In the name of God

Dyslipidemia clinical case based approach

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برگزار کننده:
گروه قلب و عروق، گروه داروسازی بالینی و گروه داخیلی دانشگاه علوم پزشکی بیرجند
Dyslipidemia Definition

Dyslipidemia is

- Disorder in lipoprotein metabolism
- Defined as *elevated* total cholesterol, LDL, TG or *low* levels of HDL
- An important risk factor for coronary heart disease (CAD) and stroke

HLP / DLP ?
Importance of Dyslipidemia

Chart 1: LDL LEVEL AND HEART DISEASE RISK

Relative Risk for Coronary Heart Disease (Log Scale)

Risk of CHD by Triglyceride Level
(The Framingham Heart Study)

N=5127

Helsinki Heart Trial - Triglyceride, HDL-C and Risk for CAD

Incidence of cardiac events per 100 patient-years

- LDL-C:HDL-C < 5.0
- LDL-C:HDL-C > 5.0

Circulation 1992;88:37-46
<table>
<thead>
<tr>
<th>Lipid level</th>
<th>CAD risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each 1% increase in LDL</td>
<td>1% increase in the risk of CHD in women and men</td>
</tr>
<tr>
<td>Each 1% increase in Non-HDL-C</td>
<td>1% increase in the risk of CHD in women and men</td>
</tr>
<tr>
<td>Each 89 mg/dL increase in TG</td>
<td>37% increase in the risk of CVD in women 14% increased risk in men</td>
</tr>
<tr>
<td>Each 1 mg/dL increase in HDL-C</td>
<td>2% decrease in CVD death in men 3% decrease in CVD death in women</td>
</tr>
</tbody>
</table>
Prevalence of DLP in Our Studies

**Table 1: Comparison of cardiac risk factors in 3 groups in Southern Khorassan-East of Iran**

<table>
<thead>
<tr>
<th>Population</th>
<th>Year</th>
<th>Hypertension (%)</th>
<th>Diabetes (%)</th>
<th>Obesity (%)</th>
<th>Smoking (%)</th>
<th>High LDL (%)</th>
<th>Low HDL (%)</th>
<th>Dyslipidemia (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low socioeconomic</td>
<td>2008</td>
<td>13.1</td>
<td>6.3</td>
<td>10.7</td>
<td>9.8</td>
<td>43.2</td>
<td>42.3</td>
<td>72.0</td>
</tr>
<tr>
<td>Nurses</td>
<td>2011</td>
<td>9.0</td>
<td>3.0</td>
<td>11.5</td>
<td>3.1</td>
<td>35.5</td>
<td>44.3</td>
<td>70.4</td>
</tr>
<tr>
<td>General population</td>
<td>2014-2015</td>
<td>13.3</td>
<td>6.1</td>
<td>18.8</td>
<td>9.0</td>
<td>44.5</td>
<td>72.0</td>
<td>74.6</td>
</tr>
</tbody>
</table>

**Cardiovascular Risk-Factors in the Eastern Iranian Population: Are We Approaching 25×25 Target?**

Sign and Symptom

✓ No symptoms
✓ Symptomatic vascular disease: CAD, Stroke, PAD
✓ Acute pancreatitis

✓ No sign
✓ may be Xanthoma
Etiology

- PRIMARY
  - Genetic
  - Hypercholesterolemia
  - Hypertriglyceridemia
  - Combination of Hypercholesterolemia and Hypertriglyceridemia

- SECONDARY
  - Genetic
  - Hypercholesterolemia
  - Hypertriglyceridemia
  - Combination of Hypercholesterolemia and Hypertriglyceridemia
  - Life style:
    - Diet
    - Lack of exercise
    - Smoking
    - Stress
    - Excessive alcohol intake
  - Diseases
  - Drugs
  - Obesity

- SECONDARY
  - Diseases
    - Diabetes mellitus
    - Nephrotic syndrome
    - Renal failure
    - Hypothyroidism
    - Cholestasis
  - Drugs
    - Thiazide diuretics
    - β-adrenergic blockers
    - Oral contraceptives
    - Corticosteroids
    - Isotretinoin (vitamin A derivative)
- **Standard** serum lipid profile measurement: CHOL, HDL, TG
  - LDL estimate by of LDL Friedewald equation.
  - LDL = Chol − (VLDL + HDL)
  - VLDL = \( \frac{TG}{5} \)

- **Error in Friedewald formula**
  1. Nonvalid in TG ≥ 400 mg/dl
  2. Error is in LDL < 70 mg/dl

- **Fasting or non Fastig**: 
  - Small, clinically insignificant differences in Chol, HDL in fasting or non-fasting
  - TG levels may vary after a recent meal.
  - Thus, we (Uptodate) generally advise that the lipid profile be measured in the **fasting state**.
  - 8 to 12 hours without food, early in the morning (before breakfast)
### Recommendations for lipid analyses for cardiovascular disease risk estimation

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC is to be used for the estimation of total CV risk by means of the SCORE system.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>HDL-C analysis is recommended to further refine risk estimation using the online SCORE system.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>LDL-C analysis is recommended as the primary lipid analysis method for screening, diagnosis, and management.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>TG analysis is recommended as part of the routine lipid analysis process.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Non-HDL-C evaluation is recommended for risk assessment, particularly in people with high TG levels, DM, obesity, or very low LDL-C levels.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>ApoB analysis is recommended for risk assessment, particularly in people with high TG levels, DM, obesity, metabolic syndrome, or very low LDL-C levels. It can be used as an alternative to LDL-C, if available, as the primary measurement for screening, diagnosis, and management, and may be preferred over non-HDL-C in people with high TG levels, DM, obesity, or very low LDL-C levels.</td>
<td>I</td>
<td>C</td>
</tr>
</tbody>
</table>
| Lp(a) measurement should be considered at least once in each adult person’s lifetime to identify those with very high inherited Lp(a) levels \(>180 \text{ mg/dL} \ (>430 \text{ mmol/L})\) who may have a lifetime risk of ASCVD equivalent to the risk associated with heterozygous familial hypercholesterolaemia. | I
type{la} | C     |
| Lp(a) should be considered in selected patients with a family history of premature CVD, and for reclassification in people who are borderline between moderate and high-risk. | I
type{la} | C     |

