Use of statins to reduce the risk of cardiovascular disease in adults

**Aims and intended learning outcomes**
This article aims to provide an overview of statins, including indications for their use in primary and secondary cardiovascular disease (CVD) prevention. After reading this article and completing the time out activities you should be able to:

- Describe the types and transport of lipids in the body.
- Explain the relationship between diet, cholesterol and atheroma development.
- Calculate body mass index (BMI) and waist circumference as measures of obesity and adiposity.
- Discuss how statins reduce cholesterol levels.
- Identify the indications, dose and contraindications for prescription of statins.

**Introduction**
The National Institute for Health and Clinical Excellence (NICE) (2008) guidelines on lipid modification indicate that people aged between 40 and 74 who are likely to be at high risk of CVD should be identified. In those with a 20% or greater risk of developing CVD over ten years, statin therapy should be commenced. However, the decision to begin statins needs to be balanced against the economic cost of the medication and the cost to the patient of taking statins for a lifetime. In addition, for primary prevention of a cardiovascular event, risk factors including smoking, alcohol consumption, blood pressure, obesity, blood glucose and renal function should also be assessed and managed.

In secondary prevention, NICE (2008) guidelines state that lipid modification should...
be given without delay, avoiding waiting to assess and manage other risk factors such as those mentioned above. Secondary prevention refers to the prevention of further events in people with clinical evidence of CVD, such as angina, previous myocardial infarction (MI) or stroke. Sniderman and Durrington (2010) stated that there are three absolute indications for offering therapy to modify lipids: objective evidence of vascular disease, diabetes mellitus and severe hyperlipidaemias such as familial hypercholesterolaemia. This article explains the role of lipids within the body and explores how optimum levels of lipids can be attained by modification with statins.

**Complete time out activity 1**

**Fats and lipids**

Terms such as cholesterol, saturated fat and recently trans fats are commonly used. However, it is likely that most people are not clear about what these terms mean, so nurses need to be able to understand and explain them to patients.

At its simplest, fat does not dissolve in water, but a diet that does not include any fat would be unhealthy as certain fats are essential elements in many functions of the human body. The most basic form of fat is a triglyceride and there are many different types, yet they are all formed from a basic structure of glycerol with three fatty acids attached. The fatty acids that form the triglyceride can be one of three types: saturated fatty acids, monounsaturated fatty acids or polyunsaturated fatty acids.

All fatty acids are made up of a chain of carbon atoms on which hydrogen and oxygen atoms are arranged. A saturated fat is one where each carbon atom is attached to as many hydrogen atoms as possible, so the carbon is said to be ‘saturated’ with hydrogen. In a monounsaturated fat, such as olive oil, two hydrogen atoms are missing so two carbon atoms form a double bond with each other instead. One double bond means that the fat is unsaturated in one place (mono). A polyunsaturated fat, such as sunflower oil, has more than one double bond between carbon atoms along its main carbon chain. These double bonds are in specific places, and the omega system classifies fatty acids according to where in the carbon chain the first double bond is. Omega fatty acids 3, 6 and 9 have their first double bond in a different place. Omegas 3 and 6 are also called essential fatty acids as they cannot be made by the body and need to be obtained through a balanced diet (Ford 2011).

**Trans fats**

There has been much concern, particularly in the media, about the effect of trans fats or trans fatty acids on health (Renton 2010). Products from ruminative animals such as sheep and cows contain small amounts of naturally occurring trans fats, however commercial processing of fat also produces trans fats, for example those found in some margarines, pastry, cakes and crisps. Trans fats are useful in the food industry as they tend to be hard at room temperature so make margarine less liquid and increase the shelf life of some foods (Derbyshire 2012). To manufacture trans fats, hydrogen is added to unsaturated fats (partial hydrogenation) turning them into partially saturated fats (Derbyshire 2012).

The Scientific Advisory Committee on Nutrition (2007) reviewed the use and effects of trans fats in the diet and found a moderate increase in risk of coronary heart disease (CHD) over a range of trans fat intakes. The committee stated that consumption of trans fats has declined in recent years, from an average of 1.2% of food energy intake in 2000/01 compared with 2.2% of food energy in 1986/87. This decline is thought to be the result of reduced use of trans fats by manufacturers, lower consumption of such fats and improved measurement techniques of food composition (The Scientific Advisory Committee on Nutrition 2007).

