute coronary syndrome (such as MI or unstable angina needing hospitalisation); coronary or other arterial revascularisation procedures, coronary heart disease; ischaemic stroke, peripheral arterial disease.
** Very high risk of CVD i.e. recurrent cardiovascular events or cardiovascular events in more than 1 arterial vascular bed (that is, polyvascular disease)
Statin Intolerance Pathway

Person at high CVD risk reports potential intolerance to recommended high intensity statin treatment

- Consider other potential side effects for statins
  - Be aware of Statin Reluctance and Nocebo Effect
  - See 'Person Centred Care' box

Muscular symptoms not related to statins

Non SRM: Consider other causes e.g. PMR, Vit D deficiency, Check bone profile, Vit D, CRP

**Tolerable symptoms**
- No clinical concern
  - CK < 4x ULN

**Improvement within 2 weeks**
- Resolved within 6 weeks
- Patient happy to continue

**Non-SRM Consider other causes**

New onset or worsening of muscle symptoms since starting statins? (pain, tenderness or weakness)

- No
- Symptoms typical for Statin Related Muscle toxicity (SRM)?
  - Yes
  - Measuring Creatinine Kinase (CK)
  - Assess severity of symptoms +/- repeat baseline assessment**

Intolerable symptoms
- **and/or clinical concern and/or** CK > 4x and < 10x ULN

**Stop statin for 4-6 weeks**
- Document time to symptom onset and time to resolution
- Has CK normalised?
  - Yes
  - Stop statin and consider Rhabdomyolysis
  - No
  - Has the patient been symptom free for at least 2 weeks?
    - Yes
    - Reassess and restart with lower dose / alternative statin (see "Statin-based Approaches")
    - Offer low or moderate dose of a higher intensity statin (Atorvastatin 10 or 20 mg OD, Rosuvastatin 5 or 10mg OD)

  - No
  - Recurrence of muscle symptoms
    - Short time to onset
    - Symptoms intolerable
      - Consider further options (e.g. co-administering ezetimibe or as monotherapy)
        - See "Statin-based Approaches"
      - If not effective

- **CK > 10x and < 50x ULN**
  - Renal function stable/normal eGFR
    - No
    - Consider Statin induced necrotizing autoimmune myopathy (SINAM)
      - Seek specialist advice and consider PCSK9s (NICE TA 363, 384)
      - Urgently seek specialist advice and inpatient assessment
  - **CK > 50x ULN**

**Abbreviations**
- CK = Creatinine Kinase
- CRP = C-Reactive protein
- eGFR = Estimated glomerular filtration rate
- PMR = Polymyalgia rheumatica
- SINAM = Statin induced necrotizing autoimmune myopathy
- SRM = Statin related muscle toxicity
- ULN = Upper Limit of Normal Range
- Vit D = Vitamin D
**Introduction**

- Statis are the cornerstone for prevention and treatment of cardiovascular (CV) disease with a substantial evidence of reduction in morbidity & mortality. Refer to Lipid Management Pathway and related NICE guidelines (CG91, CG97) for guidance on initiation, titration and monitoring of statin therapy.
- In clinical trials, statins were found to be largely well tolerated (often with a similar adverse effect [AE] profile to placebo), however this is not reflected in clinical practice where up to 75% of people start on a statin will discontinue treatment within 2 years.

**Definition of Statin Intolerance**

- Intolerance to initial statin therapy is defined by NICE as the presence of clinically significant adverse effects that represent an unacceptable risk to the patient or that may reduce compliance with therapy.
- Other definition: any adverse event (AE) considered unacceptable by the patient, and/or some laboratory abnormality, both attributed to statin treatment and leading to its discontinuation.

**Statin-associated muscle symptoms (SAMS)**

- SAMS are one of the principal reasons for statin discontinuation and adverse discontinuation. However, note that SAMS should lead to a label of ‘statin intolerance’ as they may not be truly statin related muscle toxicity (SRM) as demonstrated by resolution on de-challenge and recurrence on re-challenge.

**Non-SRM related muscle-related symptoms (Non-SRM)**

- If patients report symptoms that are not typical of SAMS (e.g. asymmetric distribution, failure to resolve with de-challenge despite normal CK) consider other muscle-related disorders, metabolic, degenerative or inflammatory e.g. Vitamin D deficiency, polymyalgia rheumatica. Check bone profile, VD, CRP.

**Considerations when starting a statin to reduce risk of SRM**

- Check baseline thyroid, liver & renal function, any potential drug interactions, and avoid the highest doses in at-risk groups (See ‘Risk Factors’ below).
- Ask the patient if they have had persistent generalised unexplained muscle pain, whether associated with previous lipid-lowering therapy. If they have, measure CK. If CK levels are >4×ULN do not start statin - investigation required.
- Do not measure CK if patient is asymptomatic.
- Warn patients about AEs, specifically muscle symptoms. Advise patients who are being treated with a statin to seek medical advice if they develop muscle symptoms (pain, tenderness or weakness). If this occurs, measure CK.