Apo = apolipoprotein; ASCVD = atherosclerotic cardiovascular disease; CV = cardiovascular; CVD = cardiovascular disease; DM = diabetes mellitus; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; Lp(a) = lipoprotein(a); SCORE = Systematic Coronary Risk Estimation; TC = total cholesterol; TG = triglyceride.
# Indication for Lipid measurement

1. Evaluate all adults 20 years (20-44 in male, 20-54 in female): every 5 years as part of a global risk assessment.

2. Adults With Diabetes:
   - Annually screen all adult individuals with T1DM or T2DM for dyslipidemia.

3. Screen for Familial Hypercholesterolemia:
   - Family history of Premature ASCVD (definite MI or SCD < 55 years in father or other male first-degree relative, or < 65 years in mother or other female first-degree relative) or Elevated cholesterol levels (total, non-HDL and/or LDL) consistent with FH (Chol > 290 / LDL > 190)

4. Middle-Aged Adults (Men Aged 45-65 Years, Women Aged 55-65 Years):
   - at least once every 1 to 2 years.

5. Older Adults (Older Than 65 Years)
   - At least annually may be more according to risk factor, no sex

6. Children and Adolescents
   - In children at risk for FH (e.g., family history of premature cardiovascular disease or elevated cholesterol), screening should be at 3 years of age, again between ages 9 and 11, and again at age 18

7. All patients with following condition regardless to sex and age:
   - Clinical ASCVD, abdominal aortic aneurysm, Hypertension, FH of DLP, CKD, Obesity (BMI ≥ 30), Inflammatory Disease, HIV infection, COPD, Hypertensive disease of pregnancy, acute pancreatitis
Approach to the Patient with DLP

Step 1: Which Lipid abnormalities? High LDL / High TG / Low HDL

Step 2: R/O secondary causes. Improve or even disappear by treatment of secondary cause. For example; treatment of hypothyroidism result in a large decrease in LDL-C, often to normal levels. Good control of FBS in a patient with uncontrolled DM may result in a large decrease in serum TG.

Step 3: Possibility of a genetic? The recognition of a genetic disorder will lead to screening family members and early treatment may prevent the adverse consequences of hyperlipidemia.

Step 4: Who to treat? The decision to treat should be based on the risk of the hyperlipidemia leading to those medical problems.

Step 5: Which goal? According to new guidelines. AHA 2018, ESC 2019

K درمان اولیه براساس سطح LDL
## Serum Lipids Levels

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>High Normal</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chol (mg/dl)</td>
<td>&lt;200</td>
<td>200-239</td>
<td>≥ 240</td>
<td></td>
</tr>
<tr>
<td>TG (mg/dl)</td>
<td>&lt;150</td>
<td>150-174</td>
<td>175-499</td>
<td>≥ 500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td></td>
<td></td>
<td></td>
<td>≥ 190</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to patients' comorbidity

Low: in M<40, F<50
Cardioprotective: > 60 mg/dl
2019 ESC/EAC Guidelines for the management of dyslipidemia: lipid modification to reduce cardiovascular risk
Clinical ASCVD

Healthy Lifestyle

ASCVD not at very high-risk

Age ≤75 y

High-intensity statin (Goal: ↓ LDL-C ≥50%) (Class I)

If high-intensity statin not tolerated, use moderate-intensity statin (Class IIa)

If on maximal statin therapy and LDL-C ≤70 mg/dL (≤1.8 mmol/L), adding ezetimibe may be reasonable (Class IIb)

Initiation of moderate- or high-intensity statin is reasonable (Class IIa)

Continuation of high-intensity statin is reasonable (Class IIa)

Very high-risk ASCVD

Age >75 y

High-intensity or maximal statin (Class I)

If on maximal statin and LDL-C ≤70 mg/dL (≤1.8 mmol/L), adding ezetimibe is reasonable (Class IIa)

If PCSK9-I is considered, add ezetimibe to maximal statin before adding PCSK9-I (Class I)

If on clinically judged maximal LDL-C lowering therapy and LDL-C ≥70 mg/dL (≥1.8 mmol/L), or non-HDL-C ≥100 mg/dL (≥2.6 mmol/L), adding PCSK9-I is reasonable (Class IIa)

Dashed arrow indicates RCT-supported efficacy, but is less cost effective

Primary Prevention:
Emphasize adherence to lifestyle

If baseline LDL-C ≥190 mg/dL, start high-intensity statin (I, B-R)

Diabetes?

Yes

No

Age <20 yr

Statin if familial hypercholesterolemia

Age 20 to 38 yr

Estimate lifetime ASCVD risk; consider statin if family history of premature ASCVD and LDL-C 160–180 mg/dL

Age 40–75 yr

Calculate 10-yr ASCVD risk to risk stratify

Age >75 yr

Clinical assessment and risk discussion

<5%

Low Risk

5 to 7.4%

Borderline Risk

7.5 to 19.9%

Intermediate Risk

≥20%

High Risk

Risk Discussion

Lifestyle (I, A)

If Risk Enhancers, consider moderate-intensity statin (Iib, B-R)

Start moderate-intensity statin if risk estimate and enhancers favor treatment (Goal: ↓ LDL-C 30–49%) (I, A)

Start high-intensity statin (Goal: ↓ LDL-C ≥50%) (I, A)

Consider measuring coronary artery calcium if risk decision uncertain (Iia, B-NR)

For each recommendation, in brackets is the Classification of Recommendation (COR) followed by the Level of Evidence (LOE).
- For COR: I = Strong recommendation with Benefit >> Risk; Ila = Moderate recommendation with Benefit >> Risk; Iib = Weak recommendation with Benefit >> Risk.
- For LOE: A = High quality evidence; B = moderate quality evidence; C = Very limited quality of evidence; NR = nonrandomized; R = randomized; LD = limited data; EO = expert opinion.

