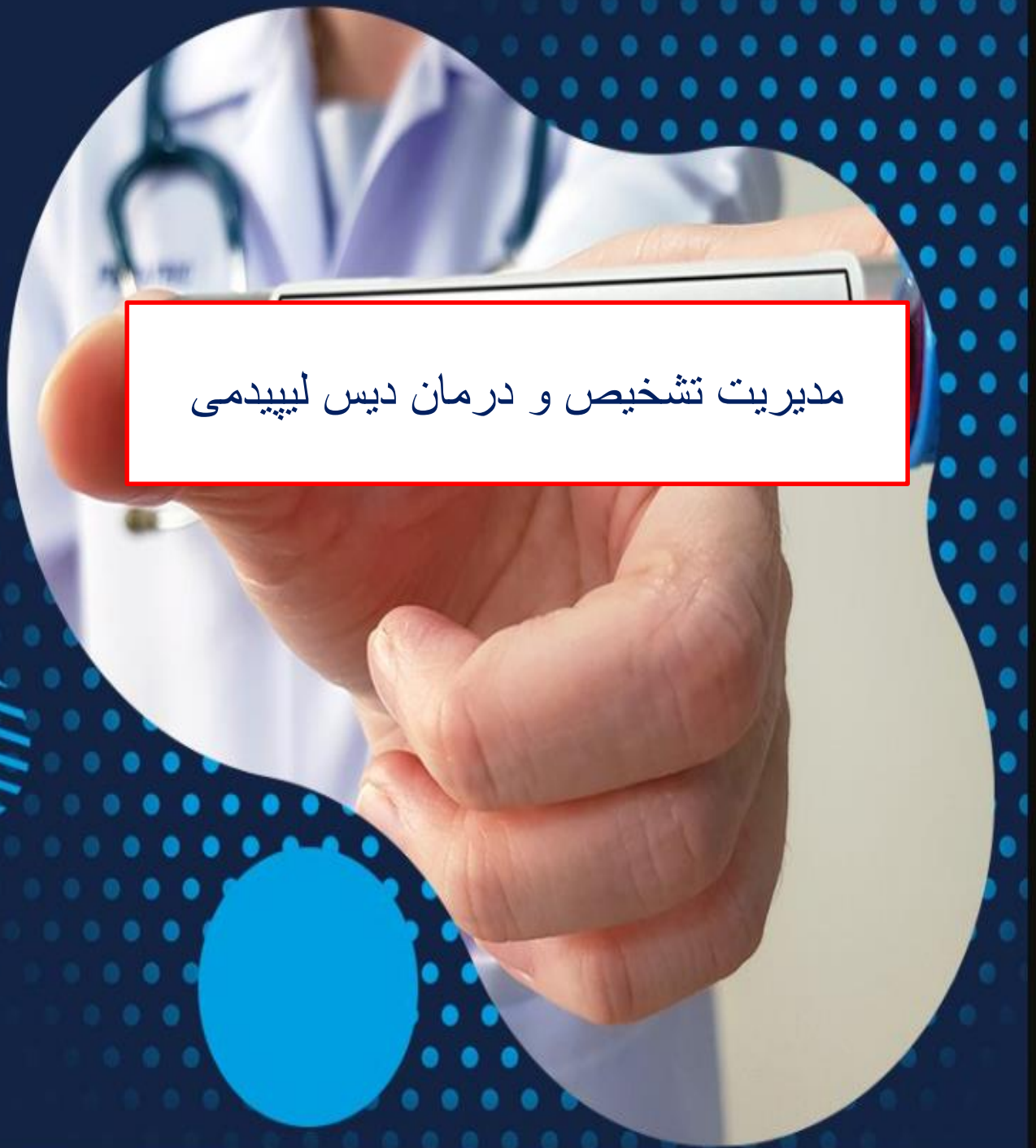
In the name of God

LIPID PROFILE Blood TEST



مدیریت تشخیص و درمان دیس لیپیدمی

- Dr Tooba kazemi
  Professor of cardiology
- Dr Shima jafari
  Assistant professor of clinical pharmacy

