>Statement of Objectives

After reading this lesson you will be able to:

1. identify patients at risk for dyslipidemia and coronary artery disease through use of objective tools, and recommend screening as appropriate.
2. discuss causes and implications of dyslipidemia with patients, thus raising awareness about the importance of treatment adherence.
3. recommend appropriate non-pharmacological and pharmacological treatment strategies for patients not at lipid target levels.
4. recommend and implement appropriate follow-up and monitoring strategies.
5. organize and implement lipid clinics at the community pharmacy level.

>Instructions

1. After carefully reading this lesson, study each question and select the one answer you believe to be correct. Circle the appropriate letter on the attached reply card.
2. Complete the card and mail, or fax to (416) 764-3937.
3. Your reply card will be marked and you will be advised of your results in a letter from Rogers Publishing.
4. To pass this lesson, a grade of 70% (14 out of 20) is required. If you pass, your CEU(s) will be recorded with the relevant provincial authority(ies).
(Note: some provinces require individual pharmacists to notify them.)

>Disclosure

The author, expert reviewers and Pharmacy Practice magazine have declared that there is no real or perceived conflict of interest with the sponsor company.

1.5 CEUs

Approved for 1.5 CE units by the Canadian Council on Continuing Education in Pharmacy.

File # 201-1204

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DYSLIPIDEMIA - A PRACTICAL APPROACH TO MANAGEMENT FOR PHARMACISTS

by Tom Smiley, BScPhm, Pharm D

INTRODUCTION

A "CARE GAP" IS DEFINED AS THE DIFFERENCE between the level of care that would be considered optimal and the level that currently exists. The following evidence overwhelmingly suggests that a "care gap" in the management (i.e., prevention and treatment) of dyslipidemia currently exists in Canada:

- Approximately 64% of Canadians between the ages of 55 and 74 who are considered to have abnormal lipid levels are unaware of their condition.[1]
  Conclusion 1: Strategies must be put in place to promote greater awareness among the population around the importance of regular lipid screening. Health professionals must put mechanisms in place to identify patients in need of lipid screening according to accepted guidelines.
- In a survey of over 140,000 patients aged 66 years or older receiving at least one statin through the Ontario Drug Benefit plan, 2-year adherence rates were only 40.1% for patients starting therapy after acute coronary syndrome (ACS), 36.1% for patients with chronic coronary artery disease (CAD), and 25.4% for patients using statins for primary prevention.[2] These results are particularly concerning in light of the fact that survival benefits gained by statin treatment usually start after one to two years of treatment.[2]
  Conclusion 2: Health professionals must anticipate challenges and implement strategies to promote adherence with recommended treatment strategies.
- The Canadian Heart Health Surveys suggest that 36% of the Canadian population have a low-density lipoprotein greater than 3.5 mmol/L and/or a total cholesterol value greater than 5.2 mmol/L.[3]
  Conclusion 3: Patients must be identified, treated and monitored appropriately in order to attain and maintain lipid levels within target ranges.

The goal of this lesson is to equip pharmacists with the knowledge and tools necessary to address the care gaps as identified above in an environment of integrated community care.

Recent studies illustrate that pharmacists can play a critical role in reducing the care gaps associated with management of dyslipidemia. In the Study of Cardiovascular Risk Intervention by Pharmacists (SCRIP), conducted in 54 community pharmacies, the primary endpoint (composite of performance of a fasting cholesterol panel by the physician or addition or increase in dose of cholesterol-lowering medication) was reached in 57% of intervention patients versus 31% of usual care patients. Intervention patients received education and a brochure on risk factors, point-of-care cholesterol measurement, referral to

physician and regular follow-up after 16 weeks.[4] The SCRIP-Plus study, conducted in 42 community pharmacies, included pharmacy point-of-care lipid testing with follow-up in the intervention group and reported a statistically significant LDL cholesterol reduction of 0.53 mmol/L (15% decrease) over the 6-month study period compared with controls.[5]

This lesson will provide pharmacists with the tools and information necessary to identify patients at risk and recommend action plans that include both non-pharmacological and pharmacological treatment.

