>Statement of Objectives

After reading this lesson you will be able to:

1. Discuss the prevalence of dyslipidemia in Canada.

2. Discuss the proposed relationship between elevated insulin resistance and its association with a cluster of metabolic abnormalities that includes dyslipidemia.

3. Help patients identify and understand their 10-year risk of coronary heart disease (CHD) as outlined in the Canadian Recommendations for the Management of Dyslipidemia and the Prevention of Cardiovascular Disease: 2003 Update.

4. Discuss the benefits of lipid-lowering drug therapy and the rationale (i.e., published evidence) around establishing individualized therapeutic targets.

5. Educate and empower patients to remain adherent to care plans aimed at achieving therapeutic targets.

6. Establish and maintain a collaborative model of patient care that fosters an optimal environment for identification and treatment of patients not at personal target lipid values.

7. Recommend optimal individualized therapeutic strategies for management of dyslipidemia while giving consideration to all modifiable risk factors and reversible causes.

>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.)

CEP 1.25 CEUs

Approved for 1.25 CE units by the Canadian Council on Continuing Education in Pharmacy.

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MANAGEMENT OF DYSLIPIDEMIA: OPTIMIZING THE PHARMACIST'S ROLE IN A COLLABORATIVE MODEL OF CARE

Tom Smiley, B.Sc.Phm., Pharm.D.

A PERSPECTIVE ON THE CHALLENGE OF DYSLIPIDEMIA IN CANADA

As incidence of obesity, diabetes and sedentary lifestyle continue to escalate in Canada the prevention and management of dyslipidemia takes on utmost importance. Although the rate of death from coronary heart disease (CHD) has been declining over the past 25 years, it is still the number one cause of mortality accounting for approximately 37% of deaths.[1] The Canadian Heart Health Surveys suggest that 36% and 45% of the Canadian population have a low-density lipoprotein or total cholesterol value greater than 3.5 mmol/L and 5.2 mmol/L respectively.[2] These statistics suggest that prevalence of dyslipidemia is high in Canada, while treatment is either not occurring or not lowering lipids optimally. This presents a significant opportunity for pharmacist intervention. Later in this lesson, evidence supporting the effectiveness of modifying lipid levels in significantly reducing the risk of CHD will be presented. New models of pharmacist care and collaboration, as successfully demonstrated in the SCRIP and SCRIP Plus studies, can help to significantly close the care gaps evident in current dyslipidemia management.[3,4] This lesson is designed to help pharmacists take part in such interventions in an effective manner that promotes optimal patient outcomes.

CHD Risk Factors and Calculation of 10-Year CHD risk

The following are risk factors for CHD as outlined by the Heart and Stroke Foundation of Canada:[5]

Modifiable

1. **Dyslipidemia** (low HDL, high LDL, high triglycerides)
2. **Hypertension**
3. **Lifestyle factors**
   * Physical inactivity
   * Obesity
   * Current Smoking
   * Excessive alcohol intake
4. **Diabetes**

Patients with Type 2 diabetes are 2 to 4 times more likely to develop CHD than the general population.[6] This is, in large part, due to the presence of a cluster of risk factors known as the "insulin resistance syndrome" or "metabolic syndrome" that develop in people with elevated levels of insulin resistance (impaired tissue responsiveness to the normal action of insulin).[7] Risk factors for CHD, generally accepted as being characteristic of this syndrome, include:[7]

* Abdominal obesity
* Physical inactivity
* Low HDL levels
* High triglyceride levels
* Smaller LDL particles that are more easily oxidized (and therefore more atherogenic)
* Elevated blood pressure

* Prothrombotic state
* Proinflammatory state

Non-Modifiable

1. **Age** — Women over 55 years of age or men over 45 years of age
2. **Ethnic descent** — (Black, South Asian, Hispanic and First Nation populations at greatest risk)
3. **Family medical history** — myocardial infarction or stroke before age 65, angina, tendency to develop hypertension or dyslipidemia

The current recommendations for the management and treatment of dyslipidemia define risk according to a model based on data obtained from the Framingham study results.[8] Increasing number of points are assessed for increasing age, total cholesterol, systolic blood pressure, decreasing HDL and smoking status. The 10-year risk for CHD is calculated according to the total number of points accumulated.[8] Patients with a history of cardiovascular disease or diabetes are automatically classified as "very high risk" (10-year risk of CHD >30%).[8] The model for calculating the 10-year risk of CHD for patients without history of cardiovascular disease or diabetes is available on the Canadian Medical Association website in the clinical practice guidelines section at: www.cmaj.ca/cgi/data/169/9/921/DC1/1.