**Cholesterol**

Non-essential fats made in the body are phospholipids and sterols. The most well known sterol is cholesterol, which is obtained from meat and animal products. Casey (2011) stated that cholesterol is synthesised in the body at the rate of about 1g per day in addition to any consumed as part of the diet. The enzyme responsible for cholesterol synthesis in the liver is HMG-CoA reductase.

The transport of cholesterol in the body involves very low-density lipoproteins (VLDLs), low-density lipoproteins (LDL), high-density lipoproteins (HDL) and chylomicrons. Lipids are not water soluble and need to combine with proteins, forming a soluble complex called a lipoprotein, to be transported around the body in the bloodstream (Sundaram and Yao 2010).

**Very low-density lipoproteins** VLDLs are made up mostly of triglyceride with a small amount of cholesterol within. VLDLs transport triglycerides synthesised by the liver to be taken up either by adipose tissue for storage or skeletal muscle for energy (Casey 2011).
Once the triglycerides have been removed, the remaining part of the VLDL continues to circulate in the blood as LDL.

**Low-density lipoproteins and high-density lipoproteins** Both LDLs and HDLs are made up mainly of cholesterol. LDLs are responsible for cholesterol transport, with around 70% of serum cholesterol being carried by them (Sniderman and Durrington 2010). LDLs come in different shapes and sizes, but small, dense particles are as important in the development of atherosclerosis as larger ones. Although larger LDL particles contain more cholesterol, the smaller particles are thought to contribute more to the development of atherosclerosis, as they can enter blood vessel walls easily and are more thrombogenic (Sniderman and Durrington 2010).

The liver uses most of the cholesterol within LDLs to manufacture bile salts (Casey 2011). HDLs remove surplus cholesterol from cells and transport it to the liver. Therefore, lowering LDL cholesterol and raising HDL cholesterol has been the subject of much research in relation to reducing the incidence of CHD.

**Chylomicrons** These are lipoproteins that are synthesised in the enterocytes of the small intestine and appear after meals. They transport triglycerides from the intestines to other parts of the body in a similar way to VLDLs (Casey 2011).

**Testing serum lipid levels**

When testing a person’s lipid level as part of cardiovascular risk assessment, measures taken should include total cholesterol, HDL level, triglyceride level, cholesterol to HDL ratio, and LDL level. NICE (2008) recommends at least one fasting blood sample should be taken. Fasting is recommended as it is thought that LDL concentration is affected by consumption of food. However, estimations of CVD risk use total cholesterol or the ratio of total cholesterol to HDL, and evidence from one large Canadian study showed that fasting times had little association with cholesterol or cholesterol sub-class levels, particularly total cholesterol or HDL levels (Sidhu and Naugler 2012). This means that fasting may be unnecessary.

**Role of fats in health**

Triglycerides provide energy and when stored as adipose tissue provide thermal insulation. Phospholipids can be found in surfactant in the lungs and in the myelin sheath around neurones, and are a major component of cell membranes. A small amount of cholesterol is necessary as it is a vital part of cell membranes, has a role in ion transport, is present in bile salts, and is involved in the synthesis of hormones such as oestrogen and testosterone. It is also involved in vitamin D synthesis (Barasi 2003).

**Development of atheroma**

Atheroma is the mechanism by which arteries become narrowed. Partial or complete blockage of an artery causes CVD. The mechanism of atheroma development is complex. Sniderman and Durrington (2010) suggested that LDL particles should be considered as the final step in the development of atherosclerosis, and the following stages occur:

- Stage 1 – LDL particles cross the arterial wall into the endothelium. The sites where this is most likely to happen are areas of damage to the wall such as that caused by hypertension, where LDL levels are high or where there is a relative lack of oxygen. LDL travels across the arterial wall via macrophages, and these can become loaded with cholesterol. These cells are now known as foam cells.
- Stage 2 – to become foam cells, other factors need to be present that alter LDL. Cigarette smoking is one of these factors, which explains why high circulating cholesterol levels and smoking combined present a greater risk of CVD.
- Stage 3 – a fibrous cap of collagen develops over the foam cells, which eventually die off. This leaves a pool of cholesterol covered by the cap. The place where the fibrous cap joins the arterial wall continues to be an active area, with more foam cells developing.
- Stage 4 – in the early stages of development, the fibrous cap is relatively thin and can rupture easily. However, as time goes on it becomes more fibrous and less likely to rupture. As this plaque grows, it can block the artery, but as it is relatively tough the blockage causes stable angina.
- Stage 5 – if the fibrous cap ruptures, the cholesterol pool beneath it leaks out. The damaged area may heal, however if it does not, a thrombus can develop over the newly damaged area, leading to unstable angina or MI.

**Diet and cardiovascular risk**

There is now a well-established relationship between serum cholesterol and development of
CVD, and it is believed that dietary cholesterol intake has a major role in raised blood cholesterol levels. However, Constance (2009) suggested that dietary cholesterol raises serum cholesterol in about one third of people. For example, it was thought that eggs were one of the main causes of raised cholesterol levels in the blood, as one egg contains 200mg of cholesterol, mainly in the yolk. However, Natoli et al. (2007) found that eating eggs has a small effect on plasma cholesterol levels and that instead the focus should be on total intake of saturated fat. In people whose diet is high in saturated fat, the equivalent of three to four eggs per week raised LDL cholesterol by $0.061 \pm 0.006$ mmol/L whereas for those whose diet is low in saturated fat, the increase was $0.036 \pm 0.004$ mmol/L. Astrup et al. (2011) supported this finding, suggesting that the risk of CHD is reduced when saturated fat is replaced with polyunsaturated fats.

NICE (2008) recommends that people should be encouraged to manage their cholesterol levels by modifying their diet and:

- Reducing total fat intake to less than 30% of total energy intake.
- Reducing saturated fat intake to less than 10% of total energy intake.
- Increasing intake of fruit and vegetables to five portions per day.
- Eating two or more portions of fish per week, including one of oily fish.

In practice, however, it may be hard to quantify total energy intake, so advice to patients should be to increase intake of fruit and vegetables and complex carbohydrate, and reduce total fat intake. The Eatwell Plate (NHS Choices 2011) can be used to help people understand what their diet should consist of, because it provides a visual representation of the proportion each food group should make up in a healthy diet. People may perceive that recommended dietary advice changes over time, which may influence whether they are willing to adjust their diet or not. However, dietary advice to increase intake of fruit and vegetables has remained constant for some time (NHS Choices 2011).

Apart from diet, altered lipid levels can be caused by many other factors. Box 1 shows primary and secondary causes of dyslipidaemia.

**Factors increasing the risk of cardiovascular disease**

The NICE (2008) guidelines on lipid modification state that apart from age and sex, smoking, hypertension and raised cholesterol are the three main modifiable risk factors that account for 80% of all cases of CHD. The risk is further increased when these factors are present in combination. The INTERHEART study (Yusuf et al. 2004), a large case control study, examined 15,152 cases of patients with acute MI and 14,820 controls in 52 countries. The study found that having more than one risk factor can exponentially increase the risk of MI.

Westerby (2011) identified other factors that increase risk of CHD, including:

- Abdominal obesity.
- Diabetes.
- Low intake of fruit and vegetables.
- Excessive alcohol intake.
- Lack of physical activity.
- Depression, life events and perceived stress.

Women pre-menopause appear to have lower triglyceride and higher HDL levels than men, although this effect disappears post-menopause (Carr 2003). Constance (2009) stated that metabolic syndrome (a group of risk factors that occur together and increase the risk of CHD, stroke and type 2 diabetes) has also been identified as a major risk factor for development of CVD, and that this increases the risk of CVD more than any other single factor. Metabolic syndrome is characterised by dyslipidaemia, insulin resistance and hypertension, and is strongly associated with abdominal obesity. Understanding the role of abdominal obesity and metabolic syndrome has led to measurement of waist circumference as a useful complement to BMI, as BMI does not give a measure of the amount or distribution of adipose tissue (NICE 2006a).