DYSLIPIDEMIA AS A RISK FACTOR FOR CAD

Because atherosclerosis is associated with high plasma concentrations of cholesterol, many assume that the evolution of the condition is simply a result of overindulgence of fats leading to accumulation of lipids within the artery wall. In fact, only about 40 to 60% of blood cholesterol levels are associated with dietary intake, with the rest originating from synthesis in the liver. The process of atherosclerosis actually begins with an inflammatory response to endothelial dysfunction that occurs secondary to vessel-wall injury.[6] Many metabolic interactions can take place within the endothelium, which lines the walls of the arteries. The inflammatory process described involves vasoactive molecules, cytokines, and growth factors which work in tandem to grow the plaques that are associated with atherosclerosis.[6] The most common and modifiable causes of endothelial dysfunction (and therefore risk factors for CAD) include:[6]

- Elevated and modified LDL particles
- Free radicals caused by cigarette smoking
- Hypertension
- Diabetes mellitus

The potential for endothelial dysfunction may be genetically influenced. Additional hypothesized causes of endothelial dysfunction include elevated plasma homocysteine concentrations and infection with microorganisms such as herpes viruses or *Chlamydia pneumoniae*.

See Table 1 for a listing of modifiable and non-modifiable risk factors for CAD to aid in helping patients better understand their risks.

Influence of the "metabolic syndrome"

People with the metabolic syndrome are also at increased risk for CAD and Type 2 diabetes.

- The metabolic syndrome refers to a cluster of CAD risk factors that worsen as insulin resistance increases.
- Components of the metabolic syndrome include dyslipidemia (high triglyceride levels, low HDL levels, and smaller more easily oxidized LDL particles), abdominal obesity, insulin resistance, hypertension and reduced levels of plasminogen activator inhibitor which results in increased coagulability of blood.[7] (See Table 2.)
- The "Recommendations for the management of dyslipidemia and the prevention of cardiovascular disease: 2003 update" (hereafter referred to as the "2003 Canadian dyslipidemia guidelines") define clinical identification of the metabolic syndrome (see Table 2). With the help of this table, pharmacists can identify patients with the metabol-

TABLE 1 Risk Factors for CAD[17]

Modifiable	Non-Modifiable
• Dyslipidemia (low HDL, high LDL, high triglycerides) • Hypertension • Physical inactivity • Obesity • Current smoking • Excessive alcohol intake (>2 standard drinks daily) • Poor nutrition • Elevated blood glucose	• Women over 55 years or men over 45 years • African, South Asian and First Nation populations at greatest risk • Family medical history - myocardial infarction or stroke in first-degree relative (parent, sibling) in men younger than 55 years or women younger than 65 years • History of previous myocardial infarction, cerebrovascular accident or peripheral arterial disease

TABLE 2 Metabolic Syndrome Definition[8]

Combination of any 3 of the following risk factors

- Abdominal obesity (waist circumference >102 cm in men or 88 cm in women)
- Triglyceride level ≥1.7 mmol/L
- HDL level <1.0 mmol/L in men or 1.3 mmol/L in women
- Blood pressure ≥130/85 mm Hg
- Fasting glucose level 6.2 to 7.0 mmol/L

FACULTY DYSLIPIDEMIA - A PRACTICAL APPROACH TO MANAGEMENT FOR PHARMACISTS

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REVIEWERS

All lessons are reviewed by pharmacists for accuracy, currency and relevance to current pharmacy practice.

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ic syndrome and help them to understand the risks associated with this condition and each of the individual components of the syndrome.

SETTING LIPID TARGETS ACCORDING TO CAD RISK ASSESSMENT

Assessing CAD Risk

The 2003 Canadian dyslipidemia guidelines categorize 10-year CAD risk as being low, moderate or high in any particular individual.[8] Data used for determining a person's 10-year risk for CAD is mathematically derived from a model based on data from the very large Framingham study. The model takes into account a person's age, gender, total cholesterol, HDL level, systolic blood pressure and smoking status. Individuals wishing to determine their approximate risk for CAD add up their "risk points" according to the factors described above and as outlined in the model. The 10-year risk percentage is based on the total number of points awarded. The model can be downloaded from page 3 of the online version of the 2003 Canadian dyslipidemia guidelines found at **www.cmaj.ca/cgi/data/169/9/921/DC1/1.**

Here are the definitions of low, moderate or high 10-year risk for CAD according to the 2003 Canadian dyslipidemia guidelines:

- Low risk = 10-year CAD risk <10%
- Moderate risk = 10-year CAD risk of 11-19%
- High risk = 10-year CAD risk of 20% or greater

Patients with clinically evident atherosclerotic disease (including coronary artery disease, peripheral artery disease or stroke) or with diabetes mellitus or chronic kidney disease are automatically deemed to be at "high risk" for CAD according to the definition used in the Canadian dyslipidemia guidelines (10-year CAD risk of nonfatal myocardial infarction or death due to CAD is 20% or greater).