Management of Dyslipidemia: A Look at the Evidence

There is much evidence to support the notion that aggressive lipid management reduces mortality and morbidity (e.g., infarctions and reinfarctions, need for bypass surgery or angioplasty). Modifying lipids has been shown to lower morbidity and mortality regardless of pre-existing conditions (i.e., whether primary or secondary prevention).[9] The findings from

TABLE 1 *Outcomes of Clinical Lipid Lowering Trials Utilizing Statins*[8]

Study and details	Drug	Lipid Effect	CHD Events	P value
WOSCOPS[10] Primary prevention 6,595 patients 4.9 years follow-up	Pravastatin 40 mg/day	↓LDL 26% HDL 5% ↓TC 20%	↓31% - Non-fatal MI or CHD death	<0.001
AFCAPS/TexCAPS[11] Primary prevention 6,605 patients 5.2 years follow-up	Lovastatin 20-40 mg/day	↓LDL 25% HDL 6% ↓TG 15% ↓TC 18%	37%↓ in first major CHD event	<0.001
ASCOT-LLA trial[12] Primary prevention 10,305 hypertensive patients 3.3 years follow-up	Atorvastatin 10 mg/day	↓TC 1.3 mmol/L compared to placebo at 12 months	34% ↓ non-fatal MI or CHD death 27% ↓fatal or non-fatal stroke 29% ↓ total coronary events	.0005 .024 .0005
4S trial[13] Secondary prevention 4,444 patients 5.4 years follow-up	Simvastatin 20-40 mg/day	↓LDL 35% HDL 8% ↓TG 10% ↓TC 25%	37% ↓ in CHD events 30% ↓ in total mortality	<0.0001 0.003
CARE[14] Secondary prevention 4,159 patients 5.0 years follow-up	Pravastatin 40 mg/day	↓LDL 32%	↓24% -Non-fatal MI or CHD death	0.003
LIPID[15] Secondary prevention 9,014 patients 6.1 years follow-up	Pravastatin 40 mg/day	↓TC 18%	29% ↓ in MI 20% ↓ in revascularization 29% ↓ in CHD mortality	<0.001 <0.001 0.001
HPS[16] Secondary prevention 20,535 patients 5 year treatment period	Simvastatin 40 mg/day		26% ↓ in first event nonfatal MI or CHD death 25% ↓ in fatal or nonfatal stroke 18% ↓in CHD mortality	<0.0001 <0.0001 0.0005

FACULTY

MANAGEMENT OF DYSLIPIDEMIA: OPTIMIZING THE PHARMACIST'S ROLE IN A COLLABORATIVE MODEL OF CARE

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REVIEWERS

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

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TABLE 2 Target cholesterol values according to level of CHD risk[8]

Level of risk (definition)	LDL (mmol/L)	Total cholesterol: HDL-C ratio
High* (10-yr. risk of CHD ≥20%, or history of diabetes mellitus or any atherosclerotic disease)	<2.5	<4.0
Moderate^ (10-yr. risk 10-20%)	<3.5	<5.0
Low† (10-yr. risk <10%)	<4.5	<6.0

* Start medication and lifestyle changes together if values are above target.
^ Start medication if target values are not achieved after 3 months of lifestyle modification.
† Start medication if target values are not achieved after 6 months of lifestyle modification.
NOTE: New guidelines recommend that optimal triglyceride level is <1.7 mmol/L.

TABLE 3 Comparative effects of agents on lipid fractions

Agent	HDL-C	LDL-C	Triglycerides
Statins	↑	↓↓↓	↓ ↔
Fibrates	↑↑	↓ ↔ ↑	↓↓↓
Niacin	↑↑	↓↓	↓↓
Resins	↑	↓↓	↑

large randomized controlled trials are outlined in Table 1. Note the consistent reduction in CHD events.