ASCVD = atherosclerotic cardiovascular disease, LDL-C = low-density lipoprotein cholesterol.
<table>
<thead>
<tr>
<th>Risk group</th>
<th>Risk group Definition</th>
<th>LDL Goal mg/dl</th>
<th>Statin Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Very High</td>
<td><strong>ASCVD</strong> 2th Event during 2 years</td>
<td>&lt; 40</td>
<td>High</td>
</tr>
<tr>
<td>Very High</td>
<td><strong>ASCVD</strong> + other RF&lt;br&gt;<strong>DM</strong> + <strong>TOD</strong>&lt;br&gt;<strong>Severe CKD</strong> (GFR &lt;30 cc/min)</td>
<td>&lt;55</td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td><strong>ASCVD</strong> (&lt;AC, MI, PCI, CABG, Stroke, TIA, PAD, AAA)&lt;br&gt;<strong>DM</strong> &gt; 10yr / with other RF&lt;br&gt;<strong>Moderate CKD</strong> (GFR 30-59 cc/min)&lt;br&gt;<strong>LDL ≥ 190 mg/dl</strong>&lt;br&gt;<strong>Risk 10 yr CAD ≥ 20%</strong></td>
<td>&lt;70</td>
<td>High</td>
</tr>
<tr>
<td>Moderate</td>
<td><strong>DM</strong> &lt;35 yrs&lt;br&gt;<strong>DMT2</strong> &lt;50 yrs without other RF&lt;br&gt;<strong>Risk 10 yr CAD :10-20%</strong></td>
<td>&lt;100</td>
<td>moderate</td>
</tr>
<tr>
<td>Low</td>
<td><strong>Risk 10 yr CAD &lt;10%</strong></td>
<td>&lt;116*</td>
<td>low</td>
</tr>
</tbody>
</table>
Clinical ASCVD

Is LDL ≥ 190 mg/dl

Age > 75 y

DM?

10-year ASCVD risk score?

Remember! Secondary cause!
Clinical cases Presentation
Case 1

44 YO woman

C.C:
Increased fatigue, weight gained about 10 kg with no changes in her life

PMH:
Negative

DH:
Negative

Lab data:
TC: 150 mg/dl  TG: 112 mg/dl HDL: 54 mg/dL  LDL: 155 mg/dL
Which is the best recommendation at this time?
A. Initiate atorvastatin 10 mg/day
B. Initiate rosuvastatin 20 mg/day
C. Obtain a high-sensitivity C-reactive protein (hs-CRP)
D. Obtain a thyroid panel
Answer: D

A. Initiate atorvastatin 10 mg/day

B. Initiate rosvuvasatin 20 mg/day

C. Obtain a high-sensitivity C-reactive protein (hs-CRP)

D. Obtain a thyroid panel
Secondary Causes of Lipoprotein Abnormalities

- **Hypothyroidism**
- Obstructive liver disease
- Nephrotic syndrome
- Uncontroled DM
- Obesity
- Drugs

- Unexplained weigh gain
- Increased fatigue
## Drug induced DLP

<table>
<thead>
<tr>
<th></th>
<th>LDL Cholesterol</th>
<th>Triglycerides</th>
<th>HDL Cholesterol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular / Endocrine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amiodarone</td>
<td>↑Variable</td>
<td>←</td>
<td>←</td>
</tr>
<tr>
<td>β-Blockers***</td>
<td>←</td>
<td>↑10-40%</td>
<td>↓5-20%</td>
</tr>
<tr>
<td>Loop diuretics</td>
<td>↑5-10%</td>
<td>↑5-10%</td>
<td>←</td>
</tr>
<tr>
<td>Thiazide diuretics (high dose)</td>
<td>↑5-10%</td>
<td>↑5-15%</td>
<td>←</td>
</tr>
<tr>
<td>Sodium-glucose co-transporter 2 (SGLT2) inhibitors</td>
<td>↑3-8%</td>
<td>←→↓</td>
<td>↑Variable</td>
</tr>
<tr>
<td><strong>Steroid Hormones/Anabolic Steroids</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estrogen</td>
<td>↓7-20%</td>
<td>↑40%</td>
<td>↑15-20%</td>
</tr>
<tr>
<td>Select progestins</td>
<td>↑Variable</td>
<td>↓Variable</td>
<td>↓15-40%</td>
</tr>
<tr>
<td>Selective Estrogen Receptor Modulators</td>
<td>↓10-20%</td>
<td>↑0-30*</td>
<td>←</td>
</tr>
<tr>
<td>Danazol</td>
<td>↑10-40%</td>
<td>←</td>
<td>↓50%</td>
</tr>
<tr>
<td>Anabolic steroids</td>
<td>↑20%</td>
<td>←</td>
<td>↓20-70%</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>↑Variable</td>
<td>↑Variable</td>
<td>←</td>
</tr>
</tbody>
</table>
# Drug induced DLP

<table>
<thead>
<tr>
<th></th>
<th>LDL Cholesterol</th>
<th>Triglycerides</th>
<th>HDL Cholesterol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antiviral Therapy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protease inhibitors</td>
<td>↑15-30%</td>
<td>↑15-200%</td>
<td>↔</td>
</tr>
<tr>
<td>Direct Acting Antivirals</td>
<td>↑12-27%</td>
<td>↔</td>
<td>↑14-20%</td>
</tr>
<tr>
<td><strong>Immunosuppressants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyclosporine and tacrolimus</td>
<td>↑0-50%</td>
<td>↑0-70%</td>
<td>↑0-90%</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>↑Variable</td>
<td>↑Variable</td>
<td>↔</td>
</tr>
<tr>
<td><strong>Centrally Acting Medications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Generation antipsychotics</td>
<td>↔</td>
<td>↑22%</td>
<td>↓20%</td>
</tr>
<tr>
<td>Second Generation antipsychotics</td>
<td>↔</td>
<td>↑20-50%</td>
<td>↔</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>↑Variable</td>
<td>↔</td>
<td>↑Variable</td>
</tr>
<tr>
<td><strong>Other Medications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retinoids</td>
<td>↑15%</td>
<td>↑35-100%</td>
<td>↔**</td>
</tr>
<tr>
<td>Growth Hormone</td>
<td>↑10-25%</td>
<td>↔</td>
<td>↔↑7%</td>
</tr>
</tbody>
</table>
Case 2