**Risk factors for SRM and statin intolerance**

- **Endogenous factors**
  - Female gender
  - Advanced age (> 75 yrs)
  - Fasting (reduced lean body mass)
  - History of muscle disorder or high CK
  - Impaired renal or hepatic function
  - Personal or Family history of intolerance to lipid-lowering therapies.
- **Exogenous factors**
  - Excessive alcohol intake
  - High intensity exercise
  - Dehydration
  - Drug interactions with statins (including herbal medicines)
  - Vitamin D deficiency

**Classification of statin related muscle toxicity (SRM)**

- **SRM 0**: CK elevation >4×ULN
- **SRM 1**: Myalgia, tolerable
  - Font size: 100/100,000 Patient-years: 0.3-33%
  - Muscle symptoms without CK elevation
- **SRM 2**: Myalgia, intolerable
  - Font size: 0.2-21.000
  - Muscle symptoms, CK >4×ULN, complete resolution on de-challenge
- **SRM 3**: Myopathy
  - Font size: 5/100,000 Patient-years
  - CK elevation >4×ULN <10×ULN, muscle symptoms complete resolution on de-challenge
- **SRM 4**: Severe myopathy
  - Font size: 0.11%
  - CK elevation >10×ULN <50×ULN, muscle symptoms complete resolution on de-challenge
- **SRM 5**: Rhabdomyolysis
  - Font size: 1.3-4.1/1000
  - CK elevation >50×ULN with evidence of renal impairment + muscle symptoms or CK >50×ULN
- **SRM 6**: Autoimmune-mediated necrotizing myositis (SNIM)
  - Font size: <1/1000
  - 3rd to 4th year after starting statin
  - C-Reactive protein (CRP) may be elevated
  - Muscle biopsy showing autoimmune myositis, interstitial resolution on de-challenge

**Person-centred approach to address statin intolerance**

**Initial Consultation**

- Be aware of ‘nocebo effect’ and ‘statin resistance’
- Reinforce healthy lifestyle habits (e.g. exercise, reducing weight)
- Listen to the concerns of each patient
- Explain LDL-C targets and strategies to lower LDL-C (NICE-HDL-C)
- Discuss options to reduce LDL-C non-HDL-C with pros and cons
- Explain the benefits of statins
- Evaluate & identify any risk factors and address (e.g. drug interactions)
- Work with patients to identify and agree on best options and next steps

**Follow up**

- Follow up on agreed plan and address any issues / concerns
- Advise patients to contact you if they experience muscle symptoms
- Ongoing patient education and regular review helps addressing concerns around medicine safety and underline the importance of adherence.

**Statin based approaches to manage muscle symptoms**

- Adopt person-centred approach as described above
- Therapy with a lower dose statin is preferred to no statin
- Apply a repetitive ‘De-Challenge’ - ‘Re-Challenge’ approach to establish if symptoms are caused by a statin(s) and the best statin regimen for each patient
- Switch to a different statin or re-challenge with the same statin using a lower dose or frequency (intermittent dosages)
- Patients who do not tolerate statins on a daily basis, alternate day or twice-weekly dosing is a good option
- Rosuvastatin and atorvastatin have longer half-lives, permitting their use on a non-daily regime.
- Adding ezetimibe to a lower dose statin may be better tolerated with robust reduction of LDL-C non-HDL-C
- Once a new regime is tolerated, dose / frequency can be up-titrated slowly to achieve LDL-C / non-HDL-C goals with minimal or no muscle complaints.

It is important to note that cardiovascular benefits have not been proven for all the above approaches but any reduction of LDL-C / non-HDL-C is beneficial.

**LDL-C lowering options for patients with unexplained statin intolerance**

- Refer to the AAG Lipid Management Algorithm. Click here
- Consider ezetimibe (NICE TA395) as an add-on
- Consider PCSK9i if eligible for treatment according to NICE TA303, 304

**Non-muscle related statin side effects**

- May vary between different statins. In clinical trials some side effects often associated with statins are not statistically different from placebo.
- Most commonly reported: gastrointestinal disturbance and asymptomatic increases in hepatic transaminases (ALT/AST). May affect up to 1 in 10 statin users.
- Rare side effects include: Hepatotoxicity, new onset Type 2 Diabetes (benefits outweigh risk, do not stop statin), Renal insufficiency, proteinuria, Neurocognitive and neurological impairments (no apparent link from RCTs), Intestinal haemorrhage (conflicting on benefits of statins), Increased skin damage (including alopecia, Lupus-like reaction, Sleep disturbance, headache, dizziness, fatigue, depression, sexual dysfunction).
- Management: if symptoms appear statin related, consider a de-challenge and re-challenge or change to a different statin (e.g. hydrophilic instead of lipophilic).
- Liver enzyme abnormalities - minor increases in liver enzymes (<3×ULN) may be seen within the first three months of statin treatment. Temporary discontinuation and further assessment is warranted if levels exceed 3×ULN. Several studies have confirmed that the cardiovascular benefits of statin treatment in high-risk populations outweigh the rare adverse effects, such as rhabdomyolysis.