Setting Targets According to Risk

Assessment of risk factors and CAD risk are important for helping patients understand the need for engaging in treatment strategies and remaining adherent to recommendations. Assessment of CAD risk is also important for recommending targets that will help patients reduce their risk of suffering a CAD event. See Table 3 for recommended target LDL levels and total cholesterol/HDL ratios (TC/HDL) according to level of CAD risk.

Here are important points to underline when making recommendations for treatment.

- The optimal level for triglycerides according to the 2003 Canadian dyslipidemia guidelines is 1.7 mmol/L, regardless of CAD risk category.
- Both LDL level and TC/HDL ratio targets within the same CAD risk category should be achieved.
- Although LDL target for high-risk patients is currently 2.5 mmol/L, recent evidence suggests that a further reduction of LDL levels to 1.8 mmol/L affords significant beneficial patient outcomes even when compared with the current target.[9]

TABLE 3 Target Lipid Levels According to 10-year CAD Risk[8]

Risk Category	LDL Target (mmol/L)	Total Cholesterol: HDL ratio	Apolipoprotein B* (g/L)
High (10-year CAD risk of 20% or greater or diabetes or any atherosclerotic disease or chronic kidney disease)	<2.5	<4.0	<0.9
Moderate (10-year CAD risk 11 to 19%)	<3.5	<5.0	<1.05
Low† (10-year CAD risk 10% or less)	<4.5	<6.0	<1.2

**Apolipoprotein B is not routinely measured at present but may become more commonly used, especially for follow-up of patients taking statins. Each of the atherogenic particles contains one molecule of apolipoprotein B.[8] Recent studies have shown apolipoprotein B concentration to be a better estimate of the risk of vascular events than LDL cholesterol level because the metabolic syndrome is associated with small particles of LDL cholesterol, rendering the volume of LDL measured less reliable as a method of CAD risk approximation.*

† In the low-risk category, treatment may be deferred if 10-year risk of CAD is <5% and LDL level is less than 5.0 mmol/L.

- Patients should achieve both LDL level and TC/HDL ratio targets within their risk category.

- Optimal triglyceride levels are <1.7 mmol/L.

- People at high risk of CAD should start pharmacological treatment immediately with simvastatin 40 mg once daily or equivalent (e.g., atorvastatin 20 mg, rosuvastatin 10 mg) along with diet and lifestyle change.

Helping Patients Understand Cholesterol Levels

Total cholesterol = LDL + HDL + triglycerides/2 (All levels measured in mmol/L). This formula is invalid if triglyceride levels are greater than 4.5 mmol/L.

Global Risk Assessment - Canadian Dyslipidemia Guidelines

• Assess patient's 10-year CAD risk online at **www.cmaj.ca/cgi/data/169/9/921/DC1/1**

DIET AND LIFESTYLE MODIFICATION APPROACHES TO DYSLIPIDEMIA MANAGEMENT

Diet and lifestyle approaches to lipid management should be instituted immediately upon discovery of the problem. Patients with hypertriglyceridemia especially benefit from lifestyle therapy that includes dietary therapy and exercise, with a focus on weight loss and restriction of refined carbohydrate and alcohol. Patients with low HDL levels especially benefit from increased aerobic exercise, increased intake of monounsaturated fats, moderate alcohol intake and weight loss.[8]

Weight Management

An overweight or obese person can improve lipid profiles with a healthier diet and weight loss of even 5 to 10%. Pharmacists can show patients how health risks increase as body mass index (BMI) increases with the help of Table 4. BMI is defined as weight in kilograms divided by the square of height in meters (i.e., kg/m^2) and can be easily determined mathematically, or with the aid of a nomogram contained in a document entitled *Canadian Guidelines for Body Weight Classification in Adults* which can be downloaded from the Health Canada website at **www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/cg_quick_reference_3.html.** This document also serves as an informative 2-page handout outlining the health

TABLE 4 Health Risks Associated with BMI Category[18]

Classification	BMI Category (kg/m^2)	Risk of Developing Health Problems
Underweight	<18.5	Increased
Normal Weight	18.5 to 24.9	Least
Overweight	25.0 to 29.9	Increased
Obese		
Class I	30.0 to 34.9	High
Class II	35.0 to 39.9	Very High
Class III	≥40.0	Extremely High

Canadian Guidelines for Body Weight Classification in Adults available at: **www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/cg_quick_reference_3.html**

The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults available online at: **www.nhlbi.nih.gov/guidelines/obesity/practgde.htm** (National Institutes of Health)

