D1. TECHNICIANS
UPDATES IN CHOLESTEROL MANAGEMENT
10:45 - 11:45AM

ACPE UAN: 107-000-14-022-L01-T  0.1 CEU/1.0 hr
Activity Type: Knowledge-Based

Learning Objectives for Technicians: Upon completion of this CPE activity participants should be able to:
1. Define high cholesterol
2. List the common medication classes of cholesterol medications
3. Identify brand and generic names of common cholesterol medications
4. Differentiate the differences in cost of common cholesterol medications
5. Identify common supplements patients may ask about in regards to their cholesterol and cholesterol medication

Speaker: Wendy M. Lantaff, PharmD, is a current University of Iowa Community Pharmacy Practice Resident. Wendy graduated from the University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences in May of 2013 with her Doctor of Pharmacy degree. Wendy’s practice interest lies in independent community pharmacy and she plans on being a pharmacy owner in the future.

Speaker Disclosure: Wendy Lantaff reports no actual or potential conflicts of interest in relation to this CPE activity. Off-label use of medications will not be discussed during this presentation.
Updates in Cholesterol Management

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Faculty Disclosure

Wendy Lantaff reports she does not have actual or potential conflicts of interest associated with this presentation
Learning Objectives

Upon completion of this activity, pharmacy technicians should be able to:

1. Define high cholesterol
2. List the common medication classes of cholesterol medications
3. Identify brand and generic names of common cholesterol medications
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5. Identify common supplements patients may ask about in regards to their cholesterol and cholesterol medication

What is Cholesterol?

- A steroid that is abundant in animal tissues and is necessary for normal function; elevated levels of total cholesterol circulating in the blood of a host are associated with increased risks of cardiovascular disease.

Greenberg et al, 2014
Why is Cholesterol Important?

- Source of:
  - Free fatty acids

- Essential elements for:
  - Cell membrane formation
  - Hormone synthesis

“Types” of Cholesterol

- Total cholesterol
  - LDL
    - VLDL
  - HDL
  - Triglycerides

Greenburg et al, 2013
Talbert et al, 2011

Talbert et al, 2011
Why worry about High Cholesterol?

- Major modifiable risk factor for:
  - Coronary heart disease
  - Heart attack
  - Stroke
High Cholesterol

A fatty streak develops between layers of artery wall.

Muscle cells in the artery wall

Inflammatory cells (macrophages) engulf deposited cholesterol.

Macrophages become giant foam cells.

American Heart Association, 2012

High Cholesterol

A fibrous outer cap forms from convected smooth muscle cells and other elements.

Foam cells continue to expand the core of the plaque.

American Heart Association, 2012
High Cholesterol

Large unstable plaque with thin fibrous cap

Plaque rupture

A blood clot (thrombus) forms at the site of the plaque rupture.

Heart muscle (myocardium) supplied by the blocked artery starts to die.

American Heart Association, 2012
What is High Cholesterol?

- Previous cholesterol guidelines: ATP III
  - Used Framingham risk score and Major Risk Factors to set LDL goal
  - Had secondary goal of treating triglycerides and tertiary goal of treating HDL

- New 2013 ACC/AHA Guidelines
  - Focus on LDL
  - Four major groups may benefit from cholesterol therapy with a statin

2013 ACC/AHA Guidelines

- Clinical ASCVD
- LDL $\geq 190$ mg/dL

- Patients with diabetes
  - 40-75 years
  - LDL 70-189 mg/dL

- 10- year risk of ASCVD $\geq 7.5$
  - 40-75 years
  - LDL 70-189 mg/dL
High Cholesterol

- Usually refers to LDL
  - For an otherwise healthy adult an LDL $\geq 190$ mg/dL
  - For patients with diabetes and/or 10 year risk of ASCVD $\geq 7.5\%$ an LDL $\geq 70$ mg/dL

High Cholesterol

- High triglycerides are $\geq 200$ mg/dL
- HDL $\leq 40$ mg/dL is considered too low
Treatment of High Cholesterol

- Therapeutic Lifestyle Changes (TLC)
  - 2013 ACC/AHA Guidelines have Lifestyle as the Foundation
    - Heart healthy diet
    - Regular exercise
    - Avoidance of tobacco
    - Maintaining a healthy weight

- Cholesterol Medications
  - 2013 ACC/AHA Guidelines focus on statin therapy
  - Triglycerides should be treated first if above 500 mg/dL

TLC

- Heart healthy diet
- Regular exercise
- Avoidance of tobacco
- Maintaining a healthy weight
Which of the following meals would be considered “heart healthy”?