68 YO woman

PMH:
HTN, hyperlipidemia, presents with an acute MI

DH:
metoprolol 50 mg/day, enalapril 20 mg/day, furosemide 20 mg/day, atorvastatin 20 mg/day, Pantoperazole 40 mg/day, aspirin 80 mg/day, and clopidogrel 75 mg/day.

Lab Data:
TC 157 mg/dL, TG 132 mg/dL, HDL 48 mg/dL, LDL 83 mg/dL

She achieved a 35% reduction in her LDL
she has previously not tolerated higher doses of atorvastatin or rosuvastatin because of myalgia.
Which is the best recommendation at this time to further reduce her risk of recurrent events?
A. Add alirocumab 75 mg subcutaneously every 2 weeks
B. Add ezetimibe 10 mg/day
C. Add niacin extended release 500 mg/night
D. Continue atorvastatin 20 mg/day
Answer: B

A. Add alirocumab 75 mg subcutaneously every 2 weeks
B. Add ezetimibe 10 mg/day
C. Add niacin extended release 500 mg/night
D. Continue atorvastatin 20 mg/day
Very high-risk ASCVD

(≥2 major ASCVD events or major ASCVD event + high risk condition)

**Major ASCVD events**
- ACS within previous 12 months
- Previous MI or ischemic stroke
- Symptomatic PAD, previous peripheral revascularization/amputation, or claudication with ABI <0.85

**High-Risk Conditions**
- Prior revascularization (CABG; PCI) outside of ASCVD event
- Diabetes mellitus
- Hypertension
- Current smoking
- eGFR 15-59 ml/min/1.73m²
- LDL-C ≥100 mg/dL
- Age ≥65 years
- HeFH
- CHF

**Clinical ASCVD**

Receiving high-intensity or maximally tolerated statin

LDL-C ≥70 mg/dL

- Ezetimibe

**Very high-risk ASCVD**

LDL-C ≥70 mg/dL or Non-HDL-C ≥100 mg/dL

- PCSK9-I
Clinical ASCVD

- ACS
- History of MI
- Stable or unstable angina
- Coronary or other arterial revascularization
- Stroke
- TIA
- PAD
- Aortic aneurysm
Ezetimibe

- Tab: 10mg
Mechanism of action

• Inhibits absorption of cholesterol at the brush border of the small intestine

• This leads to

✓ Decreased delivery of cholesterol to the liver
✓ Reduction of hepatic cholesterol stores
✓ Increased clearance of cholesterol from the blood
✓ Decreased total C, LDL-C, apoB, TG
✓ Increased HDL-C
Pharmacodynamics and Pharmacokinetics

- **Onset of action:**
  - Within 1 week; Maximum effect: 2-4 weeks

- **Half-life elimination:**
  - 22 hours

- Absorption is not affected by food

- Administered at any time of day without regard to meals

- No dose adjustment in renal and liver impairment
ADR

- Diarrhea
- Arthralgia
- Cough
- Fatigue
- Abdominal pain
- Back pain
- Increased serum transaminases

- Ezetimibe should be administered at least 2 h prior or 4 h following the administration of cholestyramine
Case 3

43-yo man

CC:
For routine monitoring

PMH:
HTN

FH
hypercholesterolemia

Lab data:
TC 267 mg/dL, TG 143 mg/dL, HDL 38 mg/dL, LDL 200 mg/Dl
Which is the best recommendation for management?
A. Initiate cholestyramine

B. Initiate atorvastatin 40 mg/day

C. Initiate ezetimibe 10 mg/day

D. Initiate simvastatin 20 mg/day
Answer: B

A. Initiate cholestyramine

B. Initiate atorvastatin 40 mg/day

C. Initiate ezetimibe 10 mg/day

D. Initiate simvastatin 20 mg/day
Severe Hypercholesterolemia

Age 20-75 with baseline LDL-C ≥190 mg/dL

High-intensity statin (or maximally tolerated statin)

LDL-C response:
<50% reduction from baseline and/or achieved LDL-C ≥100 mg/dL

Age 20-75 with LDL-C ≥190 mg/dL

LDL-C <50% reduction from baseline

Bile acid sequestrant

Age 30-75 with HeFH

LDL-C ≥100 mg/dL

Ezetimibe

Age 40-75 with baseline LDL-C ≥220 mg/dL

LDL-C ≥130 mg/dL

PCSK9-I
## Statin Intensity

<table>
<thead>
<tr>
<th>LDL-C Lowering†</th>
<th>High Intensity</th>
<th>Moderate Intensity</th>
<th>Low Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥50%</td>
<td>30%-49%</td>
<td>&lt;30%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statins</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin (40 mg†) 80 mg</td>
<td>Atorvastatin 10 mg (20 mg)</td>
<td>Simvastatin 10 mg</td>
<td></td>
</tr>
<tr>
<td>Rosuvastatin 20 mg (40 mg)</td>
<td>Rosuvastatin (5 mg) 10 mg</td>
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<td></td>
</tr>
<tr>
<td>Simvastatin 20-40 mg§</td>
<td></td>
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<td></td>
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</table>

...  