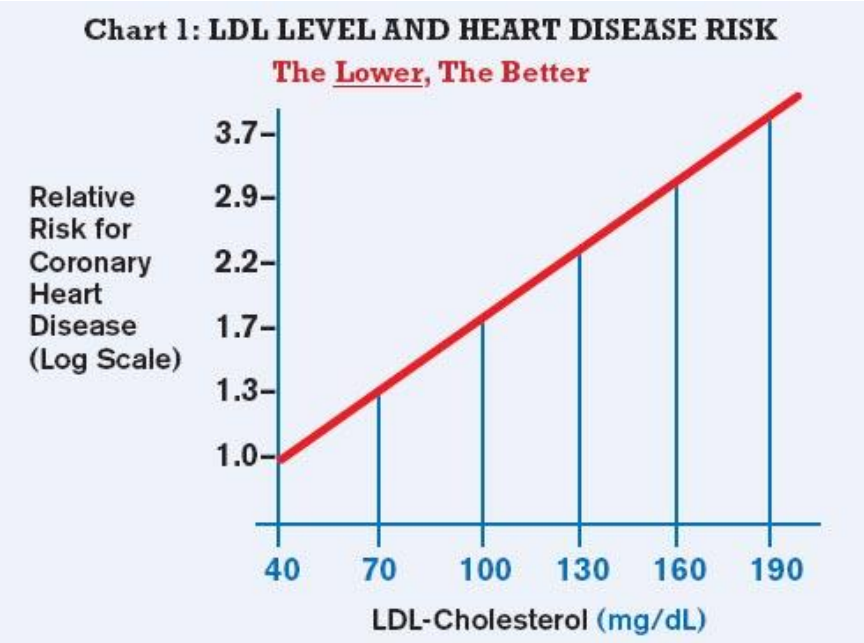
Dyslipidemia Definition

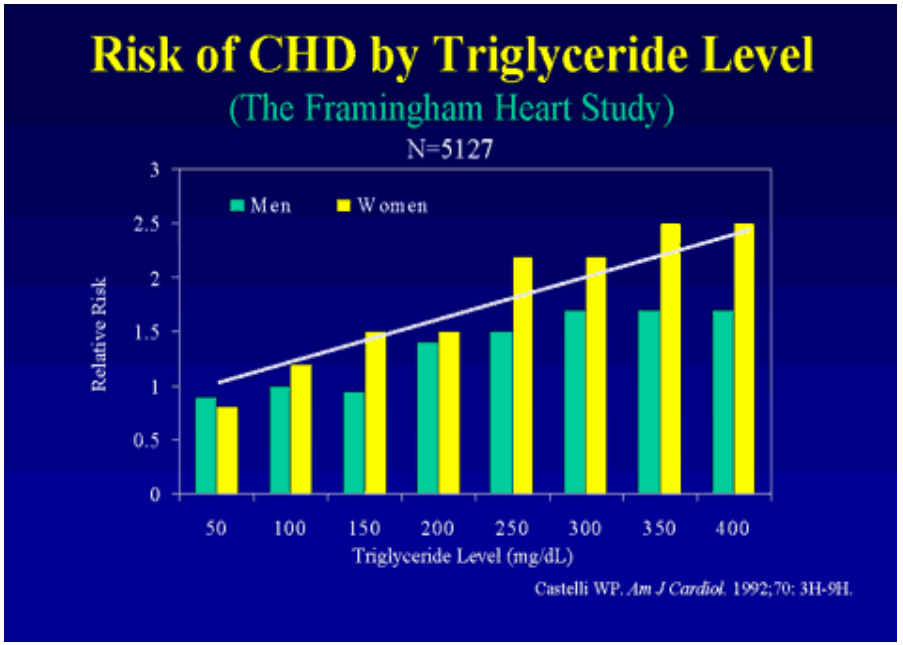
Dyslipidemia is

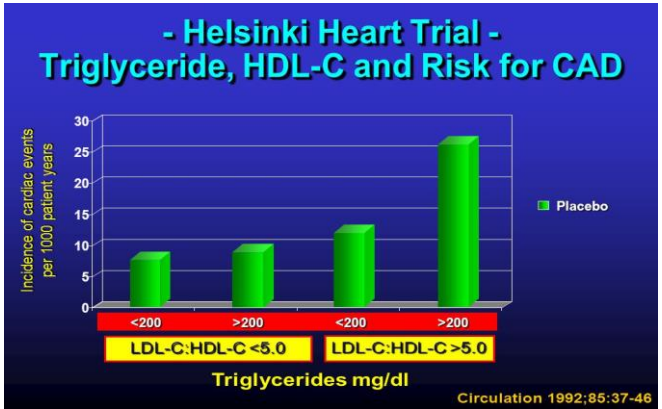
- Disorder in lipoprotein metabolism
- Defined as elevated total cholesterol , LDL, TG or low levels of HDL
- An important risk factor for coronary heart disease (CAD) and stroke

HLP / DLP ?

Importance of Dyslipidemia







Lipid level	CAD risk
Each 1% increase in LDL	**1% increase** in the risk of CHD in women and men
Each 1% increase in Non-HDL-C	1% increase in the risk of CHD in women and men
Each 89 mg/dL increase in TG	37% increase in the risk of CVD in women 14% increased risk in men
Each **1 mg/dL increase in HDL-C**	**2% decrease** in CVD death in men **3% decrease** in CVD death in women

Prevalence of DLP in Our Studies

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

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

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

Citation: Siadat M, Kazemi T, Hajihosseni M. Cardiovascular Risk-Factors in the Eastern Iranian Population: Are We Approaching 25×25 Target? J Res Health Sci. 2016; 16(1); 51-52.