Setting Therapeutic Targets and Treating Appropriately

K.M. is a 55-year-old male schoolteacher who has just had his annual medical check-up. He has a Body Mass Index (BMI) of 26 (overweight – ideal BMI = 20-25) and has a history of stable angina. He currently uses Nitro Patch 0.4 mg daily on at 8 a.m., off at 8 p.m., takes a coated ASA tablet 325 mg daily, atorvastatin 10 mg once daily and ramipril 10 mg once daily. He shows you his latest lipid profile which is:

LDL 2.9 mmol/L
Triglycerides 2.2 mmol/L
Total Cholesterol:HDL ratio 4.0

Is K.M. at his therapeutic target levels for lipids?

Therapeutic targets for dyslipidemia management are based on the category of 10-year CHD risk determined. Table 2 outlines the current recommendations of the Canadian Working Group on Hypercholesterolemia and Other Dyslipidemias.[8]

As noted in Table 2, patients such as K.M., who are classified as being high risk for CHD, should be started on lipid-lowering medication immediately instead of waiting to see if lifestyle modification brings values into target range.

In order to collaborate effectively in the management of dyslipidemia, it is important for pharmacists to understand the pharmacological effects of each of the available agents (see Table 3).

In Canada, the following pharmacological treatment strategies are currently recommended according to different abnormal lipid profiles:[8]

* Elevated LDL level alone - Statin with or without resin or ezetimibe.
* Elevated LDL with elevated triglycerides - Statin or statin plus ezetimibe only (resins increase triglycerides).
* Elevated LDL with low HDL – Combination therapy may be required (e.g., statin plus fibrate or statin plus niacin).
* Normal LDL with elevated triglyceride – Niacin or fibrate, or combination therapy.
* Normal LDL with low HDL - Niacin or fibrate, or combination therapy.

Ezetimibe belongs to a new class of lipid-lowering compounds that selectively inhibits the intestinal absorption of cholesterol and related phytosterols.[18] A multicentre, placebo-controlled trial involving the addition of ezetimibe to the drug regimen of patients not meeting their LDL-cholesterol goals while taking a statin resulted in an additional 25% reduction in LDL-cholesterol compared to the addition of placebo. Ezetimibe may also be used alone (in addition to appropriate diet) for cholesterol lowering. It is available as a 10 mg tablet, and can be taken with or without food. Adverse effects noted in trials to date have been similar to placebo.[18]

Since K.M. appears to be taking an appropriate medication (elevated LDL with slightly elevated triglycerides), an increase in dose would likely be prescribed by the physician and/or recommended by the pharmacist.

What would be the most appropriate dose of atorvastatin for K.M. and what monitoring should take place?

From Table 1 we see that K.M.'s target level for LDL is 2.5 mmol/L (since he has cardiovascular disease and is therefore classified as very high risk). His current LDL is 2.9 mmol/L. Therefore his LDL should be reduced by (2.9-2.5) x 100/2.9 = 13.8% to reach target level.

Roberts has devised a simple dosing recommendation for statins termed the rule of 5 and the rule of 7.[19] Simply put, for every doubling of statin dose, total cholesterol is reduced by approximately 5% and LDL is reduced by approximately 7%. (See Table 4.) Since K.M. is currently taking atorvastatin 10 mg and requires a further 13.8% reduction in his LDL as determined above, we could recommend increasing his dose to 40 mg daily (which would reduce LDL by a further 14% approximately). We would need to know that K.M. had been taking his current dose of atorvastatin for a minimum of 4 weeks (to ensure maximum response), and had been adherent to his medication regimen to ensure that maximum therapeutic effect had occurred. Adherence to medication regimen is critical and is discussed in detail later in this lesson. We would also have K.M. report any unexplained muscle aches, weakness or soreness or brown urine which could be signs of myopathy. If myopathy is present or suspected, the statin should be stopped immediately and the physician contacted. A creatine kinase level greater than 10 times the upper limit of normal along with symptoms is indicative of myopathy. Liver transaminases (ALT, AST) should be measured initially, approximately 12 weeks after starting therapy, and then annually or more frequently if the patient is at increased risk for liver dysfunction.