<table>
<thead>
<tr>
<th>Pravastatin 40 mg (80 mg)</th>
<th>Pravastatin 10-20 mg</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lovastatin 40 mg (80 mg)</td>
<td>Lovastatin 20 mg</td>
<td></td>
</tr>
<tr>
<td>Fluvastatin XL 80 mg</td>
<td>Fluvastatin 20-40 mg</td>
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</tr>
<tr>
<td>Fluvastatin 40 mg BID</td>
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<td></td>
</tr>
<tr>
<td>Pitavastatin 1-4 mg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STATIN

- Atorvastatin
  - Tab: 10-20-40
- Rosuvastatin
  - Tab: 5, 10, 20
- Simvastatin
  - Tab: 10, 20
- Lovastatin
  - Tab: 20
Different doses of statins

<table>
<thead>
<tr>
<th>Dose (mg of agent)</th>
<th>% Reduction</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>TC</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td></td>
</tr>
<tr>
<td>Pitavastatin</td>
<td></td>
</tr>
<tr>
<td>Simvastatin</td>
<td></td>
</tr>
<tr>
<td>Lovastatin</td>
<td></td>
</tr>
<tr>
<td>Pravastatin</td>
<td></td>
</tr>
<tr>
<td>Fluvastatin</td>
<td></td>
</tr>
<tr>
<td>Rosuvastatin</td>
<td></td>
</tr>
<tr>
<td>TC</td>
<td></td>
</tr>
<tr>
<td>LDL-C</td>
<td></td>
</tr>
</tbody>
</table>

|  |  |  |  |  |  |  |  | |
|---|---|---|---|---|---|---|---|
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |
| 10 | 1 | 20 | 40 | 40 | 80 | 5 | 22 | 27 |

TC: total cholesterol
LDL-C: LDL-cholesterol
<table>
<thead>
<tr>
<th>Drug</th>
<th>HDL</th>
<th>LDL</th>
<th>TG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotinic acid</td>
<td>↑15 to ↑35%</td>
<td>↓5 to ↓25%</td>
<td>↓20 to ↓50%</td>
</tr>
<tr>
<td>Fibric-acid derivatives</td>
<td>↑10 to ↑35%</td>
<td>↓5 to ↓20%</td>
<td>↓20 to ↓50%</td>
</tr>
<tr>
<td>Statins</td>
<td>↑5 to ↑15%</td>
<td>↓18 to ↓55%</td>
<td>↓7 to ↓30%</td>
</tr>
<tr>
<td>Thiazolidinediones</td>
<td>↑5 to ↑13%</td>
<td>↓4 to ↑16%</td>
<td>↓26 to ↑2%</td>
</tr>
<tr>
<td>Bile acid sequestrants</td>
<td>↑3 to ↑5%</td>
<td>↓15 to ↓30%</td>
<td>↓1 to ↑1%</td>
</tr>
<tr>
<td>Ezetimibe</td>
<td>↑1 to ↑5%</td>
<td>↓18 to ↓20%</td>
<td>↓5 to ↓11%</td>
</tr>
</tbody>
</table>
Mean additional changes of lipid profile

<table>
<thead>
<tr>
<th>DRUG</th>
<th>LDL</th>
<th>HDL</th>
<th>Triglycerides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phytosterols</td>
<td>-10%</td>
<td>0</td>
<td>-6-9%</td>
</tr>
<tr>
<td>Ezetimibe</td>
<td>-18%</td>
<td>6%</td>
<td>-10%</td>
</tr>
<tr>
<td>Resins</td>
<td>-15%</td>
<td>5%</td>
<td>15%</td>
</tr>
<tr>
<td>Fibrates</td>
<td>-8%</td>
<td>10%</td>
<td>-36%</td>
</tr>
<tr>
<td>Nicotinic acid</td>
<td>-14%</td>
<td>16%</td>
<td>-20%</td>
</tr>
<tr>
<td>Omega 3</td>
<td>0.7%</td>
<td>3.4%</td>
<td>-30%</td>
</tr>
</tbody>
</table>
Case 4

54 YO man

PMH:
DM, HTN, dyslipidemia, GERD

DH:
lisinopril 20 mg/day, amlodipine 10 mg/day, atorvastatin 20 mg/day, omeprazole 20 mg/day, metformin 500 BD

Lab data:
TC 197 mg/dL, TG 166 mg/dL, HDL 37 mg/dL, LDL 128 mg/dL. His non-HDL is 160 mg/dL
which is the best recommendation at this time to achieve his LDL (and non-HDL) goal?
A. Add fenofibrate 200 mg/day

B. Change atorvastatin to rosuvastatin 20 mg/day

C. Increase pravastatin to 80 mg/day

D. Add ezetimibe 10 mg/day
Answer:B

A. Add fenofibrate 200 mg/day

B. Change atorvastatin to rosvastatin 20 mg/day

C. Increase pravastatin to 80 mg/day

D. Add ezetimibe 10 mg/day
Case 5

A 69 yo woman with CHD, DM, HTN, and GERD is referred to your lipid clinic because of statin intolerance. She reports myalgias with rosuvastatin and atorvastatin (40 mg), liver enzyme elevations with atorvastatin, and GI upset with ezetimibe.

**DH:**

- metformin 1000 mg BD, amlodipine 10 mg/day, lisinopril 10 mg/day, and omeprazole 20 mg/day

**Lab data:**

- TC 238 mg/dL, TG 421 mg/dL, HDL 44 mg/dL, LDL 110 mg/dL,
Which is the best recommendation at this time to further reduce her ASCVD risk?
A. Add cholestyramine

B. Add evolocumab 140 mg SC every 2 weeks

C. Add fenofibrate 200 mg/day

D. Add omega-3 fatty acids 4 g/day
Answer:B

A. Add cholestyramine

B. Add evolocumab 140 mg SC every 2 weeks

C. Add fenofibrate 200 mg/day

D. Add omega-3 fatty acids 4 g/day
Evolocumab

PCSK9 Inhibitors

Solution for injection: 140mg/ml
SC injection

Can be administered bi-weekly or once-monthly

Mechanism

Increases the number of ldlrs available to clear LDL from the blood, thereby lowering LDL-C levels
Evolocumab

