Managing Cardiovascular Risk: The Importance of Lowering LDL Cholesterol and Reaching Treatment Goals for LDL Cholesterol – The Role of the Pharmacist

Learning Objectives

1. Review the role of lipid levels in the development of cardiovascular disease and define risk;
2. Describe barriers to effective treatment, particularly in the control of low-density lipoprotein cholesterol;
3. Evaluate adherence issues in the treatment of dyslipidemia and outline interventions to address the specific causes of nonadherence;
4. Assess the rationale and benefits of available lipid-modifying therapies; and
5. Discuss new and emerging categories of cholesterol-modifying agents, including monoclonal antibodies.

1. According to the 2013 American College of Cardiology (ACC)/American Heart Association (AHA) cholesterol guidelines, when is it appropriate for a person to be treated with non-statin, lipid-lowering agents?
   
   A. Patient has experienced statin intolerance
   
   B. Patient has not reached the percentage reduction goal with statin therapy
   
   C. Patient has a triglycerides level greater than 500 mg/dL
   
   D. All of the above***

   Correct answer: D

   ACC/AHA cholesterol guidelines state that all of these answer choices are valid reasons to use an alternative lipid-lowering agent to statins.
2. Which one of the following barriers to effective treatment may be a cause of statin intolerance:

A. Statin associated muscle symptoms (SAMS)***
B. Dietary intake of grapefruit juice
C. Intense physical activity
D. Abuse of alcohol or illicit drugs

Correct answer: A

SAMS is a cause of statin intolerance while the other options are lifestyle risk factors for SAMS.

3. Which lipid-lowering agent, in addition to simvastatin therapy, showed an additional reduction in low-density lipoprotein cholesterol (LDL-C) and cardiovascular events (i.e., deaths from cardiovascular disease (CVD), major coronary event, or nonfatal stroke)?

A. Ezetimibe***
B. Fenofibrate
C. Niacin
D. Omega-3 fatty acids

Correct Answer: A

From the Improved Reduction of Outcomes: Vytorin Efficacy International Trial (IMPROVE-IT), ezetimibe with simvastatin demonstrated a reduction in LDL-C and cardiovascular events.
4. What percentage of patients showed improved adherence to cholesterol-lowering agents when provided with reminders and reinforcement regarding the importance of adherence?

A. 2%
B. 13%
C. 24%***
D. 50%

Correct answer: C

Adherence increased up to 24% when patients were provided with reminders and reinforcements to adhere to prescribed medication regimens.

5. According to the findings in the Understanding Statin Use in America and Gaps in Patient Education (USAGE) study, what was the main reason patients reported discontinuing statin therapy?

A. Adverse effects***
B. Cost
C. Lack of understanding of the disease
D. Unclear efficacy of the medicine

Correct answer: A

The main reason patients reported discontinuing their statin therapy was experiencing an adverse effect.
6. Which lipid-lowering agent has demonstrated improvements in glycemic control and, therefore, is also approved for the treatment of type 2 diabetes?

A. Colesevelam***  
B. Ezetimibe  
C. Niacin  
D. Rosuvastatin  

**Correct answer: A**

Colesevelam is approved in type 2 diabetes and reduces blood sugar. The other agents have shown increased or no effect on blood glucose.

7. What is the mechanism of action with which PCSK9 inhibitors lower LDL-C?

A. Blocking the LDL-receptor from degradation, which allows the receptor to be recycled for further removal of LDL-C***  
B. Inhibit 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase, which results in decreased cholesterol biosynthesis  
C. Inhibit cholesterol absorption in the small intestine by the sterol transporter, Niemann-Pick C1-Like (NPC1L1)  
D. Forms an insoluble complex from bound bile acids, resulting in an increase of cholesterol oxidation  

**Correct answer: A**

The mechanism of action (MOA) of PCSK9 inhibitors is the blocking of the LDL receptor from degradation, which allows the receptor to be recycled for the removal of LDL-C. The other choices are the mechanisms for other lipid-lowering agents (e.g., statins, ezetimibe, and bile acid sequestrants).
8. According to the recommendation from the National Lipid Association expert panel, what is the root cause of atherosclerosis?

A. Elevated level of apolipoprotein B***
B. Elevated level of triglycerides
C. Decreased level of HDL-C
D. Decrease in PCSK9 inhibition

Correct answer: A

Particles containing apolipoprotein B, such as LDL-C and non-high-density lipoprotein cholesterol is the root cause of atherosclerosis.

9. A gain-of-function mutation in PCSK9 in patients with heterozygous familial hypercholesterolemia may be treated with _________________ to obtain lower LDL-C levels.

A. Atorvastatin
B. Evolocumab***
C. Lomitapide
D. Mipomersen

Correct answer: B

Evolocumab is a PCSK9 inhibitor that can increase LDL-receptor activity and thus lower LDL-C levels.
10. According to the clinical trials, which adverse drug effect is similar with the use of both evolocumab and alirocumab?

A. Influenza
B. Injection site reactions***
C. Nasopharyngitis
D. Upper respiratory tract infections

**Answer choice: B**

Injection site reactions were documented as adverse drug reactions with the use of both evolocumab and alirocumab, while the other answer choices were adverse reactions documented in the evolocumab safety data.