**Complete time out activity**

**BOX 1**

**Causes of dyslipidaemia**

**Primary causes:**

- Derangement of normal lipid metabolism such as familial hypercholesterolaemia.

**Secondary causes:**

- Diabetes mellitus.
- Thyroid disease.
- Pituitary disease.
- Pregnancy.
- Chronic renal failure.
- Drugs, for example corticosteroids.
- Myeloma.
- Hepatic disease.
- Obesity.

(Sniderman and Durrington 2010)
Measuring risk

There are several risk assessment tools available to calculate cardiovascular risk. In this context, risk means the likelihood of MI or stroke in the next ten years (British Cardiac Society et al 2005). The Framingham risk score was initially recommended within the NICE (2008) guidelines, but after review in 2010 this has been amended to leave the decision of which assessment tool to use up to the healthcare professional. ASSIGN (Woodward et al 2007) and QRISK (Hippisley-Cox et al 2007) can also be used. These two tools are felt to be more representative of risk in the UK than the Framingham risk score since they include ethnicity and family history, although the Framingham risk score can be adjusted for these factors.

It is important to note that this risk assessment is for primary prevention of CVD. For secondary prevention of CVD, such as those with existing CHD or angina, stroke or transient ischaemic attack and/or peripheral vascular disease, such risk assessment is not necessary. Also, exemptions to the use of these risk assessment tools applies to people more likely to be at high risk, such as those with type 1 or type 2 diabetes (NICE 2009). For example, NICE (2009) guidelines on the management of type 2 diabetes recommend that people with this condition are considered to be at high risk of a cardiovascular event unless all of the following apply:

- Not overweight (considering ethnic group).
- Normal blood pressure (<140/80mmHg in the absence of antihypertensive therapy).
- No microalbuminuria.
- Non-smoker.
- No high-risk lipid profile.
- No history of CVD.
- No family history of CVD.

Recommended serum lipid levels

Raised lipid levels contribute to increased CVD risk and the recommended reference values for lipids are identified in Table 1. The British Cardiac Society et al (2005) recommend optimal targets for people with established CVD, including those with type 1 or 2 diabetes, and NICE (2009) guidelines for management of type 2 diabetes recommend tighter control of blood lipids.

Statins to lower cholesterol

Statins include drugs such as simvastatin and pravastatin, which are derived from fungal origins, such as Penicillium citrinum. Atorvastatin, fluvastatin and rosuvastatin are fully synthetic (Rao et al 2011). In the UK, atorvastatin, fluvastatin, pravastatin, rosuvastatin and simvastatin have marketing authorisation (NICE 2006b). These drugs work by blocking the action of the HMG-CoA reductase enzyme, which is a key component in the manufacture of cholesterol in the liver, and they are particularly effective at lowering LDL cholesterol. They are rapidly absorbed once in the body and peak concentration is achieved within four hours (Rao et al 2011).

Peak cholesterol production in the liver is in the evening, so some statins need to be taken then for maximum effect; however, for others that work on different metabolic pathways, time of day is not important. Statins are metabolised in the liver and are eliminated via bile, and it is this factor that means caution is required for people with hepatic impairment. Rao et al (2011) summarised the main pharmacokinetic effects of the various statins, and information on optimal time of dose and effect of food is shown in Table 2. Once started, assuming statins are taken according to prescription, a fall in cholesterol level should occur within two to four weeks.