Authors: Dr Rani Khalid & Dr Dermot Flanagan on behalf of the AAG Clinical Subgroup. June 2020. Review date: June 2021. Pathway endorsed by NICE. July 2020. Please refer to the Lipid Management pathway and Full list of Interventions.
Flow chart for the assessment of severe hypercholesterolaemia

Total Cholesterol > 7.5mmol/L and/or LDL-C (fasting) > 4.9mmol/L and/or non-HDL-C > 5.9mmol/L

- Take fasting blood for repeat lipid profile AND
- Blood and urine samples for secondary hyperlipidaemia profile (U+E, LFT, TFT, HbA1c, Urine ACR)

ASSESS
- Current drug treatment
- Lifestyle including diet (note any fad diets) and physical activity
- Alcohol history
- Glycaemic control if diabetic

Are there any secondary causes?

Yes
- Manage any secondary causes and reassess
- Are tendon xanthomata (visible and/or palpable) present and/or is there a personal and/or family history of confirmed CHD/raised cholesterol

No
- Is repeat LDL-C > 4.9 mmol/L and/or non-HDL-C > 5.9mmol/L

Yes
- Assess and manage 10-year CVD risk
- Consider Atorvastatin 20mg OD

No
- Is:
  - Total Cholesterol > 9.0 mmol/L or
  - Non-HDL-C > 7.5 mmol/L or
  - LDL-C > 6.5 mmol/L or
  - Fasting triglycerides > 10 mmol/L?

Yes
- Consider discussing and treating with Atorvastatin 20mg OD. If there is a clinical concern, uncertain family history, poor response to optimal statin (i.e. < 40% reduction in non-HDL-C), younger patients, refer to Lipid Clinic

No
- Refer to Lipid Clinic

Notes
1. Personal history or first degree relative with confirmed CHD (MI, CABG, PCI or definite coronary artery disease on coronary angiography) < 60 years or second degree relative with confirmed CHD < 50 years, and/or family history of total cholesterol > 7.5mmol/L
2. If fasting triglycerides ≥4.5mmol/L refer to hypertriglyceridaemia section
3. All patients should have lifestyle advice offered and an overall management plan discussed and agreed
4. Refer to BNF/SPC for contraindications, interactions and increased risk of adverse events with Atorvastatin 20mg OD
Simon Broome criteria for Familial Hypercholesterolaemia (FH)

**Definite Familial Hypercholesterolaemia** is defined as:
- Total cholesterol > 7.5 mmol/L or LDL-C > 4.9 mmol/L in an adult
- Total cholesterol > 6.7 mmol/L or LDL-C > 4.0 mmol/L in a child (< 16 years)
  (Levels either pre-treatment or highest on treatment)

**Plus**
- Tendon Xanthomas
- 1st degree relative (parent, sibling or child) or
- 2nd degree relative (grandparent, uncle or aunt)

**Or**
- DNA-based evidence of a variant causing FH

**Possible Familial Hypercholesterolaemia** is defined as:
- Total cholesterol > 7.5 mmol/L or LDL-C > 4.9 mmol/L in an adult
- Total cholesterol > 6.7 mmol/L or LDL-C > 4.0 mmol/L in a child (< 16 years)
  (levels either pre-treatment or highest on treatment)

**Plus**
- Family history of premature myocardial infarction (one or the other):
  - < 60 years of age in 1st degree relative
  - < 50 years of age in 2nd degree relative

**Or**
- Family history of raised total cholesterol:
  - > 7.5 mmol/L in adult 1st or 2nd degree relative or
  - > 6.7 mmol/L in child or sibling < 16 years.

- **Do not** use Simon Broome LDL-C criteria for relatives of index individuals with clinical diagnosis of Familial Hypercholesterolaemia because this will result in under diagnosis.
- **Do not** use CVD risk estimation tools as people with Familial Hypercholesterolaemia are already at a high risk of premature coronary heart disease.

**Homozygous Familial Hypercholesterolaemia**
Consider a clinical diagnosis of homozygous familial hypercholesterolaemia in:
- adults with an LDL-C > 13 mmol/L
- children/young people with an LDL-C > 11 mmol/L
Flow chart for the assessment of Hypertriglyceridaemia

1. Identify and correct possible common secondary causes of dyslipidaemia (such as excess alcohol, uncontrolled diabetes, hypothyroidism, liver disease, nephrotic syndrome and medications).
2. Repeat full fasting lipid profile for all and include Apolipoprotein B (ApoB) measurement for those with triglycerides above 10 mmol/L. This should be done 5-14 days or as soon as practical after secondary factors addressed.

* Recommended diet should reduce simple sugar, total carbohydrates and fat. Dietary metabolic adaptations require at least 3 months.
** Current abdominal pain needs urgent assessment for pancreatitis.