- **Prevalence Dyslipidemia : at least 50%**

http://jrhs.umsha.ac.ir/index.php/JRHS/article/view/2513/

Etiology

- ❑ PRIMARY
- ❑ SECONDARY

PRIMARY

- ✓ Genetic
- ✓ Hypercholesterolemia
- ✓ Hypertriglyceridemia
- ✓ Combination of Hypercholesterolemia and Hypertriglyceridemia

- ❑ **SECONDARY**
- ✓ Life style :
  - **D**iet
  - **L**ack of exercise
  - **S**moking
  - **S**tress
  - **E**xcessive alcohol intake
- ✓ Diseases
- ✓ Drugs

❖ **Obesity**

- ❑ **SECONDARY**
- ✓ **Diseases**
  - **D**iabetes mellitus
  - **N**ephrotic syndrome
  - **R**enal failure
  - **H**ypothyroidism
  - **C**holestasis
- ✓ **Drugs**
  - **T**hiazide diuretics
  - **β**-adrenergic blockers
  - **O**ral contraceptives
  - **C**orticosteroids
  - **I**sotretinoin (vitamin **A** derivative)

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.

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

Indication for Lipid measurement

2 : Adults With Diabetes :

Annually screen all adult individuals with T1DM or T2DM for dyslipidemia .

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**

Indication for Lipid measurement

3 : Screen for Familial Hypercholesterolemia :

