Managing Hyperlipidemia
Every Patient, The Only Patient

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As mentioned in the earlier article on Lipid Disorders, this article will address the management of LDL as the single most important element in the prevention of coronary heart disease. The Ministry of Health Lipid management guidelines 2006 state: “For the prevention of coronary heart disease, the first priority is the optimisation of low-density lipoprotein (LDL) level”. Hence, the lowering of LDL is the primary goal; while the lowering of triglycerides (TG) and the raising of high-density lipoprotein (HDL) are secondary goals.

The first step in managing each dyslipidemic patient is to establish the target cholesterol levels. As mentioned in the previous article, a detailed clinical assessment is important as it allows identification of cardiovascular risk factors which aid in risk stratification. Risk factors are additive in their effects. Hence, it is essential to adopt a global approach consisting of an evaluation and treatment of all existing risk factors.

Non-Modifiable Risk Factors
- Increasing age
- Male gender
- Family history of premature CHD
- Indian ethnicity

Modifiable Risk Factors
- Dyslipidemia
- Hypertension
- Diabetes mellitus
- Cigarette smoking
- Obesity
- Sedentary lifestyle
- Stress

The 3-step risk stratification is illustrated in Figure 1. The target cholesterol levels are set in accordance to an individual’s risk group based on the MOH guidelines (Figure 2). Further, for very high risk patients (eg patients with established CHD and diabetes mellitus or multiple other risk factors), an “optional goal” of LDL-C < 2.1 mmol/L (80 mg/dL) may be considered.

It is well accepted through numerous large studies that HMG Co-A inhibitors, better known as statins, should be first-line in lowering LDL. In patients unable to take statins, bile acid sequestrants, niacin, or ezetimibe may be used, but the statins are by far still the most potent (Figure 3). Statin monotherapy lowers LDL by 25-63% compared to 15-30%, 6-25% and 18% respectively.

Figure 3 summarises the relative potencies of the different statins. Pravastatin has similar potency toLovastatin, but is more costly. As such, the former is not mentioned in this table. For ease of reference, the agents are grouped in bands based on the percentage change of LDL. The percentage change of the various cholesterol levels vary slightly from study to study. The values in Figure 3 were obtained from the individual package inserts. They reflect maximum percent change extracted from dose-finding or comparison trials, if the former is lacking. The reader is reminded that the relative potencies in this table should not be used as a direct dose-to-dose conversion but only as a guide.

However, it would be helpful to remember that each doubling of the dose of statins confers a further 5-6% reduction in LDL, while the addition of ezetimibe to any statin confers a further 15-18% reduction. It is noteworthy that equipotent doses of statins confer similar TG-lowering capacity (Figure 3). On the contrary, very high doses of atorvastatin 80mg daily or fluvastatin 40mg daily tend to decrease HDL compared with simvastatin, pravastatin and lovastatin as seen in the 1998 CURVES study. This would not be desirable as low HDL of < 0.9mmol/L is a cardiovascular risk factor.

Appendices A & B are algorithms we use in our Pharmacist’s Clinic, and has been modified for this publication. The flowcharts are the suggested algorithms for patients presenting with raised LDL.

Finally, as in most other chronic diseases, medication is not the magic panacea. In managing hyperlipidemia, it is imperative to stress lifestyle changes like smoking cessation, weight management and compliance to a low-saturated fat diet as well as increased levels of physical activity. The patient’s motivation should be assessed and each patient should be encouraged to take charge of their condition. Each patient’s motivations are different, thus the saying, “Every patient, the only patient”. It is important to work with the patient rather than for the patient. The power of goal setting together with the patient should not be underestimated. A sample of a goal chart is included in Figure 4. We list areas which require modification, and then get the patient to rank them according to what they think is the most to the least manageable. At each visit, we assess to see if each goal has been reached in order of priority. This has helped patients gain perspective of what is important, and, through education, empowerment, and continuing reinforcement at each visit, we can help patients attain their lipid goals.