Repeat Non fasting Triglycerides 4.5 – 9.9 mmol/L
Moderate

Assess and treat CVD risk as for general population but note that CVD risk may be underestimated by risk assessment tools
Start Atorvastatin 20mg OD if Qrisk > 10%
Lifestyle intervention: reduce weight, improve diet, reduce alcohol intake and increase aerobic activity
Seek specialist advice for
- Non-HDL-C > 7.5 mmol/L
- Untreated ApoB < 1.0g/L
- Requests for advice and guidance via eReferral accepted

Repeat Non fasting Triglycerides 10 – 20 mmol/L
Severe

At risk of acute pancreatitis
Start Fenofibrate 200mg OD; use reduced dose of 67mg daily if eGFR 30-59
Lifestyle intervention for the longer term: strict fat reduced diet (< 20% of calories as fat), reduce body weight; reduce intake of alcohol, improve diet, increase aerobic activity
* Fibrates work through nuclear transcription. Effects become apparent after ~2-3 weeks of sustained use

Repeat Non fasting Triglycerides >20 mmol/L
Very Severe

Urgent Referral to Lipid Clinic

Secondary causes of Hypertriglyceridaemia
- Obesity
- Metabolic syndrome
- Diet with high fat or calories
- Excess alcohol consumption
- Diabetes Mellitus (mainly Type 2)
- Medications (including corticosteroids, oral estrogen, Tamoxifen, thiazides, non-cardioselective beta-blockers and bile acid sequestrants, Cyclophosphamide, L-asparaginase, protease inhibitors and second-generation antipsychotic agents such as Clozapine and Olanzapine)
- Hypothyroidism
- Renal disease (proteinuria, uraemia or glomerulonephritis)
- Pregnancy (particularly in the third trimester)
- Paraproteinaemia
- Systemic lupus erythematosus
Lipid Management in Pregnancy

General Advice for Familial Hypercholesterolaemia (FH) / Lipid Patient Planning Pregnancy

1. Risks for future pregnancy should be discussed for women and girls when lipid lowering therapy is first considered, and should be discussed as part of annual review.

2. Discontinue lipid lowering therapy for 3 months before attempting to conceive.

3. Patient who conceive on lipid lowering therapy should stop therapy immediately and be offered urgent referral for foetal assessment.

4. Dietary advice should be offered as part of pre-conception planning. Pregnant women should limit intake of oily fish to no more than 2 portions a week and avoid shark, marlin and swordfish.

5. Commence Folic Acid 400 mcg OD prior to conception and continue until week 12 of pregnancy (give 5 mg once daily if high risk high of conceiving child with neural tube defect).

6. Do not routinely use aspirin. Aspirin should be commenced after first dating scan if risk of pre-eclampsia (NICE NG 133; see below).

7. Discuss smoking cessation.

8. Shared care arrangements for pregnancy, including expertise in cardiology and obstetrics should be made. Care should include an assessment of coronary heart disease risk; assessment for aortic stenosis is essential in women Homozygous FH.

9. Do not monitor lipid profile during pregnancy.

10. Discuss breast feeding plans – Statins and Ezetimibe can be re-started once breast feeding completed. Check Lipid profile after 6-8 weeks.

11. Infants should ideally have a buccal swab to screen for FH at 2 years. Earlier genetic testing should be considered if risk of Homozygous FH.

<table>
<thead>
<tr>
<th>Women are considered to be at high risk of pre-eclampsia if they have:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 or more High Risk factors:</td>
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<tr>
<td>Hypertension during previous pregnancy</td>
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<tr>
<td>CKD</td>
</tr>
<tr>
<td>Chronic Hypertension</td>
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<tr>
<td>Type 1 or Type 2 Diabetes</td>
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<tr>
<td>Autoimmune disease (SLE, Antiphospholipid syndrome)</td>
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<tr>
<td>2 or more moderate risk factors:</td>
</tr>
<tr>
<td>First Pregnancy</td>
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<tr>
<td>Age 40 or older</td>
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<tr>
<td>Pregnancy interval &gt; 10 yrs.</td>
</tr>
<tr>
<td>BMI 35 kg/m² at first visit</td>
</tr>
<tr>
<td>Family history of pre-eclampsia</td>
</tr>
<tr>
<td>Multiple Pregnancy</td>
</tr>
</tbody>
</table>
**Statins**

Statins are contraindicated in pregnancy.

Advise women of childbearing potential of potential teratogenic risks and to stop taking statins if pregnancy a possibility.

Women planning pregnancy should stop statins 3 months before they attempt to conceive and not restart them until breast feeding is finished.

**Ezetimibe**

Ezetimibe monotherapy should not routinely be given to pregnant women and used only if clearly necessary. There is no clinical data available on the use of Ezetimibe during pregnancy.

Ezetimibe should not be given during breast feeding.

**PCSK9 Inhibitors**

Alirocumab should be avoided in pregnancy unless clinical conditional requires treatment. Maternal toxicity demonstrated in animal studies.

Evolocumab should be avoided in pregnancy unless treatments essential; limited information available.

**Fibrates**

Fibrates should not be used routinely for the prevention of cardiovascular disease.

Fibrates should be avoided in pregnancy. Embryo toxicity demonstrated in animal studies with Fenofibrate / Gemfibrozil.
**Assessment of potential Familial Hypercholesterolaemia case in a child**

Child identified as possible FH due to known FH gene variant in family or unknown if this family carries FH variant. Contact FH genetics nurses for help either via Advice and Guidance under FH service referrals or 0191 241 8828. They will help direct appropriate evaluation.