LIFESTYLE MODIFICATION

T.F. IS A 66-YEAR-OLD RETIRED INSURANCE worker who has just come back from 4 months in the south. She has done a "CHD 10-year risk" analysis as published in the 2003 update of the Recommendations for the Management of Dyslipidemia and the Prevention of Cardiovascular Disease and discovered she is at moderate risk for CHD. Her latest lipid profile shows her LDL to be 4.3 mmol/L, while her triglycerides and total cholesterol:

TABLE 4 Roberts Rule of 5 and 7[19]

Statin dose (mg)					Cholesterol change		
Atorvastatin	Simvastatin	Lovastatin	Pravastatin	Fluvastatin	Total	LDL	HDL
5	10	20	20	40	22%↓	27%↓	
10	20	40	40	80	27%↓	34%↓	
20	40	80			32%↓	41%↓	7%
40	80				37%↓	48%↓	
80	160				42%↓	55%↓	↓

*Note: Rosuvastatin was not available at the time of publication of this table. Available studies suggest that rosuvastatin 10-40 mg reduces LDL by 46-55% and raises HDL by 7.6-9.6%. (Statin Therapies for Elevated Lipid Levels compared across doses to Rosuvastatin [STELLAR study] presented at the American College of Cardiology 52nd Annual Scientific Session April, 2003)

HDL ratio are in the target range. T.F. has a BMI of 29 kg/m^2. She has never taken lipid-modifying medications.

What therapeutic options would you recommend to T.F.?

Since T.F. is at moderate risk for CHD, she should try lifestyle modification strategies for 3 months before consideration is given to pharmacological therapy (see Table 2).

Diet and Weight Management

A healthy diet is an important initiative in any therapeutic care plan aimed at reducing lipid levels. Canada's Food Guide recommends the following:[20]

1. 5 to 10 servings of grain products per day with emphasis on whole grain
2. 5 to 10 servings of fruits and vegetables per day
3. 2 to 4 servings of low-fat milk products per day
4. 2 to 3 servings of low-fat meat and alternatives per day

People following recommendations from Canada's Food Guide would have a daily intake of approximately 1,800 to 3,200 calories depending on the number of servings chosen from each category.[20] If T.F. wants to lose weight, she should choose from the lower end of the servings from each category and engage in an appropriate physical activity program. In short, the number of calories utilized during the day would have to exceed the number of calories consumed in the diet.

Different types of fat affect cholesterol levels in different ways:

1. Saturated fat — contained in meat fat, dairy fat, shortening, lard, palm oil and coconut oil. These fats tend to raise blood cholesterol.
2. Trans fatty acids — contained in partially hydrogenated fats, are found in French fries, cookies, crackers and potato chips. These fats tend to raise blood cholesterol.
3. Polyunsaturated fat — contained in safflower, sunflower, corn and soybean oils as well as fish oil (omega-3 fats) and flaxseed. This type of fat may help reduce blood cholesterol and triglycerides when used in place of saturated fat.
4. Monounsaturated fat — contained in olive, canola and peanut oil. These oils may also reduce blood cholesterol when used in place of saturated fat.

T.F. should be encouraged to partake of a low-fat diet consisting of:

1. <30% of total calories daily from fat (although the Heart and Stroke Foundation of Canada recommends no more than 25% of the day's calories from fat for those with dyslipidemia). About 45 calories of energy are derived from 5 g fat.
2. <10% of total calories from saturated fat and trans fatty acids.
3. <300 mg cholesterol per day.

In discussing weight-loss strategies with T.F., the following points should be stressed:

1. Weight loss is best achieved through strategies that promote gradual weight loss (approximately 0.25 to 1 kg per week) with a long-term goal (e.g., 7 kg over 3 months).
2. T.F. should use Canada's Food Guide to plan meals that include number of servings at the lower end of the range. She should ensure that her intake of fat is within suggested limits.
3. T.F. should engage in appropriate physical activity (see next section).

TABLE 5 Time required to benefit from physical activity based on effort[21]

Very light effort	Light effort (60 minutes)*	Medium effort (30-60 minutes)*	Vigorous effort (20-30 minutes)*	Maximum effort
Strolling	Volleyball	Brisk walking	Aerobics	Sprinting
Dusting	Easy gardening	Biking	Jogging	Racing
	Stretching	Raking leaves	Hockey	
	Light walking	Swimming	Basketball	
		Dancing	Fast swimming	
			Fast dancing	

* Note: Light effort to moderate effort physical activity in the daily time ranges noted are required to stay healthy.