TABLE 5 Fat From Food Sources

Type of Fat	Food Source	Effect on Risk for CAD
Monounsaturated	Olive oil, canola oil, peanut oil	↓ Risk when substituted for saturated fat
Polyunsaturated	Liquid vegetable oils, fish oils	↓ Risk
Omega-6 (linoleic)	Safflower oil, sunflower oil, corn oil, soybean oil, peanut oil	
Omega-3 (Alpha-linolenic)	Canola oil, soybean oil, walnut oil	
EPA and DHA (Eicosapentanaeoic acid, Docosahexa-enoic acid)	Fish (such as mackerel, salmon, tuna, blue fish) and fish oils	
Saturated	Animal fat, whole fat dairy products (e.g., butter), coconut oil, palm oil, cocoa butter, cottonseed oil	↑ Risk
Trans fatty acids	Vegetable shortening, many margarine brands, crackers, cookies	↑ Risk

Canada's Food Guide available online at **http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html**

risks of being overweight and obese, as well as the benefits of losing weight.

The following weight management principles are recommended by the National Institutes of Health in their downloadable guide entitled *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* which can be found online at **www.nhlbi.nih.gov/guidelines/obesity/practgde.htm**.[10]

- Set targets of initial weight loss of 10% over 6 months at a rate of 0.5 to 1.0 kg per week.
- This target can generally be achieved through a "calorie-deficit" (i.e., more calories utilized than ingested) of approximately 500 to 1,000 calories daily.
- In general, most women should select diets containing 1,000 to 1,200 calories per day and most men (and potentially women weighing 75 kg or more or who exercise) should select diets containing 1,200 to 1,600 calories per day.
- Refined carbohydrate and sugar intake should be reduced.[8]
- Fat should be reduced for health reasons, but reducing dietary fat without reducing calories will not produce weight loss.
- Follow-up with health professionals is likely to improve adherence to weight loss regimen.
- Patients with BMI ≥30 or BMI ≥27 with additional cardiovascular risk factors may be considered for orlistat or sibutramine therapy. Generally, if a patient has not lost 2 kg after 4 weeks, the drug should be discontinued, as it is not likely that the patient will benefit.
- Weight loss surgery is an option for patients who have clinically severe obesity (BMI ≥40 or BMI ≥35 in addition to serious comorbid conditions). This procedure generally sustains significant weight loss for more than 5 years in most patients.

Dietary Considerations

Diets that are high in saturated fats and cholesterol increase levels of LDL cholesterol.[11]

- Canada's Food Guide recommends a diet that includes 30% or less of energy from fat and no more than 10% as saturated fat, 55% from carbohydrates, and 15% from protein sources.[12] Canada's Food Guide can be found online at **http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html**.
- By substituting monounsaturated or polyunsaturated fat for saturated fat in recommended amounts (i.e., keeping total energy from fat to 25 to 30%), risk for dyslipidemia is reduced.[13] Types of fat derived from various food sources can be found in Table 5.
- Trans-fatty acid intake should be reduced to a minimum as studies suggest that these fats increase TC/HDL ratio. Total proportion of saturated fats and trans-fatty acid intake should be no more than 7% of total calories.[8]
- Linoleic and alpha-linolenic (i.e. omega-3 and omega-6) fatty acids are "essential" fatty acids as they cannot be synthesized by humans. Replacement of saturated fats with these fatty acids therefore is desirable and reduces risk for CAD.[14]
- Mediterranean diets, which include higher amounts of oleic acid and omega-3 fatty acids but lower levels of cholesterol, saturated and polyunsaturated fats appear to be cardioprotective for at least 4 years after first infarction.[15]

Physical Activity

Canada's physical activity guide recommends working towards 60 minutes of light to moderate activities daily in segments of at least 10 minutes each.[16] The

TABLE 6 Approximate Effects of Lipid-Lowering Agents[19]