Complete time out activity 4

### TABLE 1

<table>
<thead>
<tr>
<th>Reference values for lipids</th>
<th>Specified target within guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Cardiac Society et al (2005)</td>
<td>Optimal targets in people with established cardiovascular disease, diabetes or asymptomatic individuals at high risk of coronary heart disease (CHD) (&gt;20% over ten years). Total cholesterol (TC) &lt;4.0mmol/L and low density lipoprotein (LDL) &lt;2.0 mmol/L. Or 25% reduction in TC and 30% reduction in LDL, whichever is lowest.</td>
</tr>
<tr>
<td>Department of Health (2000)</td>
<td>In people with diagnosed CHD or other occlusive arterial disease, or risk of CHD event of 30% over ten years. Statins and dietary advice to lower serum TC concentrations either to less than 5mmol/L (LDL cholesterol &lt;3mmol/L) or by 30%, whichever is greater.</td>
</tr>
<tr>
<td>Scottish Intercollegiate Guidelines Network (2007)</td>
<td>TC &lt;5mmol/L. LDL &lt;3mmol/L.</td>
</tr>
<tr>
<td>National Institute for Health and Clinical Excellence (2009)</td>
<td>People with type 2 diabetes – treat to achieve TC &lt;4.0mmol/L (HDL cholesterol ≤1.4mmol/L) or LDL cholesterol &lt;2.0mmol/L.</td>
</tr>
</tbody>
</table>
Evidence for the effectiveness of statins

There have been numerous trials investigating the use of statins. The first major trial was the Scandinavian Simvastatin Survival Study (Scandinavian Simvastatin Survival Study Group 1994), where a total of 4,444 patients with angina or previous MI and with serum cholesterol of 5.5-8.0mmol/L were randomised to either simvastatin or a placebo, and followed up for a median of 5.4 years. In the treatment group, total cholesterol was reduced by 25% and LDL by 35%. Total mortality was reduced significantly with a relative risk of 0.70 (95% CI, 0.58-0.85), with reduction in subsequent coronary events such as MI, coronary death or resuscitated cardiac arrest.

Other studies, including the West of Scotland Coronary Prevention Study (Shepherd et al 1995), demonstrated that the use of statins in 6,595 men aged 45-64 with hypercholesterolaemia, but no previous history of a cardiac event, reduced total cholesterol by 20% and LDL by 26%. This was a primary prevention study, and Ong (2005) stated that the study showed that high-risk patients benefited from statin use, not just those with existing identified CHD.

It is worth noting that statins do not work equally well in all racial groups. Chasman et al (2012) evaluated the reduction in LDL concentration by therapy with rosuvastatin between four distinct genotypes among 6,989 participants of European ancestry from the JUPITER trial. They found that there was variation in reduction of LDL depending on genetic variant, with the most responsive genetic profile having a mean LDL reduction of 64mg/dL compared with 40mg/dL for the least responsive. However, at present it is not feasible to test the genetic profile of individuals before starting statin therapy.

Sniderman and Durrington (2010) stated that overall, trials show that for each 1mmol/L reduction of LDL cholesterol, risk of CHD and stroke is reduced by 21%. There is no difference in relative risk of CHD for a given decrease in cholesterol between primary and secondary prevention, meaning that both groups benefit from statin therapy. Regarding CVD as a whole, relative risk reduction for those taking statins is fairly rapid, with a statistically significant decrease after one year and full decrease after two years. Relative risk represents the ratio of CVD events in people taking statins compared with events in a placebo group, so meta-analysis of trial data shows that statins are effective overall in CVD risk reduction.

On the basis that a certain lifelong dose of statin reduces the risk of a CVD-related event, recent studies have evaluated the efficacy of aggressive statin treatment with increased doses. One such study, the Treating to New Targets study (LaRosa et al 2005), explored the occurrence of first cardiovascular event in 10,001 patients with clinically stable ischaemic heart disease whose LDL was <3.4mmol/L while on atorvastatin. A significant reduction in incidence of MI was found; however, adverse events occurred in 5.8% of those taking 10mg of atorvastatin compared to adverse events in 8.1% of people taking 80mg of atorvastatin. This study highlighted the requirement to balance the need to reduce cardiovascular events with the likelihood of adverse treatment-related effects.

The SEARCH trial (SEARCH Collaborative Group et al 2010) indicated that there was no significant reduction in major cardiovascular events among people randomised to simvastatin 80mg compared to those taking 20mg. There appeared to be an increased risk of muscle side effects in the higher dose group; however, this risk was still uncommon. The most recent advice from the National Prescribing Centre (2011) states that unless there is a clear reason for prescribing higher doses of simvastatin, for example for people with severe hypercholesterolaemia and a high risk of cardiovascular events who have not achieved treatment goals on lower doses, the standard 40mg dose should be given.