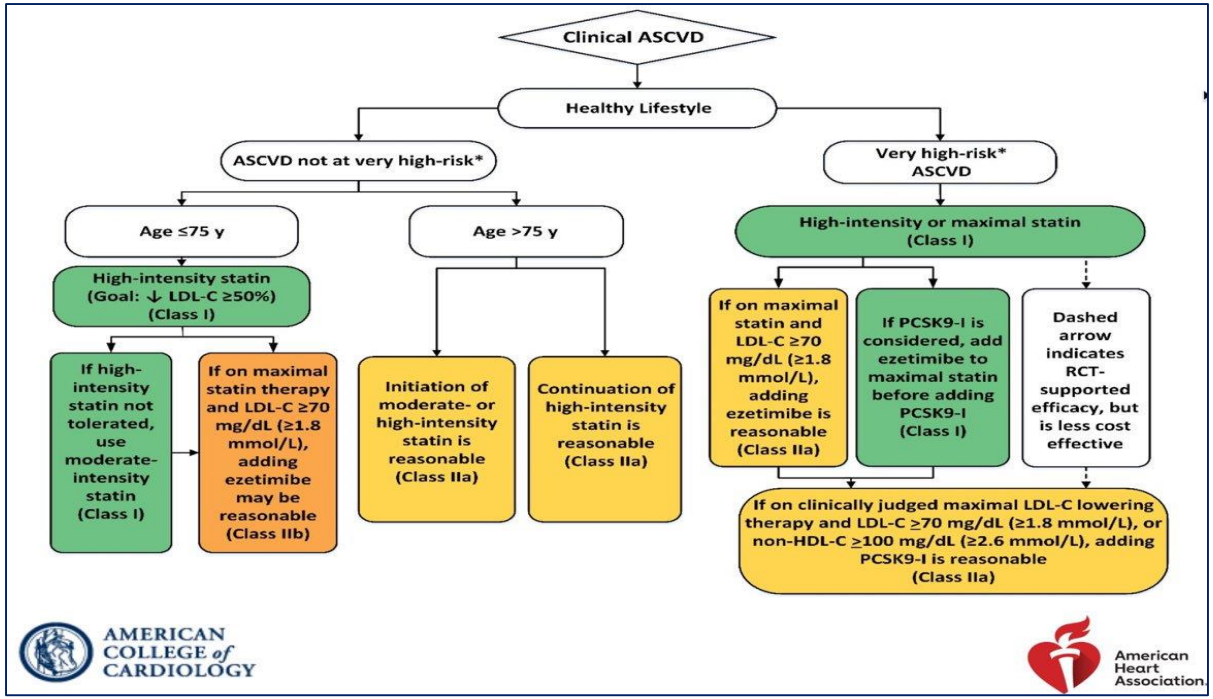
Family history of Premature ASCVD (definite MI or SCD < 55 years in father or other male first-degree relative, or <65 years in mother or other female first-degree relative) or Elevated cholesterol levels (total, non-HDL and/ or LDL) consistent with FH .(Chol >290 / LDL > 190)