Medication	Daily Dose	LDL	HDL	Triglycerides
Bile Acid Sequestrants				
Cholestyramine	4 to 16 gm	↓ 10 to 20%	↑ 3 to 5%	Potential ↑
Colestipol HCl	5 to 20 gm	↓ 10 to 20%	↑ 3 to 5%	Potential ↑
Cholesterol Absorption Inhibitor				
Ezetimibe	10 mg	↓ 18 to 20%	↑ 1%	↓ 7 to 9%
Fibrates				
Fenofibrate	160 mg	↓ 17 to 29%	↑ 0 to 40%	↓ 38 to 57%
Gemfibrozil	1,200 mg	↓ 10 to 15%	↑ 10 to 15%	↓ 20 to 50%
Niacin				
Extended-release	1 to 2 gm	↓ 7 to 16%	↑ 14 to 22%	↓ 16 to 38%
Statins				
Rosuvastatin	10 to 40 mg	↓ 47 to 57%	↑ 6 to 12%	↓ 22 to 26%
Atorvastatin	10 to 80 mg	↓ 39 to 60%	↑ 5 to 9%	↓ 19 to 37%
Simvastatin	5 to 80 mg	↓ 26 to 47%	↑ 7 to 12%	↓ 10 to 24%
Pravastatin	10 to 80 mg	↓ 22 to 37%	↑ 7 to 12%	↓ 15 to 24%
Fluvastatin	20 to 80 mg	↓ 22 to 24%	↑ Small	↓ small
Lovastatin	20 to 80 mg	↓ 20 to 40%	↑ 6 to 10	↓ 7 to 12%

Rule of 5 and 7:[20] *For every doubling of statin dose, the total cholesterol is reduced by approximately 5% and the LDL cholesterol level is reduced by approximately 7%. This rule may not apply to rosuvastatin. Current evidence suggests that rosuvastatin 10 mg and 40 mg would have slightly more potent LDL cholesterol lowering activity than atorvastatin 40 mg and 80 mg respectively.*

TABLE 7 Individualized Pharmacological Treatment of Dyslipidemia[8]

Lipid Profile	Treatment
↑ LDL only	Statin with or without resin or ezetimibe
↑ LDL with moderately elevated TG	Statin with or without ezetimibe and/or salmon oil
↑ LDL with low HDL	Combination therapy may be required (e.g., statin plus niacin or statin plus fibrate)
Elevated TG level only	Niacin or fibrate, and/or salmon oil or combination therapy
Elevated TG level with low HDL level	Niacin or fibrate, or combination therapy

guide also highlights the importance of engaging in different types of activities. These include:

1. Endurance (e.g., walking, golfing, cycling, skating)
2. Flexibility (e.g., gardening, stretching exercises, Tai Chi, bowling, curling)
3. Strength (e.g., raking and carrying leaves, climbing stairs, lifting and carrying groceries).
4. Endurance and flexibility activities should be performed 4 to 7 days each week, and strength exercises should be scheduled 2 to 4 days a week.

Canada's physical activity guide is a comprehensive, practical guide to increasing physical activity. The guide also includes sections devoted to the unique needs of older adults as well as youth and children. It is a great patient tool and can be found online at **www.paguide.com**.

PHARMACOLOGICAL THERAPY FOR DYSLIPIDEMIA MANAGEMENT

IN PATIENTS AT HIGH RISK FOR CAD, pharmacological therapy should be instituted immediately.[8] Patients at low to moderate risk for CAD should try lifestyle modification for 3 to 6 months or less depending on individual circumstances. Table 6 outlines the range of lipid-lowering effects of the currently available anti-dyslipidemia agents.

Targeting LDL levels

Table 7 outlines general treatment strategies according to type of abnormal lipid profile.

- Statin monotherapy will help patients achieve target levels in most cases (see Table 6).[8]
- People at high risk of CAD should start pharmacological treatment immediately with simvastatin 40 mg once daily or equivalent (e.g., atorvastatin 20 mg, rosuvastatin 10 mg) along with diet and lifestyle change.
- Statins are generally very well tolerated. See Table 8 for more information about adverse effects and monitoring issues.
- For the minority of patients who need additional therapy, ezetimibe and bile acid sequestrants (i.e., cholestyramine and colestipol) are available.
- Ezetimibe is better tolerated than bile acid sequestrants and can further reduce LDL levels by up to 20%. If a patient does not tolerate statin therapy, ezetemibe as monotherapy will reduce LDL levels by up to 20%.[8]

Targeting TC/HDL ratio

Lowering TC/HDL ratio implies that HDL needs to be raised while total cholesterol needs to be reduced (which would imply triglycerides and LDL need to be lowered). Patients at high risk for CAD may have more difficulty attaining this target level than the LDL target level.