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**Figure 1: 3-step Risk Stratification**
(taken from MOH Lipid Guidelines 2006)

**Step 1**
Identify individuals with:
1) Established CHD
2) CHD Risk Equivalents, defined as:
   - Diabetes mellitus
   - Atherosclerotic cerebrovascular disease, peripheral artery disease or abdominal aortic aneurysm

**Step 2**
Count the Number of Risk Factors the individual has using Table 4 (page 20)

**Step 3**
Estimate the individual’s 10-Year CHD Risk Score using Table 5 and 6 (page 23-26)

**Figure 2: Lipid Goal Levels**
(taken from MOH Lipid Guidelines 2006)

<table>
<thead>
<tr>
<th></th>
<th>High Risk Group</th>
<th>Intermediate Risk Group</th>
<th>Low Risk Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL Cholesterol mmol/L (mg/dL)</td>
<td>&lt; 2.6 (100)</td>
<td>&lt; 3.4 (130)</td>
<td>&lt; 4.1 (160)</td>
</tr>
<tr>
<td>Triglyceride mmol/L (mg/dL)</td>
<td>&lt; 2.3 (200)</td>
<td>&lt; 2.3 (200)</td>
<td>&lt; 2.3 (200)</td>
</tr>
<tr>
<td>HDL Cholesterol mmol/L (mg/dL)</td>
<td>≥ 1.0 (40)</td>
<td>≥ 1.0 (40)</td>
<td>≥ 1.0 (40)</td>
</tr>
</tbody>
</table>

**Figure 3: Comparison of Potency**
(for use in the Lipid Optimisation Pharmacist Clinic)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>% ↓ LDL</th>
<th>% ↓ TG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ezetimibe</td>
<td>10mg</td>
<td>19%</td>
<td>11%</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>5mg</td>
<td>26%</td>
<td>12%</td>
</tr>
<tr>
<td>Lovastatin</td>
<td>20mg</td>
<td>27%</td>
<td>+ 9%</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>10mg</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>Lovastatin</td>
<td>20mg</td>
<td>32%</td>
<td>8%</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>10mg</td>
<td>38%</td>
<td>19%</td>
</tr>
<tr>
<td>Lovastatin</td>
<td>10mg</td>
<td>39%</td>
<td>19%</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>40mg</td>
<td>41%</td>
<td>28%</td>
</tr>
<tr>
<td>Lovastatin</td>
<td>40mg BD</td>
<td>42%</td>
<td>27%</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>20mg</td>
<td>43%</td>
<td>26%</td>
</tr>
<tr>
<td>Rosuvastatin</td>
<td>5mg</td>
<td>45%</td>
<td>35%</td>
</tr>
<tr>
<td>Ezetimibe / simvastatin</td>
<td>10mg / 10mg</td>
<td>45%</td>
<td>23%</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>80mg</td>
<td>47%</td>
<td>33%</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>40mg</td>
<td>50%</td>
<td>29%</td>
</tr>
<tr>
<td>Rosuvastatin</td>
<td>10mg</td>
<td>52%</td>
<td>10%</td>
</tr>
<tr>
<td>Ezetimibe / simvastatin</td>
<td>10mg / 20mg</td>
<td>52%</td>
<td>24%</td>
</tr>
<tr>
<td>Rosuvastatin</td>
<td>20mg</td>
<td>55%</td>
<td>23%</td>
</tr>
<tr>
<td>Ezetimibe / simvastatin</td>
<td>10mg / 40mg</td>
<td>55%</td>
<td>23%</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>80mg</td>
<td>60%</td>
<td>37%</td>
</tr>
<tr>
<td>Ezetimibe / simvastatin</td>
<td>10mg / 80mg</td>
<td>60%</td>
<td>31%</td>
</tr>
<tr>
<td>Rosuvastatin</td>
<td>40mg</td>
<td>63%</td>
<td>28%</td>
</tr>
</tbody>
</table>