6: Children and Adolescents

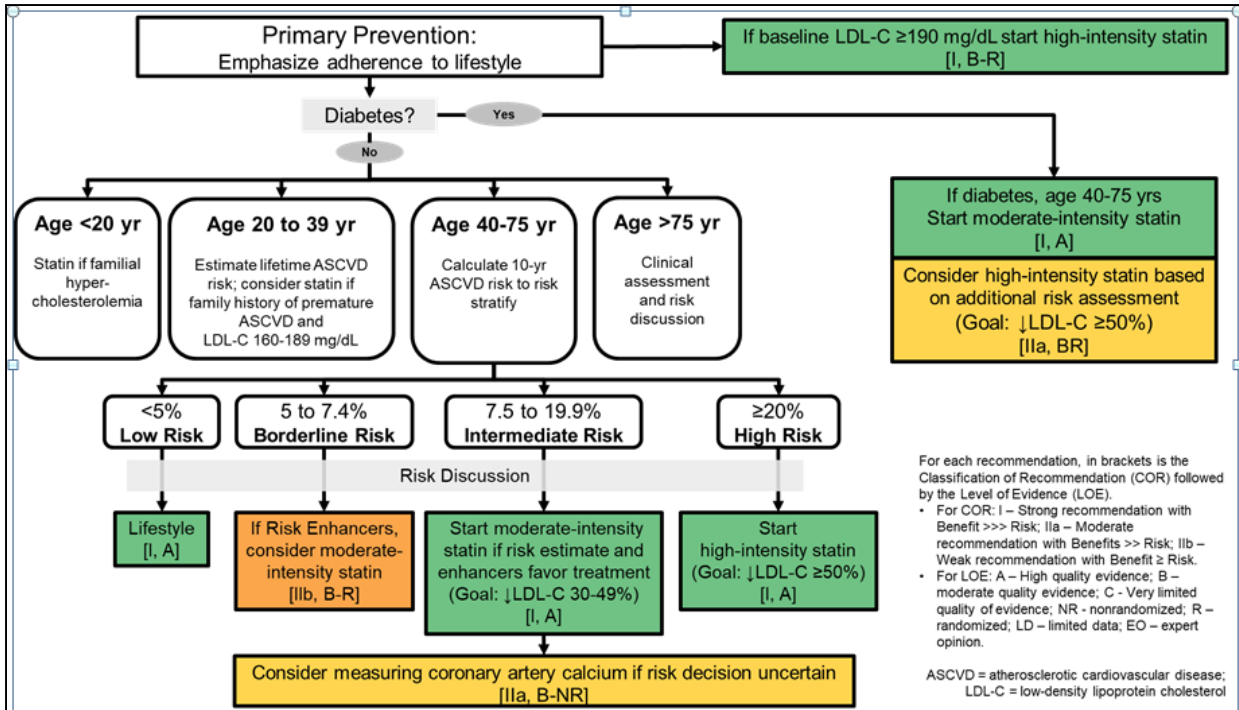
In children at risk for FH (e.g., family history of premature cardiovascular disease or elevated cholesterol), screening should be at **3** years of age, again between ages **9 and 11**, and again at **age 18**