- Child identified as potential proband
  - No opportunity to test adult relative OR
  - Adult relative’s test inconclusive OR
  - Child tested for some other reason

Take family history, physical examination
- Non-fasted lipid profile, Lipoprotein (a), if not already done

Bleeds normal
- Discharge

Bleeds abnormal
- Lifestyle advice
  - After 2 months
  - Repeat lipid profile (fasted if TGs not normal on initial sample)
  - TSH, free T4, HbA1c, LFT, CK, Lipoprotein (a) if not already done

- Measure Apolipoprotein B
- Consider discussion in regional MDT

**Lifestyle advice**
- After 2 months
- Repeat lipid profile (fasted if TGs not normal on initial sample)
- TSH, free T4, HbA1c, LFT, CK, Lipoprotein (a) if not already done

**Pathogenic variant found**
- Activate initial genetic testing
- Pathogenic variant negative
  - Repeat lipid profile if not already done
  - If remains abnormal follow up and consider screening family members with lipid profiles, Consider discussion at regional MDT

**Variant Positive**
- Age appropriate treatment if LDL-C > 3.5mmol/L
- Cascade test family

**Can be done in primary care/general paediatrics or paediatric lipid clinic**

**Refer to one of 3 Paediatric Lipid Clinics**
- **Dr Mark Anderson**, Great North Children’s Hospital for Newcastle, Northumberland, Gateshead, Cumbria
- **Dr Neil Hopper**, Sunderland Royal Hospital for Sunderland, South Tyneside and County Durham
- **Dr Mark Burns**, James Cook University hospital for Teesside

**TG – Triglycerides**
- Lp(a) – Lipoprotein (a)
## Common Drug Interactions

For full information refer to British National Formulary [www.bnf.org.uk](http://www.bnf.org.uk)

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<th>Anti-Biotics</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Clarithromycin</td>
<td>Atorvastatin/Simvastatin</td>
<td>Pravastatin</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Simvastatin</td>
<td>Atorvastatin/Pravastatin</td>
</tr>
<tr>
<td>Daptomycin</td>
<td>All Statins</td>
<td>All Statins / Fibrates</td>
</tr>
<tr>
<td>Fusidic Acid</td>
<td>Atorvastatin</td>
<td>Atorvastatin/Simvastatin</td>
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<tr>
<td>Rifampicin</td>
<td>Atorvastatin / Fluvastatin / Rosuvastatin</td>
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<tr>
<td>Tedizolid</td>
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<thead>
<tr>
<th>Anti-Fungals</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Fluconazole</td>
<td>Atorvastatin / Simvastatin</td>
<td>Atorvastatin / Fluvastatin / Simvastatin</td>
</tr>
<tr>
<td>Isavuconazole</td>
<td>Atorvastatin</td>
<td>Atorvastatin/Fluvastatin/Rosuvastatin/Simvastatin</td>
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<tr>
<td>Itraconazole</td>
<td>Atorvastatin / Simvastatin</td>
<td>Atorvastatin/Fluvastatin</td>
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<tr>
<td>Ketoconazole</td>
<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Miconazole</td>
<td>Simvastatin</td>
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<tr>
<td>Posaconazole</td>
<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Voriconazole</td>
<td>Atorvastatin / Simvastatin</td>
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<thead>
<tr>
<th>Drugs used in HIV</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Multiple interactions – seek specialist advice; Consult <a href="http://www.hiv-druginteractions.org">www.hiv-druginteractions.org</a></td>
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<thead>
<tr>
<th>Anti-Coagulants</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Coumarins / Warfarin</td>
<td>All Fibrates / Fluvastatin / Rosuvastatin</td>
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<tr>
<th>Anti-Arrhythmics</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Amiodarone</td>
<td>Atorvastatin / Fluvastatin / Simvastatin</td>
<td>Atorvastatin/Rosuvastatin/Simvastatin</td>
</tr>
<tr>
<td>Dronedarone</td>
<td>Atorvastatin / Fluvastatin / Simvastatin</td>
<td>Atorvastatin/Fluvastatin</td>
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<thead>
<tr>
<th>Calcium Channel Blockers</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Amlodipine</td>
<td>Simvastatin</td>
<td>Atorvastatin / Simvastatin</td>
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<td>Diltiazem</td>
<td>Atorvastatin / Simvastatin</td>
<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Verapamil</td>
<td>Atorvastatin / Simvastatin</td>
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<th>Anti-Platelet Agents</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tr>
<td>Clopidogrel</td>
<td>Rosuvastatin</td>
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<tr>
<td>Ticagrelor</td>
<td>Simvastatin</td>
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<thead>
<tr>
<th>Anti-Epileptics</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Carbamazepine</td>
<td>All Statins</td>
<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Eslicarbazepine</td>
<td>All Statins</td>
<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Phenytoin</td>
<td>All Statins</td>
<td>Atorvastatin / Simvastatin</td>
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<thead>
<tr>
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<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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</thead>
<tbody>
<tr>
<td>Leflunomide</td>
<td>All Statins</td>
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<tr>
<td>Teriflunomide</td>
<td>All Statins</td>
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<thead>
<tr>
<th>IL-6 Receptor Antagonists</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Sarilumab</td>
<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Tocilizumab</td>
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<table>
<thead>
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<th>Lipid Lowering Agents</th>
<th>Severe – Avoid</th>
<th>Caution/Adjust Dose/Monitor</th>
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<tbody>
<tr>
<td>Ezetimibe</td>
<td>All Statins / Fibrates</td>
<td></td>
</tr>
<tr>
<td>Fibrates</td>
<td>All Statins / Ezetimibe</td>
<td></td>
</tr>
<tr>
<td>Lomitapide</td>
<td>Atorvastatin / Simvastatin</td>
<td></td>
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<tr>
<td>Nicotinic Acid</td>
<td>All Statins</td>
<td></td>
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<tr>
<td>Bempedoic Acid</td>
<td>All Statins</td>
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<tr>
<td><strong>Androgen Receptor Inhibitors</strong></td>
<td>Simvastatin</td>
<td>Rosuvastatin</td>
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<tr>
<td>Apalutamiide</td>
<td>Simvastatin</td>
<td>Rosuvastatin</td>
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<tr>
<td>Darolutamide</td>
<td>Atorvastatin / Fluvastatin / Rosuvastatin</td>
<td>Pravastatin / Simvastatin</td>
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<td>Enzalutamide</td>
<td>Simvastatin</td>
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<tr>
<th><strong>Anti-Neoplastics</strong></th>
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<th>All Statins</th>
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<tbody>
<tr>
<td>Mitotane</td>
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<tr>
<td>Venetoclax</td>
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<tr>
<th><strong>Protein Kinase Inhibitors</strong></th>
<th>Simvastatin</th>
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<tr>
<td>Crizotinib</td>
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<td>Fostamatinib</td>
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<td>Atorvastatin / Simvastatin</td>
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<td>Idelalisib</td>
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<td>Imatinib</td>
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<td>Atorvastatin / Simvastatin</td>
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<td>Nilotinib</td>
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<td>Atorvastatin / Pravastatin / Rosuvastatin / Simvastatin</td>
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<td>Pazopanib</td>
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<td>Regorafenib</td>
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<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Ribociclib</td>
<td>Simvastatin</td>
<td>Pravastatin / Rosuvastatin</td>
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<td>Tivozanib</td>
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<tr>
<th><strong>Neurokinin Receptor Antagonists</strong></th>
<th>Rosuvastatin</th>
<th>Atorvastatin / Simvastatin</th>
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<tr>
<td>Aprepitant</td>
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<td>Atorvastatin / Simvastatin</td>
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<td>Netupitant</td>
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<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Rolapitant</td>
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<td>Rosuvastatin</td>
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<thead>
<tr>
<th><strong>Others</strong></th>
<th>Rosuvastatin</th>
<th>All Statins / Fibrates</th>
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<tbody>
<tr>
<td>Antacids</td>
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<td>All Statins / Fibrates</td>
</tr>
<tr>
<td>Ciclosporin</td>
<td>Atorvastatin / Rosuvastatin / Simvastatin</td>
<td>All Statins / Fibrates</td>
</tr>
<tr>
<td>Colchicine</td>
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<td>All Statins / Fibrates</td>
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<tr>
<td>Danazol</td>
<td>Simvastatin</td>
<td>Atorvastatin</td>
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<td>Eltrombopag</td>
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<td>All Statins</td>
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<tr>
<td>Glibenclamide</td>
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<td>All Fibrates / Fluvastatin</td>
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<tr>
<td>Grapefruit Juice</td>
<td>Simvastatin</td>
<td>Atorvastatin</td>
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<tr>
<td>Ranolazine</td>
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<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Sacubitril + Valsartan</td>
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<td>All Statins</td>
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<tr>
<td>St John’s Wort</td>
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<td>Atorvastatin / Simvastatin</td>
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<tr>
<td>Ursodeoxycholic acid</td>
<td>All Fibrates</td>
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</table>
Lipid Clinic referral criteria

