

# AU InforMed

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## Key Inforbits

- What is hyperlipidemia?
- How to set LDL goals
- How to lower your cholesterol without medication
- How fructose can increase triglycerides
- Pitavastatin: the new statin
- Heart healthy dessert: Yummy
- Cholesterol Quiz: How well do you know your stuff

**Cholesterol Education Month!**



## HYPERLIPIDEMIA: What is it?

The American Heart Association defines hyperlipidemia as “an elevation of lipids (fats) in the bloodstream.”<sup>1</sup> LDL (low-density lipoprotein) and VLDL (very low density lipoprotein) are the two markers for hyperlipidemia. VLDL is otherwise known as triglyceride (TG). Total cholesterol and LDL increase throughout life. Approximately half of all American adults have total cholesterol above 200 mg/dL.<sup>2</sup> Desirable levels for total cholesterol are less than 200 mg/dL.<sup>3</sup> Most patients do not even realize that they have high cholesterol levels.

### Signs and Symptoms of Disease Progression:

- Chest pain
- Palpitations
- Sweating
- Anxiety
- Shortness of breath
- Difficulty with speech or movement

1. Talbert RL. Hyperlipidemia. In: DiPiro RL, Yee GC, Matzke GR, Wells BG, Posey LM, editors, *Pharmacotherapy: A pathophysiologic approach*. 7<sup>th</sup> ed. New York: McGraw-Hill Medical; c2008. p. 385-407
2. AHA [Internet]. Dallas: American Heart Association; c2010. Hyperlipidemia; [cited 2010 Aug 23]; [about 2 screens]. Available from: <http://www.americanheart.org/presenter.jhtml?identifier=4600>
3. National Cholesterol Education Program: ATP III Guidelines At-A-Glance Quick Desk Reference. National Institutes of Health [Internet]. 2001 May [cited 2010 Aug 23]. Available from: <http://www.matecmichigan.com/resource/5.HIV%20Patient%20Care/F%20CholesterolGuidelines%20at%20a%20Glance%20NCEP%20ATPIII%202004.pdf>

## Determining the LDL goal: the Basis for Medication Therapy

Start by evaluating what risk factors are present:

### Major Risk Factors:

- Cigarette smoking
- Hypertension (BP  $\geq$ 140/90 mmHg or on antihypertensive medication)
- Low HDL (<40 mg/dL)
- Family history of premature CHD (male relative <55 years and female <65 years)
- Age (men  $\geq$ 45 years and women  $\geq$ 55 years)

### **Coronary Heart Disease (CHD) Risk Equivalents:**

- Diabetes Mellitus
- Symptomatic carotid artery disease
- Peripheral artery disease
- Abdominal aortic aneurysm

### **How to determine the LDL goal based on risk:**

If a patient has 2 or more risk factors or has a CHD risk equivalent then the Framingham 10 year risk assessment should be performed. A person's LDL level is what determines therapy for hyperlipidemia. Depending on a patient's risk, his/her LDL should be as follows:

- Patient has a CHD risk equivalent (or 10 year risk  $\geq 20\%$ ): LDL goal  $< 100$  mg/dL
- Patient has 2 or more risk factors (or 10 year risk  $< 20\%$ ): LDL goal  $< 130$  mg/dL
- 0-1 risk factor: LDL goal  $< 160$  mg/dL

### **Summary of Goals:**

- Total cholesterol:  $< 200$  mg/dL
- LDL:  $< 100$  mg/dL is optimal ( $< 160$  mg/dL is acceptable if no risk factors are present)
- HDL:  $> 40$  mg/dL (optimal is  $\geq 60$  mg/dL and this serves as a negative risk factor)
- TG:  $< 200$  mg/dL (if TG are  $> 500$  then this should drive therapy decisions instead of LDL)

National Cholesterol Education Program: ATP III Guidelines At-A-Glance Quick Desk Reference. National Institutes of Health [Internet]. 2001 May [cited 2010 Aug 23]. Available from: <http://www.matecmichigan.com/resource/5.HIV%20Patient%20Care/F%20CholesterolGuidelines%20at%20a%20Glance%20NCEP%20ATPIII%202004.pdf>

### **How to lower your bad cholesterol without medication:**

**Diet:** Your diet should be all about low saturated fats and low cholesterol foods. Aim for having less than 7% of calories from saturated fat and less than 200 g of dietary cholesterol per day. Plant sterols/stanols and soluble fiber are great options to help lower LDL and are great options to add to your diet! The goal is to ingest 20-25 g soluble fiber and 2 g plant sterols/stanols per day in order to increase LDL lowering.

**Weight:** Weight loss is one of the best ways to help bring your LDL within goal. Large waist measurements are a big risk factor for heart disease ( $> 40"$  for men and  $> 35"$  for women).<sup>1</sup> A new study released by Archives of Internal Medicine concluded that waist circumference can cause a 2 fold higher risk of death in men and women.<sup>2</sup> This emphasizes the important of maintaining a healthy weight in order to prevent decline in health or even death.