Serum Lipids Levels

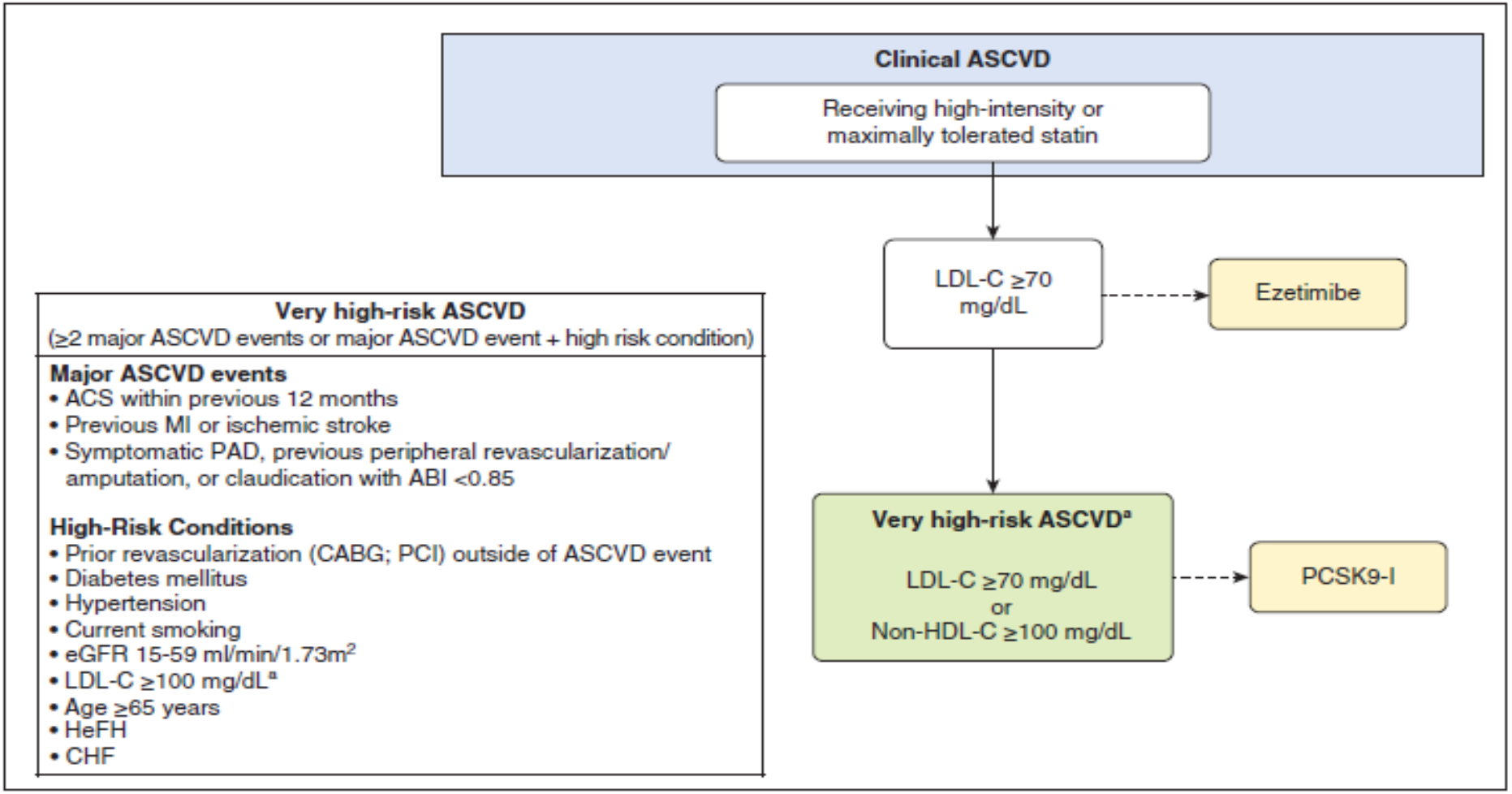
	Normal	High Normal	High	Very High
Chol (mg/dl)	<200	200-239	≥ 240	
TG(mg/dl)	<150	150-174	175-499 Moderate	**≥500** Severe
LDL(mg/dl)	**According To patients comorbidity**			**≥190**
HDL(mg/dl)	**Low** : in M<40 , F<50 **cardioprotective :** > 60 mg/dl			