All lipid clinics within the region offer Advice & Guidance and Electronic Booking System referrals.

For more general enquiries about Familial Hypercholesterolaemia (FH) Advice & Guidance can be accessed from the Familial Hypercholesterolaemia Specialist Nurses.

Refer to lipid clinic if:
- Clinical diagnosis of Familial Hypercholesterolaemia according to Simon Broome criteria.

- Relatives of patients with FH who may require genetic screening.

- Children with FH (Paediatric Clinic).

- Total cholesterol > 9 mmol/L or non-HDL-C > 7.5 mmol/L even if absence of first degree family history of premature heart disease.

- Triglycerides > 10 mmol/L (not due to alcohol or poor glycaemia control).
  - refer urgently if triglycerides > 20 mmol/L

- Patients with other inherited disorders of lipid metabolism including Familial Combined Hyperlipidaemia (FCH), Familial Hypertriglyceridaemia and Remnant Dyslipidaemia.

- Patients with existing CVD and non-HDL-C > 4 mmol/L due to intolerance of Statins/Ezetimibe.

- Patients who fulfil NICE TA 393 / 394 criteria for PCSK9i therapy (See table for thresholds in green section under "Specialist Services")
Lipoprotein (a)

Lipoprotein (a) is a modified form of LDL (bad) cholesterol. It is a major independent risk factor for cardiovascular disease (CVD) and calcific aortic valve stenosis. It promotes atherosclerosis and has a pro-thrombotic effect.