### Table 2

<table>
<thead>
<tr>
<th>Optimal dose time and effect of food on absorption of statins</th>
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</thead>
<tbody>
<tr>
<td><strong>Statin</strong></td>
</tr>
<tr>
<td>Optimal time of dose</td>
</tr>
<tr>
<td>Effect of food on absorption</td>
</tr>
</tbody>
</table>

(Adapted from Rao et al 2011)
Deciding to treat with statins

The NICE (2008) guidelines state that any decision to commence statin therapy should be made in full consultation with the patient, taking into account the following factors:

- Assessment and management of modifiable risk factors.
- Primary or secondary prevention.
- Presence of comorbidities.
- Life expectancy.
- Risk of side effects.
- Effectiveness of treatment.
- Attitude to taking medication for a lifetime.

It is important to be aware of a patient’s baseline or absolute risk of CVD – in those without existing CVD, risk can be estimated using a validated tool. For people at low risk, but who show elevated cholesterol levels, it would be worth recommending lifestyle changes before starting statin therapy. Combinations of exercise and dietary changes have been shown to be effective in altering lipid profiles. Varady and Jones (2005) conducted a review of trials that evaluated different combinations of diet and exercise, and found that diets low in saturated fats and engaging in exercise lowered total cholesterol, LDL and triglyceride concentrations, and increased HDL.

Statins appear to have an effect on liver enzymes, so NICE (2008) recommend baseline assessment before starting a patient on statin therapy, and repeat transaminases at three and 12 months. However, Bader (2010) stated that statin-induced hepatotoxicity is a myth as large trials have shown no difference in frequency or level of alanine aminotransferase (a liver enzyme) increases between treatment and placebo groups. He further suggested that apparent low risk of liver damage needs to be weighed against the increased risk of CVD if statin treatment is withheld as a result of misplaced concerns.

Helping patients to make a decision
The National Prescribing Centre (NPC) (2009) has produced a decision aid to assist with the explanation of whether or not to commence statin therapy. It relates to primary prevention in people who will be taking a standard, not intensive, dose of statin, such as simvastatin 40mg, pravastatin 40mg or atorvastatin 10mg, and who have had risk calculated using a risk

### TABLE 3

<table>
<thead>
<tr>
<th>Drug</th>
<th>Interaction</th>
<th>Prescribing advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macrolide antibiotics</td>
<td>Can increase risk of muscle toxicity.</td>
<td>Omit statin while taking an antibiotic. Report muscle pain, tenderness or weakness if combination cannot be avoided.</td>
</tr>
<tr>
<td>Azole anti-fungals</td>
<td>Significantly increase plasma concentration of atorvastatin, fluvastatin and simvastatin; less so other statins.</td>
<td>Omit statin while taking anti-fungal drug.</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>Interact with simvastatin and atorvastatin. No interactions reported with other statins.</td>
<td>Reduce dose or avoid this combination.</td>
</tr>
<tr>
<td>Fusidic acid</td>
<td>Serious risk of rhabdomyolysis.</td>
<td>Stop statin use while taking fusidic acid and for seven days after the course has finished.</td>
</tr>
<tr>
<td>Grapefruit juice</td>
<td>Increases plasma levels of atorvastatin and simvastatin. No interaction reported with other statins.</td>
<td>Avoid all grapefruit juice while on statins.</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Simvastatin, fluvasatin and rosuvastatin reported to increase the effect of warfarin.</td>
<td>Monitor international normalised ratio carefully, including if dose is changed or stopped.</td>
</tr>
<tr>
<td>Fibrates</td>
<td>May increase risk of muscle toxicity.</td>
<td>Avoid combination where possible. If needed to lower resistant hyperlipidaemia, avoid gemfibrozil and use lowest statin dose. Any muscular symptoms need to be reported promptly.</td>
</tr>
<tr>
<td>Ciclosporin</td>
<td>May increase plasma concentrations of simvastatin, so increased risk of myopathy or rhabdomyolysis.</td>
<td>Contraindicated with simvastatin. For other statins, dose adjustment is required.</td>
</tr>
<tr>
<td>Danazol</td>
<td>May increase plasma concentrations of simvastatin, so increased risk of myopathy or rhabdomyolysis.</td>
<td>Contraindicated with simvastatin. Monitor muscle symptoms in combination with atorvastatin.</td>
</tr>
</tbody>
</table>