- For patients with hypertriglyceridemia or low HDL, lifestyle modification strategies are first-line treatment (see Pharmacological Therapy for Dyslipidemia Management).
- Niacin is the most effective agent for increasing HDL concentrations. Adverse effects, which include flushing, dry skin and gastrointestinal irritation, limit adherence in many patients. The dose of niacin should be increased slowly to minimize side effects, and the drug should be taken 3 times daily after meals. Flushing may also be reduced by treatment with daily low-dose ASA for

TABLE 8 Medication Follow-Up and Monitoring

Drug Class and Contraindications (CI)	Monitoring Parameters and Follow-up	Side Effects
Statins CI=active liver disease, high alcohol consumption, pregnancy	Watch for muscle pain and weakness and dark urine - monitor creatine kinase (CK) if indicated (patients with unexplained symptoms of weakness, soreness and unexplained muscle aches and those on combination of statins and interacting medications such as fibrates). Liver Function Tests at 0, 3, 6, 12 months, then annually. Note: CYP 3A4 interaction with grapefruit juice with all statins except pravastatin, fluvastatin, rosuvastatin.	Upper gastrointestinal disturbances, muscle pains, headache, rash, sleep disturbances are more common. Peripheral neuropathy, lupus like symptoms and impotence occur rarely.
Fibrates CI=severe hepatic and renal disease	Watch for muscle pain and weakness and dark urine especially in combination with statin - monitor CK if indicated. Monitor CBC, serum creatinine (decrease dose if serum creatinine increases), glucose, liver enzymes periodically, especially during initial months of therapy.	Gastrointestinal upset, rash and abdominal pain more common. Headache, pruritis, reduced libido, dizzy, drowsy, arthralgia, increased blood glucose and sleep or vision changes less common. Reduced renal function, anemia, increased lever enzymes, myopathy, erectile dysfunction, and gallstones rare.
Niacin CI=severe peptic ulcer, chronic liver disease, overt diabetes and severe gout	Monitor liver enzymes (0, 6 to 8 weeks after reaching daily dose of 1,500 mg, 6 to 8 weeks after reaching maximum daily dose, then once yearly or as required), glucose and uric acid.	Flushing, dry eyes, pruritus, headache, gastrointestinal upset, increased glucose, increased uric acid and increased liver enzymes more common.
Bile acid sequestrants CI=biliary obstruction, dysbetalipoproteinemia, triglycerides >4.6 mmol/L, phenylketonuria	Monitor triglycerides periodically. Evaluate history of cholelithiasis and symptoms initially, and then as required.	Constipation, nausea and bloating more common. Hyperchloremic acidosis in children and reduced renal function rare.
Ezetimibe	Monitor liver enzymes if added to a statin.	Adverse effects similar to placebo when used as monotherapy.

the first few weeks of treatment. See Table 8 for more information about monitoring issues.

- Fibrate therapy is an option for patients with high triglycerides and/or low HDL. They may be used alone or with statins. If used in combination with statin therapy, the smallest available doses of both agents are recommended for initial treatment.[8] Gemfibrozil has been associated with a higher risk of myotoxicity than fenofibrate and should not be used in combination with a statin.[8] See Table 8 for more information about monitoring issues.
- Moderate hypertriglyceridemia may be treated with the addition of salmon oil (1 to 3 grams, 3 times daily) to statin therapy.[8]
- Isolated hypertriglyceridemia is best treated through lifestyle modification (see Pharmacological Therapy for Dyslipidemia Management). If triglyceride levels reach 6.0 mmol/L or more, pharmacological treatment is necessary (e.g., fibrate or niacin and salmon oil supplementation), as patients are at significant risk for pancreatitis.

MANAGEMENT OF DYSLIPIDEMIA - OPPORTUNITIES FOR PHARMACIST INTERVENTION

THE SCRIP AND SCRIP-PLUS STUDIES (SEE Introduction) are excellent Canadian examples of the potential for closing the care gap in dyslipidemia management through collaborative pharmacist intervention. Creating awareness around need for appropriate lipid screening is the first step to optimal management for dyslipidemia. This can be accomplished by routinely asking men over 40 years and women who are postmenopausal or over 50 years about their lipid screening history, especially those with additional risk factors such as hypertension, smoking or abdominal obesity.

Hosting "Cholesterol Management Clinic Days" helps to raise awareness of dyslipidemia and identify patients who may be in need of intervention. Preparation for the clinic day should include:

- educating staff about the benefits and the logistics of the clinic day.
- marketing the event by hanging posters in the pharmacy and local community establishments, stuffing bags with brochures (especially for those patients at risk), talking with patients about the day, and possibly advertising in the newspaper or on the radio.
- booking appointments using appointment schedule and appointment cards. Explain to patients that they will derive the most benefit from the appointment by knowing their cholesterol levels.
- setting up a private area to conduct appointments and making sure pharmacist staffing is adequate for the day.
- having support staff phone patients to remind them of their appointment the day before the clinic.