<table>
<thead>
<tr>
<th>Lipoprotein (a) level (nmol/L)</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 32</td>
<td>No change</td>
</tr>
<tr>
<td>32 - 90</td>
<td>Minor CVD risk</td>
</tr>
<tr>
<td>91-200</td>
<td>Moderate CVD risk</td>
</tr>
<tr>
<td>201-400</td>
<td>High CVD risk</td>
</tr>
<tr>
<td>&gt; 400</td>
<td>Very High CVD risk</td>
</tr>
</tbody>
</table>

Lipoprotein (a) levels are predominantly genetically determined and therefore raised levels can run in families. The genetic inheritance pattern is autosomal co-dominant and may be more apparent at higher concentrations of lipoprotein (a). However, the presence of a raised level of lipoprotein (a) does not exclude the possibility of an underlying genetic lipid disorder such as Familial Hypercholesterolaemia (FH) or Familial Combined Hyperlipidaemia (FCH) as it is possible for patients with these conditions to also have a raised lipoprotein (a) which will confer an additional risk of CVD.

Secondary causes of a raised lipoprotein (a) level:
- Chronic Kidney Disease
- Proteinuria
- Hypothyroidism
- Chronic inflammatory disease (e.g. Rheumatoid Arthritis, SLE, Psoriasis)

Levels may be reduced in liver disease and in postmenopausal women on HRT.

Lipoprotein (a) levels are generally 2 x higher in patients of African descent compared with Caucasian, Hispanic and certain Asian populations, with South Asian patients tending to have intermediate levels.

Measurement of lipoprotein (a)

Measurements of lipoprotein (a) should be considered in the following patients:

1. Personal or Family history of premature CVD (< 60 yrs of age)
2. 1st degree relative with raised Lipoprotein (a) (> 200 nmol/L)
3. Known genetic dyslipidaemia e.g. FH, FCH or Remnant Dyslipidaemia
4. Calcific Aortic valve stenosis
5. Borderline 10 yr CVD risk (<15%)

No fasting prior to sampling or repeat measurement is required.
Management of patients with raised Lipoprotein (a)

There are no specific therapies currently available for patients with raised levels of lipoprotein (a), although these are in development.

Management therefore needs to focus on

1. Addressing modifiable cardiovascular risk factors such as:
   i. non-HDL Cholesterol
   ii. Blood pressure

2. Lifestyle issues such as
   i. Diet
   ii. Exercise
   iii. Weight loss
   iv. Smoking
   v. Alcohol intake.

In patients with borderline QRisk scores, lipoprotein(a) > 90 nmol/L should be considered together with other factors that predispose to premature CVD but are not included in calculated risk scores.

Patients with a lipoprotein (a) of > 200 nmol/L should have a non-HDL-C target of < 2.5 mmol/L. They should also be advised that first degree relatives should have a non fasting lipid profile and lipoprotein (a) measured.

The routine use of Aspirin therapy in patients with raised lipoprotein (a) is not recommended, unless they have confirmed CVD or have been commenced on Aspirin by their Lipid Specialist.

Lipoprotein (a) only needs to be measured once as concentrations are generally stable throughout life. Lipoprotein (a) values are generally unaffected by Lipid lowering therapies.

Lipoprotein (a) is distinct from Apolipoprotein A1, which is a major component of HDL (good) cholesterol.
<table>
<thead>
<tr>
<th>Clinic address</th>
<th>Consultant(s)</th>
</tr>
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<tbody>
<tr>
<td>Lipid and Metabolic Clinic</td>
<td>Dr Ahai Luvai  Dr Fiona Jenkinson  Dr Purba Banerjee 0191 282 4301</td>
</tr>
<tr>
<td>Lipid Clinic</td>
<td>Dr Peter Carey  0191 565 6256  Secretary Ext 47449</td>
</tr>
<tr>
<td>Healthy Hearts Lipid Clinic</td>
<td>Dr Stewart Pattman  0191 293 2546</td>
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<tr>
<td>Lipid Clinic</td>
<td>Dr Shafie Kamaruddin  Dr Srikanth Mada  Dr Paul Peter  Dr Azmi Mohammed 0191 333 2333</td>
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<tr>
<td>Lipid Clinic</td>
<td>Dr Shafie Kamaruddin  Dr Srikanth Mada  Dr Paul Peter  Dr Azmi Mohammed 0191 333 2333</td>
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<td>Clinic Name</td>
<td>Address</td>
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<tr>
<td>Lipid Clinic</td>
<td>Queen Elizabeth Hospital, Queen Elizabeth Avenue, Sheriff Hill, Gateshead, Tyne and Wear</td>
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<tr>
<td>Trinity Square Diabetes Clinic</td>
<td>Trinity Square, Gateshead, Tyne and Wear, NE8 1AG</td>
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<tr>
<td>Lipid Clinic</td>
<td>Bishop Auckland Hospital, Cockton Hill Road, Bishop Auckland, County Durham, DL14 6AD</td>
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<tr>
<td>Specialist Lipid and Metabolic Clinic</td>
<td>James Cook University Hospital, Marton Road, Middlesborough, Cleveland, TS4 3BW</td>
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<tr>
<td>Lipid and Metabolic Clinic</td>
<td>James Cook University Hospital, Marton Road, Middlesborough, Cleveland, TS4 3BW</td>
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<tr>
<td>Lipid Clinic at The University Hospital of Hartlepool</td>
<td>University Hospital of North Tees, Hardwick Rd, Hardwick, Stockton-on-Tees, S19 8PE</td>
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<tr>
<td>Lipid and Metabolic Clinic</td>
<td>Cumberland Infirmary, Newtown Road, Carlisle, Cumbria, CA2 7HY</td>
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<tr>
<td>Lipid and Metabolic Clinic</td>
<td>West Cumberland Hospital, Hensingham, Whitehaven, Cumbria, CA28 8JG</td>
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<td>Paediatric Clinics</td>
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<tr>
<td>Paediatric Lipid Clinic</td>
<td>Dr Mark Anderson</td>
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<tr>
<td>Royal Victoria Infirmary</td>
<td>0191 233 6161</td>
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<td>Queen Victoria Road</td>
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<tr>
<td>Paediatric Lipid Clinic</td>
<td>Dr Neil Hopper</td>
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<td>City Hospitals Sunderland</td>
<td>0191 565 6256</td>
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<td>Kayll Road</td>
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<td>Paediatric Lipid Clinic</td>
<td>Dr Mark Burns</td>
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<tr>
<td>James Cook University Hospital</td>
<td>01642 850 850</td>
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<td>Marton Road</td>
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<td>Middlesborough</td>
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<td>TS4 3BW</td>
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</tbody>
</table>