- No dosage adjustment necessary in renal and hepatic failure
- Most common adverse effect reported are injection site reactions
- Evolocumab is FDA-approved for use as monotherapy in primary hyperlipidemia
Case 6

57-year-old woman

CC:
Increased thirst and polyuria

PMH:
HTN, Dyslipidemia, Given a new diagnosis of diabetes, Cigarette smoker

DH:
Enalapril 20 mg/day, Amlodipine 10 mg/day, HCTZ 12.5 mg/day
Atorvastatin 10 mg/day

Lab Data:
FBS: 156 mg/dL, HbA1C 7.7%, TC 184 mg/dL, TG 202 mg/dL, HDL 41 mg/dL
LDL 103 mg/dL
SBP: 150 mmHg
Which is the best recommendation at this time?
A. Add fenofibrate 200 mg/day

B. Add niacin extended release 500 mg/night.

C. Increase atorvastatin to 40 mg/day

D. Continue atorvastatin 10 mg/day
Answer: C

A. Add fenofibrate 200 mg/day

B. Add niacin extended release 500 mg/night.

C. Increase atorvastatin to 40 mg/day

D. Continue atorvastatin 10 mg/day
40-75 years and LDL 70-189mg/dl

**Primary Prevention:**
Assess ASCVD Risk in Each Age Group  
Emphasize Adherence to Healthy Lifestyle

- **Age 0-19 y**  
  Lifestyle to prevent or reduce ASCVD risk  
  Diagnosis of Familial Hypercholesterolemia → statin

- **Age 20-39 y**  
  Estimate lifetime risk to encourage lifestyle to reduce ASCVD risk  
  Consider statin if family history premature ASCVD and LDL-C ≥160 mg/dL (≥4.1 mmol/L)

- **Age 40-75 y and LDL-C ≥70<190 mg/dL**  
  (≥1.8<4.9 mmol/L) without diabetes mellitus  
  10-year ASCVD risk percent begins risk discussion

**ASCVD Risk Enhancers:**
- Family history of premature ASCVD  
- Persistently elevated LDL-C ≥160 mg/dL (≥4.1 mmol/L)  
- Chronic kidney disease  
- Metabolic syndrome  
- Conditions specific to women (e.g., preeclampsia, premature menopause)  
- Inflammatory diseases (especially rheumatoid arthritis, psoriasis, HIV)  
- Ethnicity (e.g., South Asian ancestry)

- Lipid/Biomarkers:  
  - Persistently elevated triglycerides (≥175 mg/dL, ≥2.0 mmol/L)

  *In selected individuals if measured:*  
  - hs-CRP ≥2.0 mg/L  
  - Lp(a) levels >50 mg/dL or >125 nmol/L  
  - apoB ≥130 mg/dL  
  - Ankle-brachial index (ABI) <0.9

**Risk Discussion:**
- **<5% “Low Risk”**  
  Risk discussion: Emphasize lifestyle to reduce risk factors (Class I)

- **5% - <7.5% “Borderline Risk”**  
  Risk discussion: If risk enhancers present then risk discussion regarding moderate-intensity statin therapy (Class IIb)

- **≥7.5% - <20% “Intermediate Risk”**  
  Risk discussion: If risk estimate + risk enhancers favor statin, initiate moderate-intensity statin to reduce LDL-C by 30% - 49% (Class I)

- **≥20% “High Risk”**  
  Risk discussion: Initiate statin to reduce LDL-C ≥50% (Class I)

If risk decision is uncertain:  
Consider measuring CAC in selected adults:  
CAC = zero (lowers risk; consider no statin, unless diabetes, family history of premature CHD, or cigarette smoking are present)  
CAC = 1-99 favors statin (especially after age 55)  
CAC = 100+ and/or ≥75th percentile, initiate statin therapy
<5%  "Low Risk"
  Risk discussion:  Emphasize lifestyle to reduce risk factors (Class I)

5% - <7.5%  "Borderline Risk"
  Risk discussion:  If risk enhancers present then risk discussion regarding moderate-intensity statin therapy (Class IIb)

≥7.5% - <20%  "Intermediate Risk"
  Risk discussion:  If risk estimate + risk enhancers favor statin, initiate moderate-intensity statin to reduce LDL-C by 30% - 49% (Class I)

≥20%  "High Risk"
  Risk discussion:  Initiate statin to reduce LDL-C ≥50% (Class I)

If risk decision is uncertain:
Consider measuring CAC in selected adults:
CAC = zero (lowers risk; consider no statin, unless diabetes, family history of premature CHD, or cigarette smoking are present)
CAC = 1-99 favors statin (especially after age 55)
CAC = 100+ and/or ≥75th percentile, initiate statin therapy
10-year ASCVD risk score is 22%
### Step 1

In the "points" column enter the appropriate value according to the patient's age, HDL-C, total cholesterol, systolic blood pressure, and if they smoke or have diabetes. Calculate the total points.

<table>
<thead>
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<th>Risk Factor</th>
<th>Men</th>
<th>Risk Points</th>
<th>Women</th>
<th>Points</th>
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<tr>
<td><strong>Age</strong></td>
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<td>30-34</td>
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</tr>
<tr>
<td>35-39</td>
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<td>2</td>
<td>2</td>
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<tr>
<td>40-44</td>
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<td>4</td>
<td>4</td>
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<tr>
<td>45-49</td>
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<td>6</td>
<td>6</td>
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<tr>
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<td>65-69</td>
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<tr>
<td>70-74</td>
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<tr>
<td>75+</td>
<td>16</td>
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<td>12</td>
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<tr>
<td><strong>HDL-C (mg/dl)</strong></td>
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<tr>
<td>&gt;60</td>
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<td>≥280</td>
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<td><strong>Systolic Blood Pressure (mmHg)</strong></td>
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<td>Not Treated</td>
<td>Treated</td>
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<td>160+</td>
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<td><strong>Smoker</strong></td>
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<td>statin-indicated condition</td>
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<tr>
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<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>
**Step 2**

Using the total points from Step 1, determine the 10-year CVD risk* (%)..