Be sure to have set criteria for the interview. For example:

- Collect health information using a standardized patient history form (e.g., medical problems, allergies, tobacco/alcohol/recreational drug use, family history). It may be a good idea to have patients fill this in before the interview.
- Consider point-of-care cholesterol screening where available. Ensure capabilities of the screening test chosen. For example, some measure only "total cholesterol."
- Perform a global risk assessment for 10-year CAD risk determination with the

patient. This is available in the 2003 Canadian dyslipidemia guidelines.[8]

- Educate patients about risk factors and assess the patient's personal risks. Provide individualized educational materials as take-away.
- Identify drug-related problems through assessment of patient medications. Educate around patient's lipid management medications (if any). Advise patients that knowledge of both blood pressure AND cholesterol levels is important.
- Create a lipid management care plan in collaboration with patient and physician.
- Refer to a physician as appropriate for lipid screening or follow-up. If recommendations to physicians are in order, gain permission from patient before communicating with physician directly. Be sure all specific recommendations are based on the most recent Canadian dyslipidemia guidelines.
- Follow-up is important for addressing any barriers patients might have to remaining adherent to therapeutic regimens. Assessment of goal and target attainment should be made at appropriate intervals (e.g., 6 weeks after statin dose change).
- Have patients fill out a survey to determine what they liked about the clinic and how it might be improved for the future.

Optimal management of dyslipidemia requires a collaborative approach between health professionals and patients. As a primary-care practitioner and the health professional patients see most often, pharmacists have an opportunity to play a central role in identifying, recommending management and following up with patients who have abnormal lipids. The value of such pharmacist activities in Canada has been demonstrated.

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QUESTIONS

CASE 1

L.P. is a 42-year-old man who has just received the results of his lipid panel. He has a triglyceride level of 3.0 mmol/L, HDL of 0.9 mmol/L, LDL of 4.9 mmol/L. His average blood pressure is 142/90 mm Hg. His BMI is 30.4 kg/m^2.

1. L.P. says he has been trying to eat a healthy diet and can't understand why his LDL level is so high. Approximately what portion of blood cholesterol levels are a result of dietary intake?

a) 10 to 20%
b) 20 to 40%
c) 40 to 60%
d) 60 to 80%

2. Which of the following combination of factors suggests that L.P. has the metabolic syndrome by the definition put forward by the latest Canadian cardiovascular guidelines?

a) Elevated triglyceride, elevated LDL and low HDL levels
b) Elevated triglyceride, elevated LDL and elevated blood pressure levels
c) Elevated LDL, elevated blood pressure and low HDL levels
d) Elevated blood pressure, low HDL and elevated triglyceride levels

3. L.P. tells you his doctor is concerned about his LDL and total cholesterol level. What is L.P's approximate total cholesterol level?

a) 6.5 mmol/L
b) 7.3 mmol/L
c) 8.1 mmol/L
d) 8.9 mmol/L

4. The doctor has also told L.P. that his LDL level may be "under-represented." He asks you what the doctor meant by that statement. Choose the best response.

a) LDL levels are generally measured artificially low when total cholesterol levels are high.
b) The doctor is probably confused with the measurement considerations associated with high triglycerides.
c) When associated with the metabolic syndrome, LDL particles are smaller and therefore a given LDL volume will actually contain more LDL particles.
d) It is generally more difficult to measure LDL accurately after the age of 40.

5. L.P. would like to lose weight as he realizes it is contributing to dyslipidemia. What rate of weight loss (based on National Institutes of Health Guidelines on Overweight and Obesity) would you recommend?
a) 1 to 2 kg weekly with a target of 20% weight loss over 3 months
b) 0.5 to 1 kg weekly with a target of 20% weight loss over 6 months
c) 0.5 to 1 kg weekly with a target of 10% weight loss over 6 months
d) 3 to 5 kg monthly with a target of 10% weight loss over 2 months

6. L.P. wants to try a diet that supplies 900 calories daily. He asks for your opinion on this idea. Which reply would be most appropriate considering the National Institutes of Health Guidelines on Overweight and Obesity?
a) Although it is L.P.'s choice, a diet that supplies 1,200 to 1,600 calories daily combined with an exercise program would probably be a better option.
b) Although it is L.P.'s choice, a diet that supplies 1,000 to 1,200 calories daily combined with an exercise program would probably be a better option.
c) L.P.'s diet choice is a little extreme but one that should be relatively easy to maintain for an extended period of time.
d) If L.P. is already cutting down on fats, he likely shouldn't have to worry about calories to manage his dyslipidemia.