A: A Big Mac with a side of fries and a small diet soda

B: A grilled chicken sandwich with a side of fruit and an orange juice

C: A sirloin with a small side salad, baked potato and red wine
Classes of Cholesterol Medications

- Statins
- Bile acid sequestrants
- Nicotinic acid
- Fibric acids
- Cholesterol absorption inhibitor
- Omega-3 Fatty Acids
Classes of Cholesterol Medications

- **Statins**
- Bile acid sequestrants
- Nicotinic acid
- Fibric acids
- Cholesterol absorption inhibitor
- Omega-3 Fatty Acids

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name(s)</th>
<th>Generic Drug Available?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin</td>
<td>Lipitor</td>
<td>Yes</td>
</tr>
<tr>
<td>Fluvastatin</td>
<td>Lescol, Lescol XL</td>
<td>Yes</td>
</tr>
<tr>
<td>Lovastatin</td>
<td>Altoprev, Mevacor</td>
<td>Yes</td>
</tr>
<tr>
<td>Pitavastatin</td>
<td>Livalo</td>
<td>No</td>
</tr>
<tr>
<td>Pravastatin</td>
<td>Pravachol</td>
<td>Yes</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>Zocor</td>
<td>Yes</td>
</tr>
<tr>
<td>Rosuvastatin</td>
<td>Crestor</td>
<td>No</td>
</tr>
</tbody>
</table>

Rosenson 2013
## 30 Day Supply Cost to Patient

<table>
<thead>
<tr>
<th>Name</th>
<th>Cost</th>
<th>Generic Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin (Lipitor)</td>
<td>10 mg: $7.08</td>
<td>Yes</td>
</tr>
<tr>
<td>Fluvastatin (Lescol)</td>
<td>80 mg XL: $162.24</td>
<td>Yes</td>
</tr>
<tr>
<td>Lovastatin (Altoprev)</td>
<td>40 mg: $5</td>
<td>Yes</td>
</tr>
<tr>
<td>Pitavastatin (Livalo)</td>
<td>2 mg: $150</td>
<td>No</td>
</tr>
<tr>
<td>Pravastatin (Pravachol)</td>
<td>40 mg $18.82</td>
<td>Yes</td>
</tr>
<tr>
<td>Simvastatin (Zocor)</td>
<td>20 mg: $4</td>
<td>Yes</td>
</tr>
<tr>
<td>Rosuvastatin (Crestor)</td>
<td>5 mg: $171.33</td>
<td>No</td>
</tr>
</tbody>
</table>
Comparison of the Efficacy of Statin Drugs

Mechanism of Action

- Statins decrease the body’s production of cholesterol
  - Prevent a step in cholesterol synthesis in the liver lowering LDL
  - HMG CoA reductase inhibitor

- Statins can also decrease triglycerides and increase HDL

- 2013 ACC/AHA Guidelines divide the different statins by dosages into 3 categories:
  - High-intensity
  - Moderate-intensity
  - Low-intensity
Technician Pearls

- Patient’s should only take one statin medication at a time
- Atorvastatin and rosuvastatin lower triglycerides the most
- Simvastatin, lovastatin, and fluvastatin should be taken in the evening
- Grapefruit juice inhibits intestinal enzymes which metabolize some of the statins. Most patients can safely have ½ a grapefruit or 8 oz of juice

Bakker-Arkema et al, 1996
Davidson et al 1997

Technician Pearls

- Simvastatin may have more interactions with other medications due to its metabolism
- Major side effect of statin drugs is muscle pain/weakness
- All statins are category X in pregnancy
- Adherence to statin therapy is important
Technician Pearls

- **Red Yeast Rice:**
  - Similar chemical make-up as lovastatin
  - Should not be taken at the same time as any statin

- **Coenzyme Q10 (CoQ10):**
  - Antioxidant found in the human body
  - Statin may decrease naturally occurring CoQ10
  - Some evidence that when taken with statin medications ↓ muscle pain/weakness

Audience Response

Technicians are crucial in identifying if a patient is adherent to their statin therapy.