**Exercise:** It is recommended to get at least 30 minutes of exercise on most days of the week. Exercise helps to decrease LDL and raise HDL! The important thing is to get your heart pumping!<sup>1,3</sup>

### **Examples of beneficial foods:**

- **Soluble fiber:** oatmeal, apples, bananas, oranges, grapefruit, lima beans, pinto beans, broccoli, carrots, and brussel sprouts.<sup>1,2</sup>
- **Plant sterols/stanols:** orange juice, vegetable oils, milk, and margarine are all available fortified with plant stanols. Nuts such as walnuts, almonds, and peanuts are also great options that help to lower LDL and raise HDL.<sup>1,2</sup>

1. National Cholesterol Education Program: Summary of the third report of the national cholesterol education program expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III). National Institutes of Health [Internet]. 2001 May [cited 2010 Aug 23]. Available from: <http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3xsum.pdf>
2. Jacobs EJ, Newton CC, Wang Y, Patel AV, McCullough ML, Campbell PT, et al. Waist Circumference and All-Cause Mortality in a Large US Cohort. Arch Intern Med [Internet]. 2010 [cited 2010 Aug 31]; 170(15):1293-1301. Available from: <http://xt5bv6dq8y.scholar.serialssolutions.com/?sid=google&aunit=EJ&aulast=Jacobs&atitle=Waist+Circumference+and+All-Cause+Mortality+in+a+Large+US+Cohort&id=doi:10.1001/archinternmed.2010.201&title=Archives+of+internal+medicine+%281960%29+&volume=170&issue=15&date=2010&spage=1293&issn=0003-9926>

3. Conditions: Cholesterol. American Heart Association. [Internet]. 2010 [cited 2010 Aug 23]. Available from: [http://www.heart.org/HEARTORG/Conditions/Cholesterol/Cholesterol\\_UCM\\_001089\\_SubHomePage.jsp](http://www.heart.org/HEARTORG/Conditions/Cholesterol/Cholesterol_UCM_001089_SubHomePage.jsp)

## **Fructose: How it can increase triglycerides**

Did you know that fructose increases triglycerides? Fructose is a artificial sweetener which can be bought from health food stores. Low doses of fructose (50-90 g/day) improve the glycemic response in patients with diabetes. Fructose bypasses the major limiting step of glycolysis (phosphofructokinase) and serves as a substrate for de novo lipogenesis and increases this process. Fructose also decreases LPL (lipoprotein lipase), which normally breaks down lipids, leading to hypertriglyceridemia. The increase in triglycerides happens at threshold doses of fructose greater than 60 g/day postprandial and greater than 100 g/day fasting. These fructose doses are much higher than the normal daily fructose intake of 45.5 g. So, fructose is safe if it is consumed in small doses.<sup>1,2</sup> However, high fructose corn syrup is a common ingredient in processed foods and over-indulgence can contribute to obesity and attendant chronic diseases. Moderation is the key.<sup>3</sup>

1. Sievenpiper JL, Carleton AJ, Chatha S, Jiang HY, Russell JDS, Beyene J et al. Heterogeneous effect of fructose on blood lipids in individuals with type 2 diabetes. *Diabetes Care*. Oct 2009 [cited 2010 Aug 26]. 32(10): 1930-1937. Available from: <http://care.diabetesjournals.org/content/32/10/1930.full>
2. Livesey G Taylor R. Fructose consumption and consequences for glycation, plasma triacylglycerol, and body weight. *AJNC*. Nov 2008 [cited 2010 Aug 26]. 88(5): 1419-1437. Available from: <http://www.ajcn.org/cgi/content/full/88/5/1419>
3. Zeratsky K. High-fructose corn syrup: What are the concerns? [Internet]. Rochester, MN; c1998-2010. MayoClinic.com; 2008 Oct 24 [cited 2010 Sep 1]; [about 2 screens.]. Available from: <http://www.mayoclinic.com/health/high-fructose-corn-syrup/AN01588>

## **Pitavastatin: the newest statin on the market**

Statins are the gold standard treatment for high cholesterol. They inhibit HMG-CoA reductase thereby preventing cholesterol formation. LDL is then able to be cleared from the blood stream due to the decrease in cholesterol synthesis.<sup>4</sup> Statins have also been found to have additional benefits such as improved endothelial function, reduction in platelet aggregation, and reduction in inflammatory processes.<sup>4</sup> Current statins on the market are atorvastatin, fluvastatin, lovastatin, pravastatin, rosuvastatin, simvastatin, and the new addition of pitavastatin. Pitavastatin (Livalo<sup>®</sup>) has been available in Japan since 2003, however it just emerged on the U.S. market in August 2009. Livalo's<sup>®</sup> potency has been grouped along with Lipitor<sup>®</sup> and Crestor<sup>®</sup>. What separates Pitavastatin from the previously mentioned statins are its triglyceride lowering and HDL elevating effects. It is minimally metabolized by CYP 450 enzymes, thereby reducing its potential for drug-drug interactions.<sup>1</sup> Available doses are 1, 2, and 4 mg tablets.<sup>3</sup> The 2 mg tablet is said to be equivalent to Lipitor<sup>®</sup> (atorvastatin) 10 mg. Pitavastatin shows similar tolerability as simvastatin and atorvastatin according to several clinical trials.<sup>1</sup> It has been noted that pitavastatin has the potential for a 47% decrease in LDL at a 4 mg dose for 12 weeks, according to a study performed in Japan.<sup>1</sup> Similar results have been seen in Korea and Europe. Below is a table comparing qualities of the various statins currently available on the market.<sup>2,3</sup>