<table>
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<tr>
<th>Total Points</th>
<th>10-Year CVD Risk (%)*</th>
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<tbody>
<tr>
<td></td>
<td>Men</td>
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<td>-3 or less</td>
<td>&lt;1</td>
</tr>
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<td>4</td>
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<td>20</td>
<td>&gt;30</td>
</tr>
<tr>
<td>≥21</td>
<td>&gt;30</td>
</tr>
</tbody>
</table>
Case 7

a 51 yo man

**PMH:**
DM, HTN, Hypertriglyceridemia, Peptic ulcer disease, History of acute pancreatitis

**SH:**
Drinks 4–6 beers/day

**DH:**
Enalapril 20 mg/day, HCTZ 50 mg/day, amlodipine 10 mg/day
pantoprazole 40 mg/day, rosuvastatin 20 mg/day
metformin 1000 mg BD, insulin glargine 28 units at bedtime

BMI: 38 kg/m²

**Lab Data:**
HbA1C 6.9%, TC 157 mg/dL, TG 588 mg/dL, HDL 38 mg/dL, LDL 78 mg/dL
LFT: NL  Scr: 1 mg/dL
Which best describes potential secondary causes that may be contributing to his hypertriglyceridemia?
A. Alcohol consumption, poorly controlled DM, amlodipine.
B. Alcohol consumption, rosuvastatin, weight loss.
C. Obesity, alcohol consumption, HCTZ
D. Obesity, poorly controlled DM, metformin.
Answer: C

A. Alcohol consumption, poorly controlled DM, amlodipine.
B. Alcohol consumption, rosuvastatin, weight loss.

C. Obesity, alcohol consumption, HCTZ

D. Obesity, poorly controlled DM, metformin.
Secondary Causes of Hypertriglyceridemia

- Obesity
- Diabetes mellitus
- Ileal bypass surgery
- Sepsis
- Pregnancy
- Acute Hepatitis
- Drugs:
  - Alcohol
  - Estrogens
  - Isotretinoin
  - Beta blockers
  - Glucocorticoids
  - Bile-acid resins
  - Thiazides
  - Azole antifungals
  - Anabolic steroids
  - Sirolimus

BMI: 38 kg/m²
Case 8

A 46-yo woman who was recently (3 months ago) hospitalized for acute pancreatitis (TG greater than 2000 mg/dL) is referred to you for management of hypertriglyceridemia.

Since her hospitalization, she has lost 10 kg by reducing her intake of simple carbohydrates and walking for 30 minutes five times a week.

**PMH:** HTN

**DH:**
- amlodipine 10 mg/day, Atorvastatin 20mg/day, losartan 100 mg/day, multivitamin.

**Lab data**
- TC 210 mg/dL, TG 653 mg/dL, HDL 39 mg/dL, LDL 100 mg/dL
Which is the best treatment recommendation at this time?
A. Continue diet, exercise, and weight loss only.
B. Initiate atorvastatin 40 mg/day.
C. Initiate ezetimibe 10 mg/day.
D. Initiate fenofibrate 200 mg/day.
Answer: D

A. Continue diet, exercise, and weight loss only.

B. Initiate atorvastatin 40 mg/day.

C. Initiate ezetimibe 10 mg/day.

D. Initiate fenofibrate 200 mg/day.
Serum triglycerides (TG) ≥150 mg/dL

- Repeat if non-fasting

- TG = 150-499 mg/dL

  - Screen for secondary causes/exacerbating factors: alcohol, diabetes, drugs, hypothyroidism, liver/kidney disease
  - Initiate therapeutic lifestyle changes (TLC):
    - Alcohol abstinence, weight loss, regular physical exercise
    - Dietary counseling: ↓ simple sugars, fructose, saturated fat
    - ↑ fiber, monounsaturated and polyunsaturated fat
  - Repeat in 8-12 weeks

- TG ≥ 500 mg/dL

  - Repeat in 4 weeks

  - TG < 500

    - TG = 200-499
      - Known ASCVD/↑ risk
      - No
        - Continue TLC
        - No pharmacotherapy
      - Yes
        - Statin ± fibrate/EPA
  - TG > 500

    - TG < 500
      - Start fibrate/w-3 FA
        - Repeat in 6-8 weeks
        - TG > 500
          - Fibrate + w-3 FA
          - Consider niacin
          - Reevaluate diet, secondary causes
Fibric Acid Derivatives

**Gemfibrozil**
- Cap: 300 mg
- Tab: 450 mg

**Fenofibrate**
- Cap: 100-200 mg

Primarily used in patients with TG levels that exceed 500 mg/dl to reduce the risk of acute pancreatitis

Reduce TG 20%-50%
Rise HDL-C 10% to 15%
Generally well tolerated

Gastrointestinal complaints and transient elevations in transaminase levels have been reported

Muscle-related adverse effects can occur with both gemfibrozil and fenofibrate alone but is more common when used in combination with statins

Gemfibrozil and fenofibrate require dose adjustments for significant renal impairment

Current guidelines do not recommend gemfibrozil to be initiated in patients receiving statin therapy

Fibrates may potentiate the effects of warfarin
A 34-year-old woman with a history of heterozygous familial hypercholesterolemia recently tested positive for pregnancy. She takes atorvastatin 40 mg/day and ezetimibe 10 mg/day.
Which is the best recommendation at this time?
A. Continue atorvastatin; discontinue ezetimibe

B. Continue ezetimibe; discontinue atorvastatin

C. Discontinue both atorvastatin and ezetimibe; initiate alirocumab 75 mg subcutaneously every 2 weeks.

D. Discontinue both atorvastatin and ezetimibe; initiate cholestyramine twice daily.
A. Continue atorvastatin; discontinue ezetimibe

B. Continue ezetimibe; discontinue atorvastatin

C. Discontinue both atorvastatin and ezetimibe; initiate alirocumab 75 mg subcutaneously every 2 weeks.

D. Discontinue both atorvastatin and ezetimibe; initiate cholestyramine twice daily.
Pregnancy

- AAP/ACOG guidelines suggest that lipid assessment should occur **annually** for all age groups.
- The NLA suggests women should be screened for dyslipidemia before pregnancy.
- Most cholesterol-lowering drugs should be discontinued 1-2 months before getting pregnant or as soon as pregnancy is discovered.
Pregnancy

- The only agents with the historic FDA pregnancy category B are bile acid sequestrants and omega-3 fatty acids.