A: TRUE

B: FALSE
Audience Response

Technicians are crucial in identifying if a patient is adherent to their statin therapy.

A: TRUE

B: FALSE

Classes of Cholesterol Medications

- Statins
- **Bile acid sequestrants**
- Nicotinic acid
- Fibric acids
- Cholesterol absorption inhibitor
- Omega-3 Fatty Acids
# Bile Acid Sequestrants

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colestipol</td>
<td>Colestid</td>
</tr>
<tr>
<td>Cholestyramine</td>
<td>LoCholest, Prevalite, Questan</td>
</tr>
<tr>
<td>Colesevelam</td>
<td>Welchol</td>
</tr>
</tbody>
</table>

- Bind to bile acids in the intestine which reduces the amount of cholesterol absorbed from food
- Decrease LDL
Technician Pearls

- Bile acid sequestrants can affect the absorption of other medications and fat soluble vitamins
  - Separate dosing by several hours

- Take with meals

- Common side effects: nausea, bloating, cramping

Classes of Cholesterol Medications

- Statins
- Bile acid sequestrants
- **Nicotinic acid**
- Fibric acids
- Cholesterol absorption inhibitor
- Omega-3 Fatty Acids
Nicotinic Acid

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niacin, Nicotinic Acid</td>
<td>Niaspan</td>
</tr>
<tr>
<td>Niacin + lovastatin</td>
<td>Advicor</td>
</tr>
<tr>
<td>Niacin + simvastatin</td>
<td>Simcor</td>
</tr>
</tbody>
</table>

- Available prescription ($$$) and OTC ($)
- Can decrease triglycerides up to 50%, some reduction in LDL and increase in HDL
Technician Pearls

- Side effects: flushing
  - Taking aspirin 30 minutes before nicotinic acid can decrease flushing
  - Usually improves after the first few weeks of therapy

- Caution in patients with gout, diabetes

Classes of Cholesterol Medications

- Statins
- Bile acid sequestrants
- Nicotinic acid
- **Fibric acids**
- Cholesterol absorption inhibitor
- Omega-3 Fatty Acids
## Fibric Acid

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenofibrate</td>
<td>Antara, Fenoglide, Lipofen,</td>
</tr>
<tr>
<td></td>
<td>Tricor, Triglide, Trilipix</td>
</tr>
<tr>
<td>Gemfibrozil</td>
<td>Lopid</td>
</tr>
</tbody>
</table>

- Can decrease triglyceride up to 50% and raise HDL
- Used primarily to treat high triglycerides
**Technician Pearls**

- If a patient is also on a statin, fenofibrate is preferred over gemfibrozil
- Interaction with warfarin, so patients may need to decrease their warfarin dose
- Micronized fenofibrate should be taken with meals

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**Classes of Cholesterol Medications**

- Statins
- Bile acid sequestrants
- Nicotinic acid
- Fibric acids
- **Cholesterol absorption inhibitor**
- Omega-3 Fatty Acids
Cholesterol Absorption Inhibitor

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ezetimibe</td>
<td>Zetia</td>
</tr>
<tr>
<td>Ezetimibe + simvastatin</td>
<td>Vytorin</td>
</tr>
</tbody>
</table>

- Decreases the body’s ability to absorb cholesterol from food and impairs the body’s ability to make cholesterol
- Studies show it lowers LDL cholesterol HOWEVER the studies do not support fewer heart attacks or strokes
- $$$
Classes of Cholesterol Medications