Clinical ASCVD
Healthy Lifestyle
ASCVD not at very high-risk*
Very high-risk* ASCVD
Age ≤75 y
Age >75 y
High-intensity or maximal statin (Class I)
High-intensity statin (Goal: ↓ LDL-C ≥50%) (Class I)
If high-intensity statin not tolerated, use moderate-intensity statin (Class I)
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)
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)
Dashed arrow indicates RCT-supported efficacy, but is less cost effective
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)
AMERICAN COLLEGE of CARDIOLOGY
American Heart Association.

AHA 2018


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 hyper-cholesterolemia
Age 20 to 39 yr
Estimate lifetime ASCVD risk; consider statin if family history of premature ASCVD and LDL-C 160-189 mg/dL
Age 40-75 yr
Calculate 10-yr ASCVD risk to risk stratify
Age >75 yr
Clinical assessment and risk discussion
If diabetes, age 40-75 yrs Start moderate-intensity statin [I, A]
Consider high-intensity statin based on additional risk assessment (Goal: ↓LDL-C ≥50%) [IIa, BR]
<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; IIa – Moderate recommendation with Benefits >> 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

Step 1



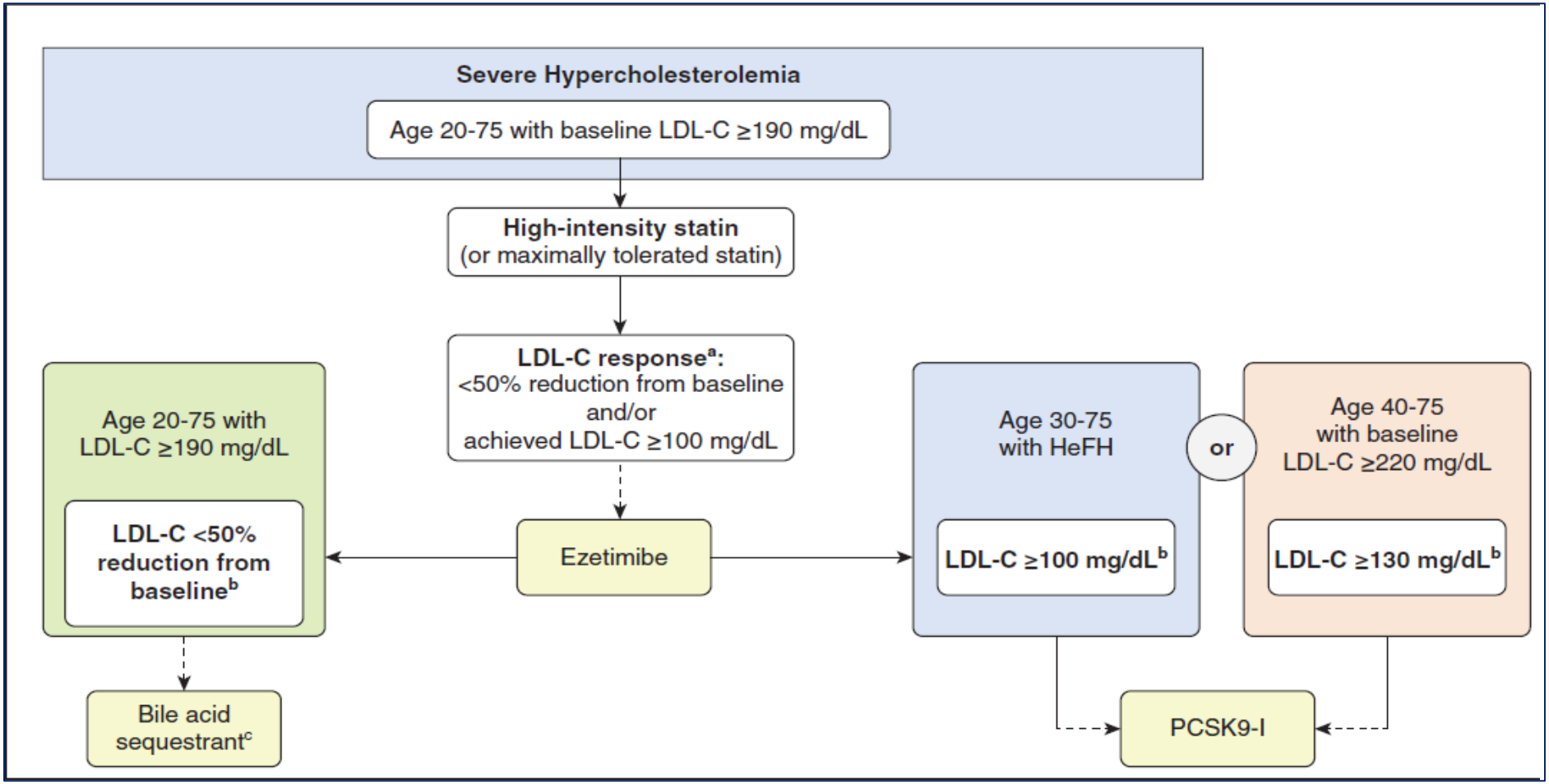
Clinical ASCVD

ACS (AMI ,UA)
CABG ,PCI
PAD
Carotid Disease
Chronic Stable Angina
Stroke ,TIA
Abdominal Aortic Aneurysm
Revascularization of other Arteries