Physical Activity for Managing Dyslipidemia and Reducing CHD Risk

T.F. should be referred to Canada's physical activity guide which can be found on the internet at www.paguide.com. Canada's physical activity guide recommends working towards 60 minutes of light activities daily in segments of at least 10 minutes each.[21] The physical activity guide also highlights the importance of engaging in different types of activities. These include:[21]

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.

The amount of time needed for positive results depends on the amount of effort required to perform the activity (see Table 5).

The results of a study evaluating the effects of low-fat diet plus aerobic exercise vs. low-fat diet alone vs. exercise alone vs. a control group, found that the low-fat diet was effective in lowering LDL cholesterol only when combined with exercise. This study underlines the importance of physical activity in lifestyle modification strategies aimed at reducing LDL cholesterol levels.[22]

COLLABORATIVE APPROACHES FOR OPTIMAL PATIENT OUTCOMES

Issues in Patient Adherence: Knowledge is Empowerment

NON-ADHERENCE TO THERAPEUTIC REGIMENS is a major barrier to optimal patient outcomes. It has been estimated that only 50% of patients take their medication as prescribed.[23] Furthermore, when taking medications for a period of 2 weeks or longer, less than 50% of patients take sufficient medication to allow for effective treatment.[23,24]

Considering that survival benefits of statins usually begin after 1 to 2 years of treatment, patients taking lipid-modifying medications may not derive any benefit of medication if discontinued early. A recent analysis of more than 140,000 patients over the age of 66 who were prescribed statins in Ontario between January 1994 and December 1998, revealed that adherence to therapy after 2 years was only 40.1% for patients with acute coronary syndrome, 36.1% for patients with chronic CHD and 25.4% for patients using statins for primary prevention.[25] This identifies a major need for the education and follow-up of patients taking lipid-modifying medications.

Bruce Berger, a professor of pharmacy at Auburn University has completed a major review of the adherence literature and puts forward the following pre-conditions for adherence to treatment regimens.[26] Patients must:
1. be interested in their health
2. believe and understand the diagnosis
3. correctly assess the potential impact of the diagnosis
4. believe in the efficacy of the prescribed treatment
5. find ways of using the medication that are not more trouble than the disease itself (this includes remembering when to take the medication and the possibility that many side effects of the medication may make the patient feel worse than the disease)
6. know exactly how and for how long to take the medication
7. value the outcome of treatment more than the cost of treatment
8. believe that they can exert some degree of control over their illness by carrying out the treatment plan (either alleviation of symptoms or cure)
9. believe that the health-care practitioners involved in the treatment process truly care about them as a person, and do not view the patient as simply a disease to be treated.

It is apparent from the preceding list of pre-conditions to adherence that patient education and relationship to health-care providers play a critical role. Pharmacists are in an ideal position to ensure that patients understand the importance of taking medication correctly, identify patients who may be at risk of not adhering to their medication schedules and to make recommendations for optimizing an individual's adherence to medication regimens.

The SCRIP Study: A Success Story Worth Building On

The Study of Cardiovascular Risk Intervention by Pharmacists (SCRIP) demonstrated that pharmacist education, referral and follow-up can significantly close the lipid management "care gap" that currently exists.[3] In the study, 54 community pharmacies in Alberta and Saskatchewan were randomized to provide patients with education, a brochure outlining risk factors, a point-of-care cholesterol measurement, referral to their physician where appropriate, and regular follow-up for 16 weeks. The control pharmacies provided patients (referred to as usual care patients) with the same brochure and advice only, with minimal follow-up. The primary endpoint included conducting a fasting-cholesterol panel and/or the addition or increase in dose of lipid modifying medication. The study involving 675 patients was terminated early because the primary endpoint was reached in 57% of the intervention patients versus 31% of usual-care patients ($p<0.001$).[3]

The SCRIP Plus Study was designed to determine the effect of a community-pharmacist intervention program on LDL cholesterol in patients at high risk for cardiovascular disease.[4] The primary endpoint was change in LDL from baseline to study end at 6 months. Secondary objectives included patient satisfaction with pharmacist services, patient compliance with lipid-lowering medications, proportion of patients achieving target LDL and total cholesterol to HDL ratio, and cost analysis of providing the clinic. The study was conducted in partnership with 42 Pharmasave pharmacies in British Columbia, Saskatchewan, Manitoba, Ontario, New Brunswick, PEI and Nova Scotia. Results of the study were presented at the American Heart Association in November 2002 (the study was not yet published at the time of printing).[27] A statistically significant LDL cholesterol reduction of 0.53 mmol/L (15% decrease) over the 6-month study period was reported.[27] The SCRIP and SCRIP Plus studies provide undeniable evidence that enhanced pharmacist care helps to reduce current care gaps in lipid management, thereby reducing patient risk associated with lipid levels above target values.