- Statins
- Bile acid sequestrants
- Nicotinic acid
- Fibric acids
- Cholesterol absorption inhibitor
- **Omega-3 Fatty Acids**

Fish Oil: Omega-3 Fatty Acid

- Prescription: Lovaza ($$$)
- OTC: various products ($)
  - EPA/DHA
  - Doses > 1 gram

Images from: Naturemade.com
  Naturesbounty.com
Fish Oil: Omega-3 Fatty Acid

- Can decrease triglycerides 25-30%, raise HDL and LDL slightly

- Can increase risk of bleeding

- Common side effects: nausea, “fishy burps”

Audience Response

A patient presents to your pharmacy with a prescription for Lovaza. The patient is concerned about being able to afford the co-payment. The patient states the doctor said if the Lovaza was too expensive taking 2 grams Omega-3 Fatty Acids from Fish Oil available over-the-counter daily would be fine. The pharmacy has “Fish Oil 1000 mg” with 300 mg of Omega-3 Fatty Acids (EPA and DHA) per capsule available.

How many capsules of the over-the-counter product would this patient need to take to consume at least 2 grams per day?
Audience Response

The pharmacy has “Fish Oil 1000 mg” with 300 mg of Omega-3 Fatty Acids (EPA and DHA) per capsule available.

How many capsules of the over-the-counter product would this patient need to take to consume at least 2 grams per day?
A: 2 capsules
B: 4 capsules
C: 7 capsules
D: 10 capsules

(2000 mg Omega-3 Fatty Acids needed) / (300 mg per capsule) = 6.67 capsules
Round up to 7 capsules
### Common Cholesterol Lowering Supplements

<table>
<thead>
<tr>
<th>Cholesterol-lowering supplement</th>
<th>What it does</th>
<th>Side effects and drug interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artichoke extract</td>
<td>May reduce total cholesterol and LDL, or &quot;bad,&quot; cholesterol</td>
<td>May cause gas or an allergic reaction</td>
</tr>
<tr>
<td>Barley</td>
<td>May reduce total cholesterol and LDL cholesterol</td>
<td>None</td>
</tr>
<tr>
<td>Beta-sitosterol (found in oral supplements and some margarines, such as Promise Activ)</td>
<td>May reduce total cholesterol and LDL cholesterol</td>
<td>May cause nausea, indigestion, gas, diarrhea or constipation. May be ineffective if you take ezetimibe (Zetia), a prescription cholesterol medication.</td>
</tr>
<tr>
<td>Blond psyllium (found in seed husk and products such as Metamucil)</td>
<td>May reduce total cholesterol and LDL cholesterol</td>
<td>May cause gas, stomach pain, diarrhea, constipation or nausea</td>
</tr>
<tr>
<td>Fish oil (found as a liquid oil and in oil-filled capsules)</td>
<td>May reduce triglycerides</td>
<td>May cause a fishy aftertaste, bad breath, gas, nausea, vomiting or diarrhea. May interact with some blood-thinning medications, such as warfarin (Coumadin).</td>
</tr>
<tr>
<td>Flaxseed, ground</td>
<td>May reduce triglycerides</td>
<td>May cause, gas, bloating or diarrhea. May interact with some blood-thinning medications, such as aspirin, clopidogrel (Plavix) and warfarin (Coumadin).</td>
</tr>
<tr>
<td>Garlic extract</td>
<td>May reduce total cholesterol, LDL cholesterol and triglycerides</td>
<td>May cause bad breath, body odor, heartburn, gas, nausea, vomiting or diarrhea. May interact with blood-thinning medications, such as warfarin (Coumadin).</td>
</tr>
<tr>
<td>Green tea extract</td>
<td>May lower LDL cholesterol</td>
<td>May cause nausea, vomiting, gas or diarrhea. May interact with blood-thinning medications, such as warfarin (Coumadin).</td>
</tr>
<tr>
<td>Oat bran (found in oatmeal and whole oats)</td>
<td>May reduce total cholesterol and LDL cholesterol</td>
<td>May cause gas or bloating</td>
</tr>
</tbody>
</table>

**Mayo Clinic**
References