	Atorvastatin Lipitor <sup>®</sup>	Fluvastatin Lescol <sup>®</sup>	Lovastatin Altoprev <sup>®</sup> , Mevacor <sup>®</sup>	Pitavastatin Livalo <sup>®</sup>	Pravastatin Pravachol <sup>®</sup>	Rosuvastatin Crestor <sup>®</sup>	Simvastatin Zocor <sup>®</sup>
Food Effect on Bioavailability	YES (↓)	YES(↓)	YES(↑)	NONE	YES(↓)	NONE	NONE
Range of Dose (mg)	10-80	20-80	10-80	1-4	5-40	5-80	5-80
CYP Metabolism	3A4	2C9	3A4	MINIMAL 2C9	MINIMAL 3A4	MINIMAL 2C9	3A4
% LDL reduction	50	24	34	48	34	63	41
Time of Dosing	Anytime	Bedtime	With evening meal	Anytime	Bedtime	Anytime	Bedtime

1. Saito Y. Critical appraisal of the role of pitavastatin in treating dyslipidemias and achieving lipid goals. *Vascular Health and Risk Management* [Internet]. 2009 [cited 2010 Aug 26]; 5: 921-936. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2788597/>
2. Schachter M. Chemical, pharmacokinetic, and pharmacodynamic properties of statins: an update. *Fundamental and Clinical Pharmacology* [Internet]. 2004 [cited 2010 Aug 26]; 19: 117-125. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1472-8206.2004.00299.x/pdf>
3. Pitavastatin, Lovastatin. In: Lexi-Comp Online [AUHSOP Intranet]. Hudson, OH: Lexi-Comp, Inc. [updated 2010, cited 2010 Aug 26]. [about 20 p.]. Available from: <http://online.lexi.com/crlsql/servlet/crlonline>
4. Drugs for Lipids. Treatment Guidelines from the Medical Letter. 2008 Feb;6(66): 9-16.

### Heart-healthy dessert: YUMMY!!!

- ¼ cup fat-free cream cheese
- ¼ cup light ricotta cheese
- 1 tablespoon sugar
- ¼ teaspoon finely shredded orange peel
- 2 teaspoons orange juice
- 1 ½ cups fresh berries of your choice
- Optional:
  - 2 gingersnaps or chocolate wafer cookies
  - Fresh mint



**Directions:** Combine cream cheese, ricotta cheese, sugar, orange peel and orange juice in a bowl. Beat with an electric mixer until smooth. Cover and chill for at least 4 hours. Split mixture evenly between two parfait glasses. Top the mixture with berries of your choice. Top with broken cookies and mint and enjoy! (Makes 2 servings)

Better Homes and Gardens [Internet]. Heart Healthy Living; c2010. Healthy Recipes; [cited 2010 Aug 23]; [about 1 screen]. Available from: <http://my.hearthealthyonline.com/recipe/desserts/berry-cheesecake-dessert/>

### CHOLESTEROL QUIZ: How much do YOU know?

1. According to ATPIII guidelines, what is the total cholesterol goal?
  - a. <250 mg/dL
  - b. <100 mg/dL
  - c. <200 mg/dL
  - d. <130 mg/dL
2. HDL is known as the \_\_\_\_\_ cholesterol, while LDL is known as the \_\_\_\_\_ cholesterol:
  - a. Bad, Good
  - b. Good, Bad
  - c. Undesireable, Desirable
  - d. Bad, Bad
3. What is the LDL goal of a patient who has 2 or more risk factors (or a CHD risk equivalent)?
  - a. <80 mg/dL
  - b. <100 mg/dL
  - c. <130 mg/dL
  - d. <160 mg/dL
4. What are some good food options to help lower LDL and raise HDL?
  - a. Nuts, cheese, grapes,
  - b. Nuts, oranges, red meat
  - c. Nuts, tomatoes, oatmeal
  - d. Nuts, grapefruit, oatmeal
5. Which of the following is NOT a CHD risk equivalent?
  - a. CAD (carotid artery disease)
  - b. PAD (peripheral artery disease)
  - c. Atrial Fibrillation
  - d. Diabetes Mellitus

Answers: (c, b, b, d, c)



### The last “dose” ...

*“A journey of a thousand miles begins with a single step.”*

Lao Tzu (6<sup>th</sup> century B.C.) *An electronic bulletin of drug and health-related news highlights, a service of ...*

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