Setting Up a Cholesterol Clinic: Practical Considerations and Opportunities

Before you can help your patients understand their condition and lipid management, they should know their lipid values. This information is every bit as important as blood pressure values and need to be viewed in that light. You can empower patients by designing a documentation tool which allows them to list these values after they have had their lipid profiles done.

Before you sit down with a patient to talk about lipid management, you will want to have resources available to complement your discussion. These may include:
* A customized information-gathering form which includes patient demographics, current medications (both prescription and OTC) and heart health risk assessment tool (e.g., risk calculator as published in CMAJ – available online at www.cmaj.ca/cgi/data/

169/9/921/DC1/1. The Canadian Pharmacists' Association "Just Checking" form is another useful tool for gathering information and identifying drug-related problems. Details of how to obtain this form can be found on the Canadian Pharmacists' Association website at www.pharmacists.ca.

* Patient information on the topics of healthy diet (e.g., Canada's Food Guide, Heart and Stroke Foundation *Healthy Eating* at www.heartandstroke.ca, Health Canada's *Healthy Heart Kit* at www.heartandstroke.ca/healthyweight), physical activity (e.g., Canada's Physical Activity Guide at www.paguide.ca) and the importance of weight management (e.g., *Healthy Heart Kit* at www.heartandstroke.ca/healthyweight).
* Patient information and education about the role of lipids in health risks and the benefits afforded by modifying levels to targets. (Available through organizations such as Canadian Heart and Stroke Foundation).
* A tool for creating a care plan which includes:
  * Patient health goals
  * Monitoring parameters
  * Collaborative-care plan recommendations
  * Implementation strategies and related documentation
  * Follow-up strategies and related documentation.

To get started, discussion with local physicians or informational leaflets are appropriate for promoting optimal communication and collaboration. Referral to the SCRIP and SCRIP Plus programs provide evidence that such a patient-care approach is warranted. Identifying patients who have been nonadherent to therapeutic regimens is also an important component of this strategy.

Marketing your services is a very important step towards a successful clinic. Initiatives might include:

* Using promotional posters and bag stuffers and especially approaching patients who might benefit from the service.
* Partnering with local employers in collaboration with wellness initiatives.
* Placing an ad in the local newspaper or local radio station, or sending out flyers into the community.

Pharmacists interacting and intervening with patients on a regular basis have demonstrated value in improving public health.[3,4] Through such activities, patients will better understand the importance of adherence to therapeutic regimens and regular health professional consultations. In addition, the public and other health professionals will recognize the value of enhanced pharmacist services.

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QUESTIONS

Case Study

L.S., a 52-year-old woman diagnosed with Type 2 diabetes two years ago, has just been told by her doctor that her "bad cholesterol" is higher than it should be. She has a BMI of 29 kg/m^2 (overweight). She has her lipid profile written on a piece of paper:
LDL 3.4 mmol/L
HDL 1.3 mmol/L
Total cholesterol 5.7 mmol/L
Triglycerides 2.3 mmol/L
L.S. has a prescription for pravastatin but would like a few questions answered before filling the prescription.

1. L.S. says she has always followed a diet low in saturated fats. She can't understand why she is being told that her LDL cholesterol is high. Which explanation would you be most likely to give to L.S.?
a) You may be eating more cholesterol than you realize. Try replacing corn oil with coconut oil.
b) Perhaps cooking with palm oil instead of canola oil will help you reduce your intake of saturated fats.
c) Many people develop high levels of LDL because they are of a certain race or genetic make-up.
d) You might as well forget about your diet because it won't do any good anyway.