**Familial Hypercholesterolaemia Specialist Nurses**

| Institute of Genetic Medicine                                                     | Susan Musson                                                    |
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| Central Parkway                                                                   |                                                                  |
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Membership of the NEELI Clinical Guidelines Steering group

- Dr Peter Carey, Consultant Endocrinologist, South Tyneside and Sunderland Hospitals NHS Foundation Trust and Chair of Northern England Clinical Networks Lipids Specialist Advisory Network
- Dr Ahai Luwai, Consultant Chemical Pathologist, Newcastle Hospitals NHS Foundation Trust
- Dr Neil Hopper, Consultant Paediatrician, South Tyneside and Sunderland Hospitals NHS Foundation Trust
- Susan Musson, Familial Hypercholesterolaemia Specialist Nurse, Northern Genetics Service, Newcastle upon Tyne NHS Foundation Trust
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- Dr Srikanth Mada, Consultant Endocrinologist, County Durham and Darlington NHS Foundation Trust
- Susan Turner, Prescribing Pharmacist and Professional Secretary for Pharmacy Committee
- Dr Dermot Neely, Specialist Adviser on Lipids, Academic Health Science Network, North East and North Cumbria

With thanks to the following colleagues for their input and expertise regarding lipid management in pregnancy

- Dr Shafie Kamaruddin, Consultant Endocrinologist, County Durham and Darlington NHS Foundation Trust
- Dr Dermot Neely, Consultant in Clinical Biochemistry and Metabolic Medicine, Newcastle upon Tyne
- Dr Aarti Ullal, Consultant in Obstetrics and Gynaecology, South Tyneside and Sunderland NHS Foundation Trust
- Dr Alexandra Thompson, Consultant Cardiologist, Newcastle upon Tyne Hospitals
- Dr Shahid Junejo, Consultant Cardiologist STS
With thanks to the following colleagues for their chairmanship, coordination and business support

- Dr Robin Mitchell, Clinical Director, Northern England Clinical Networks
- Elaine Stephenson, Clinical Networks Delivery Manager, Northern England Clinical Networks
- Karen Pellegrino, Business Support Assistant, Northern England Clinical Networks

Approval of the guideline

This guideline was endorsed by the Local Pharmacy Committees on the following dates

- Northumberland, Tyne & Wear, Cumbria - 13th October 2020
- Sunderland South Tyneside - 7th October 2020
- County Durham and Darlington - 12th November 2020

Declared conflicts of interest

AL has received conference fees and travel from Amgen and Sanofi, is an investigator for clinical trials sponsored by Novartis, Evidera and Regeneron, has received speaker honoraria from Amgen, Sanofi and MSD and acts on advisory boards for Sanofi, Akcea, MSD and Novartis. PC is the Clinical Lead for the Lipid Specialists Advisory Group and has received conference fees from Sanofi, Lilly and Novo Nordisk, is on advisory boards for Amgen and Novartis, has received speaker fees from Lilly and Sanofi and has undertaken research involving Sanofi and Novartis products. SJP has received conference fees and travel from Sanofi, is involved in study work sponsored by Diiachi Sankyo and has received funding for NHSE AAC rapid uptake product work involving Sanofi and Amgen. RDGN has speaker honoraria previously from Novartis, Amgen and Sanofi and acts as a trustee for the NHSE AAC rapid uptake product work involving Sanofi and Amgen. No DOI reported by SK, SM, IO, HD.

- Date of review

1 April 2023 to align with NICE review of CG 181.

It is noted the embedded NHS England AAC documents (in green and red sections) hold review dates in 2021. Significant changes are not envisaged with these documents. Should substantial changes occur in advance of the review of CG181 the NEELI guideline will be updated accordingly.

- Contact Person for enquiries

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- Version number

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