2. Women of childbearing age who are treated with statin therapy and are sexually active should be counseled to use a reliable form of contraception (S4.5.3-7–S4.5.3-12).

3. Women of childbearing age with hypercholesterolemia who plan to become pregnant should stop the statin 1 to 2 months before pregnancy is attempted, or if they become pregnant while on a statin, should have the statin stopped as soon as the pregnancy is discovered (S4.5.3-7–S4.5.3-12).
Bile acid sequestrants

- Reduce LDL-C (13%-20%)
- First line during pregnancy
- Not systemically absorbed
- Should be avoided in those with TG levels exceeding 300 mg/dl
- Poor tolerability profile
ADR

- GI complaints
  - Constipation
  - Bloating
  - Epigastric fullness
  - Nausea
  - Flatulence

- Impaired absorption of fat-soluble vitamins A, D, E, and K

- Gastrointestinal obstruction
Reduced bioavailability of other drugs (warfarin, levothyroxine, phenytoin)

Drug–drug interactions may be avoided by taking other medications 1 hour before or 4 hours after the BAS
Omega-3

- 2-4 g/day of EPA/DHA
- Reduce TG and VLDL  20%-50%
- Gastrointestinal complaints
  - Abdominal pain

- Caution is advised when used concomitantly with antiplatelet agents or anticoagulants since omega-3 PUFA may prolong bleeding time
Lovaza:

Each 1g cap (EPA: 465mg) + (DHA: 375mg)
Case 10

70- yo  man

CC:  
Bilateral muscle aches in his legs with atorvastatin (40 mg)

PMH:  
CAD, HTN

Lab data:  
TC 267 mg/dL, TG 143 mg/dL , HDL 38 mg/dL, LDL 200 mg/dL
25(OH)D3 = 28
TFT: NL
LFT: NL
CK: 3 ULN

Which one is the best recommendation?
A. D/C atorvastatin
B. Continue atorvastatin and check CK after few days
C. Change to atorvastatin 20 mg
D. Change to rosuvastatin
Answer: B

A. D/C atorvastatin
B. Continue atorvastatin and check CK after few days
C. Change to atorvastatin 20 mg
D. Change to rosuvastatin
Risk Factor

- Statin characteristics
  - Metabolized by CYP 3A4
  - High dose
- Advanced age
- Hypothyroidism
- Preexisting muscle disease
- Renal impairment
- Female sex
- Diabetes mellitus
- lower BMI
- vitamin D deficiency
- Chinese (and possibly east asian in general) ancestry
Muscle symptoms are typically

- muscle weakness, soreness, cramping, stiffness, tendon pain
- Bilateral
- Symmetrical
- Distributed proximally (hip flexor region, upper chest and shoulders)
- Onset of muscle symptoms is usually within weeks to months
- The risk is greatest in the first year of therapy
- After a dose increase or the addition of an interacting drug
- Symptoms typically improve within 1–2 weeks of statin discontinuation

The risk of rhabdomyolysis is ≈0.01% and is potentially preventable by prompt cessation of statin treatment
Clinical Aproach to Myopathy or Rhabdomyolysis

❖ Consider other reasons
  – Unusual or strenuous exercise
  – Hypothyroidism (muscle weakness and increased CK levels)

❖ Measure CK
  – Unexplained muscle symptoms
  – Unexplained increases above 3 ULN in transaminases

Routine monitoring of serum CK levels is not recommended

❖ Consider drug interaction
Statin drug interaction

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<th>Moderate inhibitors 3A4</th>
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<th>Moderate inducers 3A4</th>
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Gemfibrozil
If CK

- >10 ULN (>5 ULN in a vulnerable patient)
  statin should be stopped immediately
  Start high fluid intake
  If the symptom or lab test do not improve soon after statin D/C, should be consider other diagnosis

- 3 -4 > ULN and mild symptoms
  continue statin
  check CK in a few days
Case 11

52-yo man

DH: Amlodipine, Atorvastatin

PMH: CAD, HTN

Lab data: TC 267 mg/dL, TG 143 mg/dL, HDL 38 mg/dL, LDL 100 mg/dL
ALT: 120  AST: 80  ALP: 150
Which one is the best recommendation?
A. Hold atorvastatin and check LFT after 3 days

B. Continue atorvastatin and check LFT after 3 days

C. Change to atorvastatin 20 mg

D. Change to rosuvastatin
Answer: A

A. Hold atorvastatin and check LFT after 3 days

B. Continue atorvastatin and check LFT after 3 days

C. Change to atorvastatin 20 mg

D. Change to rosuvastatin
If ALT or AST is 1 to 3 times the ULN
   No need to discontinue the statin

If ALT or AST exceeds 3 times the ULN
   Hold statin
   Repeat LFT

If a patient’s transaminase levels continue to rise
Or If there is further objective of liver injury
   The statin should be discontinued
LOW HDL: component of Metabolic syndrome, associated with high TG, High LDL

Most common form of dyslipidemia in Iran
LOW HDL treatment

- **Life style Modification:**
  - Obesity, Physical activity, stop Smoking, stress
  - carbohydrate, fruits & Vegetable

- **Pharmacotherapy:**
  - IF low HDL + High LDL: statin
  - IF low HDL + High TG: statin or fibrate (According to TG level)
  - IF isolated Low HDL: no recommendation for drug treatment
Thank You For Your Attention