2. Which statement is TRUE?
a) The percentage of deaths caused by CHD has been increasing over the past 25 years.
b) CHD is still the number one cause of death in Canada.
c) About 15% of Canadians have an LDL value greater than 3.5 mmol/L.
d) b and c

3. L.S. tells you she has heard that one should try becoming more physically active and modifying diet before starting medication. How would you respond?
a) She is absolutely right. You will discuss options with her so she can get started right away.
b) Since she has a low intake of cholesterol already, the doctor probably decided to start medication right away.
c) She is right, but in her circumstances the doctor should only wait for three months before treating LDL that is higher than target values.
d) Because L.S. has been diagnosed with diabetes, she is at very high risk for CHD. Therefore, guidelines recommend that medication be started right away if cholesterol levels are higher than target values.

4. Which features of the insulin resistance syndrome (or metabolic syndrome) increase risk for CHD?
a) Extra weight around the hips instead of around the abdominal area.
b) Larger LDL particles than the general population.
c) Low HDL level.
d) All of the above.

5. L.S. asks you to explain what "very high risk" for coronary heart disease means? What is your response?
a) Her risk for developing coronary heart disease within the next 10 years is greater than 20%.
b) Her risk for developing coronary heart disease within the next 10 years is at least 6 times that of the general population.
c) Her risk for developing coronary heart disease within the next 10 years is 40%.
d) Her risk for developing coronary heart disease within the next 10 years is 50%.

6. L.S. asks you by how much she needs to reduce her bad cholesterol. How would you respond?
a) The guidelines indicate that she should reduce her LDL to 2.5 mmol/L and her triglycerides should stay at or below 3.0 mmol/L.
b) The guidelines indicate that she should reduce her LDL to 3.0 mmol/L and her triglycerides to 2.0 mmol/L.
c) The guidelines indicate that she should reduce her LDL to 2.5 mmol/L and her triglycerides should stay at or below 2.5 mmol/L.
d) The guidelines state that she should reduce her LDL below 2.5 mmol/L and her triglycerides to 2.0 mmol/L.

7. L.S. asks you if pravastatin is a good choice for her. How would you respond?
a) It would probably have been better to start with cholestyramine, considering triglycerides are not at target levels.
b) No medication should be started until the effects of lifestyle modification are evaluated.
c) Pravastatin is a logical choice for starting therapy since her LDL is elevated and her triglyceride levels are slightly above target.
d) Simvastatin would have been a better choice since it would be easier to reach target levels of LDL with this medication.

8. If L.S.'s physician asked you if pravastatin 20 mg daily was sufficient to bring her LDL into target range, how would you respond?
a) Because L.S. requires a 0.9 mmol/L reduction in LDL, pravastatin 20 mg is a good choice.
b) Because L.S. requires a 0.9 mmol/L reduction in LDL, pravastatin 40 mg would be a better choice.
c) Because L.S. requires a 0.9 mmol/L reduction in LDL, atorvastatin 40 mg or simvastatin 80 mg would be the best choice.
d) Because L.S. requires a 0.9 mmol/L reduction in LDL, atorvastatin 80 mg or simvastatin 160 mg would be the best choice.

9. Which statement regarding triglyceride levels is TRUE?
a) People who are classified as having a moderate 10-year risk of CHD must target a triglyceride value less than 2 mmol/L.
b) All patients should target a triglyceride value of less than 1.7 mmol/L.
c) People who are classified as having a low 10-year risk of CHD must target a triglyceride value less than 2 mmol/L.
d) a and c

10. If a 50% reduction in LDL level was required in a patient, which of the following medications would you recommend?

a) Pravastatin, lovastatin or rosuvastatin
b) Atorvastatin, simvastatin or rosuvastatin
c) Fluvastatin, simvastatin or rosuvastatin
d) None of the above

11. L.S. says she would like to lose some weight as part of her strategy to manage her risk for CHD. Which of the following recommendations about fat intake would be most appropriate?
a) Because L.S. has dyslipidemia, the Heart and Stroke Foundation recommends she obtain no more than 35% of the day's calories from fat.
b) L.S. should receive less than 10% of total calories from saturated fat and trans fatty acids.
c) L.S. should ingest 700 mg cholesterol per day or less.
d) L.S. should ingest no more than 1,000 calories daily from fat sources.