**Figure 4: My Goals Chart**
(for use in the Lipid Optimisation Pharmacist Clinic)

<table>
<thead>
<tr>
<th>My Goal(s)</th>
<th>Options (Date)</th>
<th>My choice / Priority</th>
<th>Pharmacist</th>
<th>Signature &amp; Date</th>
<th>Follow-up Date</th>
<th>Goal attained?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Diet (take less nasi lemak and fried food)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes / No</td>
</tr>
<tr>
<td>2 Increase Exercise (increase to 2 - 3 times weekly)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes / No</td>
</tr>
<tr>
<td>3 Reduce smoking (cut from 20 to 10 per day)</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes / No</td>
</tr>
<tr>
<td>4 Regularly take medicine</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes / No</td>
</tr>
</tbody>
</table>
Appendix A Titration Algorithm (TG ≤ 4.5mmol/L)

**Abbreviations**
- BAR = Bile acid resin (cholestyramine)
- CK = Creatinine kinase
- DM = Diabetes mellitus
- FBG = Fasting blood glucose
- HDL = High density lipoprotein
- HMG = HMG Co-A reductase inhibitor
- LDL = Low density lipoprotein
- LFTs = Liver function tests
- Lipids = Fasting TC, TG, HDL and LDL
- PUD = Peptic ulcer disease
- TC = Total cholesterol
- TG = Triglycerides
- TLC = Therapeutic Lifestyle Changes
- TSH = Thyroid stimulating hormone
- Tx = Treatment

**Note:**
All patients should receive general counselling on diet, smoking cessation and exercise. Compliance to medication, diet and exercise advice should be reinforced and checked at each visit. Co-management with a Lipid Specialist may be considered at any point should patients develop adverse effects to any lipid lowering agent or if lipid levels seem uncontrollable.

**Adapted from Annals of Pharmacotherapy 2002; 36:892-904. Updated April 2007.**
Appendix B Titration Algorithm (TG > 4.5mmol/L)

**Abbreviations**

CK = Creatinine kinase  
DM = Diabetes mellitus  
FBG = Fasting blood glucose  
HMG = HMG Co-A reductase inhibitor  
LDL = Low density lipoprotein  
LFTs = Liver function tests  
Lipids = Fasting TC, TG, HDL and LDL  
PUD = Peptic ulcer disease  
TC = Total cholesterol  
TG = Triglycerides  
TLC = Therapeutic Lifestyle Changes  
TSH = Thyroid stimulating hormone  
Tx = Treatment

↑TC, TG > 4.5mmol/L  
(after secondary causes ruled out and after TLC)

Baseline labs:  
Lipids, LFTs, FBG, TSH, CK

Renal or liver disease  
Gall bladder disease  
No

Consider referral to specialist

Yes

TG > 4.5mmol/L

Initiate and titrate potent HMG OR fibrate

Use Algorithm A

No

Yes

LDL at goal?

1. Monitor lipids and LFTs  
2. Cont therapy

Initiate fibrate

TG > 2.3mmol/L

DM, gout, active PUD, hyperuricemia

Add low-dose HMG

Use Algorithm A

Yes

No

TG < 2.3mmol/L

Add low-dose HMG OR niacin

Optimise combination therapy

Yes

No

TG < 2.3mmol/L

Continue treatment to goal

Use Algorithm A

No

Yes

LDL at goal?

1. Monitor lipids and LFTs  
2. Cont therapy

1. Monitor lipids and LFTs  
2. Cont therapy, treat to non-HDL goal

**Note:**
All patients should receive general counselling on diet, smoking cessation and exercise. Compliance to medication, diet and exercise advice should be reinforced and checked at each visit. Co-management with a Lipid Specialist may be considered at any point should patients develop adverse effects to any lipid lowering agent or if lipid levels seem uncontrolled.