7. L.P has heard that omega-3 fatty acids and omega-6 fatty acids are healthier than trans-fatty acids or saturated fats. Which one of the following is the best source of omega-3 or omega-6 fatty acids of those listed?
a) Palm oil c) Canola oil
b) Cottonseed oil d) Olive oil

8. You would like to help L.P. determine his 10-year risk for coronary artery disease. What additional information do you need to use the risk assessment tool recommended in the latest Canadian cardiovascular guidelines?
a) Whether or not he has first-degree relatives with coronary artery disease
b) His waist measurement
c) His level of alcohol intake
d) His smoking status

CASE 2
R.T. is a 55-year-old female who has been diagnosed with Type 2 diabetes. She has an LDL level of 4.2 mmol/L, triglycerides of 3.2 mmol/L and HDL of 1.0 mmol/L. She has a BMI of 28.9 kg/m^2.

9. What is R.T.'s target total cholesterol:HDL ratio?
a) <3.0 c) <5.0
b) <4.0 d) <6.0

10. Which medication would be most appropriate for helping R.T. meet her LDL targets (according to the most recent Canadian dyslipidemia guidelines)?
a) Simvastatin 20 mg
b) Atorvastatin 10 mg
c) Atorvastatin 20 mg
d) Atorvastatin 40 mg

11. After 6 weeks of statin therapy at the initial dose, R.T. is still not at target. What effect would you expect a doubling of the dose of simvastatin or atorvastatin to have?
a) Reduce LDL by a further 7%
b) Reduce LDL by a further 15%
c) Reduce LDL by a further 22%
d) Reduce LDL by a further 39%

12. What approximate effect on LDL would the use of ezetimibe have?
a) Further 7% reduction if added to statin and initial 20% reduction if used alone.
b) Further 20% reduction if added to statin and initial 35% reduction if used alone.
c) Further 5% reduction if added to statin and initial 39% reduction if used alone.
d) Further 20% reduction if added to statin and initial 20% reduction if used alone.

13. Which of the following statins might be a better choice if R.T. drinks an 8-ounce glass of grapefruit juice 2 or 3 times weekly.
a) Atorvastatin c) Pravastatin
b) Simvastatin d) Lovastatin

14. R.T. wants to engage in physical activity to help manage her dyslipidemia and overall health. Which recommendation (based on Canada's Physical Activity Guide) would be most appropriate?
a) Try and achieve 60 continuous minutes of moderate exercise daily.
b) Try and achieve 60 minutes of continuous light to moderate exercise at least twice a week.
c) Try and achieve 60 minutes of moderate exercise (may be broken down into 10-minute segments) 2 to 4 days a week.
d) Try and achieve 60 minutes of light moderate exercise (may be broken down into 10-minute segments) on a daily basis.

15. Which statement best describes atherosclerosis?
a) A condition of lipid accumulation dependent almost entirely on quantity of lipid intake.
b) An inflammatory condition prompted by endothelial dysfunction.
c) A condition associated with aging that is unavoidable in senior years.
d) A condition of lipid accumulation that only occurs in the presence of metabolic syndrome.

16. Is R.T. a candidate for orlistat treatment if diet and exercise fail to get her to her target weight?
a) No, because she does not have a BMI of 30 kg/m^2.
b) Yes, because she has a BMI greater than 25 kg/m^2.
c) Yes, because she has a BMI of 27 kg/m^2 or greater and has risk factors for cardiovascular disease.
d) No, because orlistat causes intolerable side effects when combined with statins.

17. Which medication would you NOT add to R.T.'s medication regimen in light of moderately elevated triglycerides?
a) Colestipol c) Niacin
b) Fenofibrate d) Salmon oil

18. For which monotherapy would you NOT monitor liver enzymes?
a) Niacin c) Ezetimibe
b) Rosuvastatin d) Simvastatin

19. If a patient had isolated hypertriglyceridemia (i.e. all other lipid fractions were at target), when would you recommend starting pharmacotherapy?
a) Triglycerides >1.7 mmol/L
b) Triglycerides >3.0 mmol/L
c) Triglycerides >4.5 mmol/L
d) Triglycerides >6.0 mmol/L

20. Approximately what percentage of Canadians with lipid levels considered abnormal who are between the ages of 55 and 74 are not aware of their condition?
a) 24% c) 64%
b) 44% d) 84%

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1. Do you now better understand dyslipidemia? ❑ Yes ❑ No
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