12. To lose weight, how many calories per day would L.S. receive if she consumes the smaller number of portions in each food group as recommended by Canada's Food Guide?
a) ~ 1,800
b) ~ 2,500
c) ~ 3,200
d) ~ 4,000

13. You inform L.S. that appropriate physical activity should be part of any weight management program. Which of the following would be an appropriate total physical activity recommendation based on Canada's Physical Activity Guide if L.S. is otherwise healthy?
a) Light walking for 30 minutes, three times a week.
b) Brisk walking for 20 minutes, three times a week.
c) Sixty minutes of light activities, performed continuously in a day.
d) Sixty minutes of light activities per day, divided into segments of at least 10 minutes.

14. L.S. says she wants to lose weight and keep it off. She asks you how much weight she should lose per week. What is your response?
a) It is best to lose weight quickly (e.g., 2 kg per week).
b) She should try and reach her target weight within one month.
c) She should target approximately 0.25 kg per to 1 kg per week and set a long-term goal for about three months.
d) She should lose a maximum of 1 kg per month.

15. L.S. comes back to your pharmacy in 6 weeks. Her LDL is now 2.7 mmol/L and her triglycerides 2.1 mmol/L. If her doctor wants to increase her dose of pravastatin, what would you recommend (after verifying she has been adherent with therapy)?
a) Don't change anything because 2.7 mmol/L is close enough.
b) Increase pravastatin to 40 mg daily which will reduce LDL by approximately 7% to bring it into target range.
c) Change pravastatin to simvastatin since pravastatin doesn't seem to be effective.
d) Add cholestyramine to therapy instead of increasing pravastatin dose.

16. L.S. says she has a friend whose LDL cholesterol is 3.7 mmol/L. Her doctor said that was good! How would you explain her doctor's comments?
a) Perhaps her friend's doctor is not aware of current guidelines.
b) Targets for LDL are more rigorous as risk for CHD increases. It's likely that her friend isn't in as high a risk category as L.S.
c) Most doctors don't refer to guidelines but tend to use a limit of 5 mmol/L for LDL as a cutoff point for all patients.
d) Only people with diabetes need to lower their LDL to the lowest target levels.

17. L.S. wonders if she will need to take this medication for more than a year because she already has a lot of medications to take. How would you respond?
a) Unfortunately, the mortality reduction benefits from taking lipid modifying medication don't become evident for at least one year. Since her body seems to be making too much cholesterol, she will likely need to keep taking the medication indefinitely if she wants her lipid levels at target.
b) Her doctor will check her cholesterol levels in 4 to 6 weeks. If they are at target, she will be asked to stop taking the medication to see how she does.
c) Most people take this type of medication for 6 months. If target levels are reached, medication is stopped on the advice of their doctor.
d) Since the risk of CHD is reduced after 1 or 2 years of taking this medication, medication is usually discontinued at this point.

18. When taking medications for 2 weeks or longer, approximately what percentage of patients take enough medication to result in effective treatment?
a. <30%
b) ~60%
c) 20%
d) <50%

19. Which of the following are important points for assessing potential adherence to medication regimens?
a) Identifying whether patients believe and understand their diagnosis.
b) Assessing if the patient values the outcome of treatment more than the cost of treatment.
c) Determining if the patient knows exactly how and for how long to take the medication.
d) All of the above.

20. Which statement is CORRECT regarding evidence forthcoming from randomized controlled trials assessing outcomes associated with lipid modification?
a) Lipid management significantly reduces morbidity and mortality associated with CHD in secondary prevention only.
b) Lipid management significantly reduces morbidity and mortality associated with CHD in both primary and secondary prevention.
c) Lipid management significantly reduces morbidity and mortality associated with CHD only when lipid values are significantly elevated.
d) Lipid management significantly reduces morbidity and mortality associated with CHD only in overweight or obese individuals.

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1. Do you now feel better able to provide pharmaceutical care for patients with dyslipidemia? ❑ Yes ❑ No
2. Was the information in this lesson relevant to your practice? ❑ Yes ❑ No
3. Will you be able to incorporate the information from this lesson into your practice? ❑ Yes ❑ No
4. Was the information in this lesson... ❑ Too basic ❑ Appropriate ❑ Too Difficult
5. Do you feel this lesson met its stated learning objectives? ❑ Yes ❑ No
6. What topic would you like to see covered in a future issue? _____

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