(Regional Drug and Therapeutics Centre 2012)
assessment tool. Risk assessment in secondary prevention is not necessary according to NICE (2008), as statins should be offered before attempting to modify risk through lifestyle measures. For people who have a moderate risk of a cardiovascular event (20% over ten years), the NPC (2009) suggests that information about risk and the benefit of statins should be given, for example, through the scenario:

- Imagine 100 people with a 20% risk of having a cardiovascular event. None of them are taking statins. In the next ten years, about 20 (20%) of them will have a cardiovascular event.
- It is impossible to know what will happen to each person. However, if those 100 people took a statin for ten years:
  - About five people who would have had a cardiovascular event will not die.
  - About 80 people will not have a cardiovascular event, but they would not have died even if they had not taken a statin.
- About 15 people will still have a cardiovascular event even though they take a statin.

**Dose and targets for treatment**

NICE (2008) recommend that treatment with a statin depends on the patient. For primary prevention, simvastatin 40mg is the drug and dose of choice. Simvastatin is the cheapest statin available. There is no target for lipid values, and therefore repeat lipid measurement is not required routinely. For secondary prevention, simvastatin 40mg should be prescribed unless there is evidence of acute coronary syndrome or a target of total cholesterol of less than 4mmol/L or LDL less than 2mmol/L is not obtained. In this case, a higher intensity statin may be used, for example simvastatin 80mg.

**Side effects**

Sniderman and Durrington (2010) suggested that in general, statins are well tolerated. Side effects include altered liver function; gastrointestinal effects such as flatulence, abdominal pain, diarrhoea, nausea and vomiting; and muscle aches (myalgia) (NICE 2006b). Rarely, muscle damage can progress to rhabdomyolysis, which can be severe and life threatening.

**References**


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fatal. Sniderman and Durrington (2010) suggested this occurs in less than one in 50,000 people per year of treatment, and is a rare consequence.

NICE (2006b) guidelines state that among the aggregated data of the trials conducted and evaluated for the guideline, there were six cases of non-fatal rhabdomyolysis among the 47,637 people randomised to take statins and three among the 47,180 individuals on placebo. In the case of muscle aches, there were 22 cases in the 43,125 people randomised to the treatment group and 25 cases among the 42,678 individuals in the placebo group. Less well known side effects include sleep disturbances, memory loss and sexual dysfunction. It is important to take into account patient reports of side effects, and acknowledge that concordance with therapy may be influenced by individuals’ perceptions of side effects.

**Interactions with food and other drugs**

Inhibition or induction of hepatic enzymes by other drugs means that the dose of statins may need to be modified. Table 3 illustrates that some drugs should be taken with caution or avoided while taking statins (Regional Drug and Therapeutics Centre 2012). The latest drug formulary needs to be consulted before any prescribing decisions are made.

**Conclusion**

Statins have been consistently shown to be effective in lowering cholesterol levels, and have a role in both primary and secondary prevention of CVD. Ideally, for primary prevention statin use should take place alongside attempts to manage other modifiable risk factors such as hypertension, poor diet and smoking. For secondary prevention, statin use is recommended immediately without waiting to manage these risks.

Lipid metabolism is complex and includes many terms that people may have heard of, but cannot precisely define. Therefore, the role of the nurse in discussing statin use should include information to clarify what fats are healthy and unhealthy, and why statins may be required. The nurse should also be able to present information about the benefits and risks of statin use, and this information should be given in a clear manner while considering the needs of the patient.

**Complete time out activity 5**

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**Ong H (2005)** The statin studies: from targeting hypercholesterolaemia to targeting the high-risk patient. QJM. 98, 8, 599-614.


**Renton A (2010)** They were Supposed to have been Banished from the Shelves, but Lethal Trans Fats are STILL Lurking in Your Weekly Shopping. tiny.cc/lethal_trans_fats (Last accessed: May 8 2013)