LDL Goal
<70 mg/dl

High Intensity Statin

Step 2



Severe Hypercholesterolemia

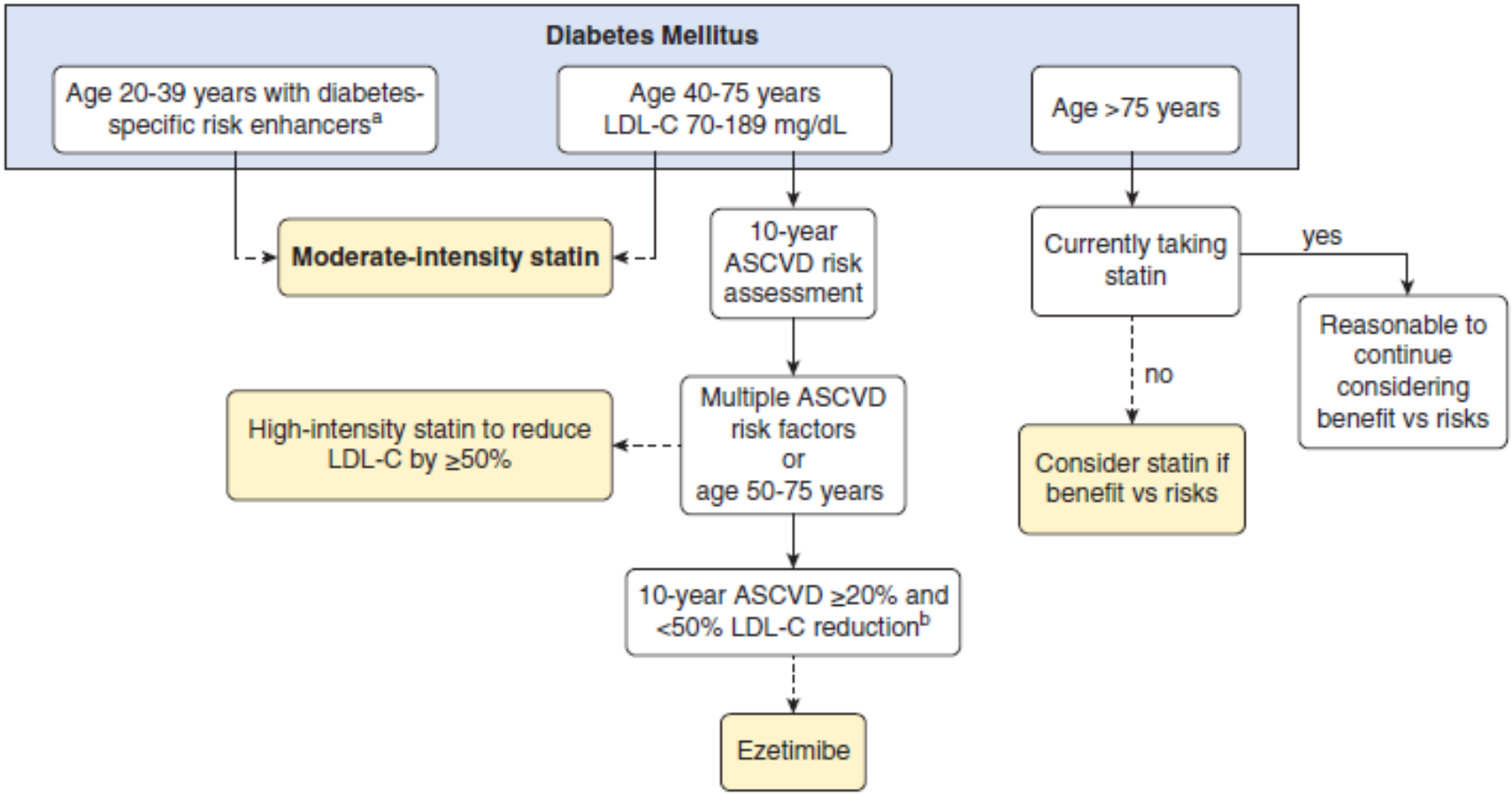
LDL ≥ 190

LDL Goal

<100 mg/dl

High Intensity Statin

Step 3



Hx of DM

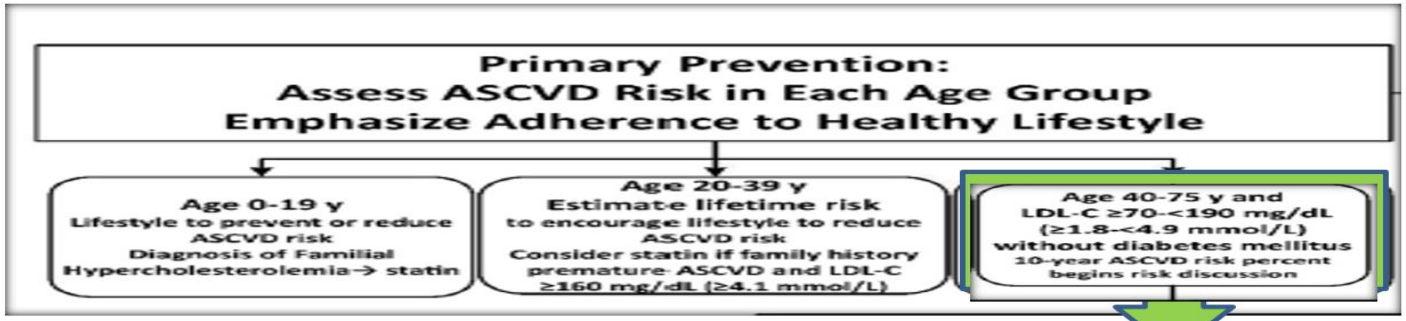
LDL Goal

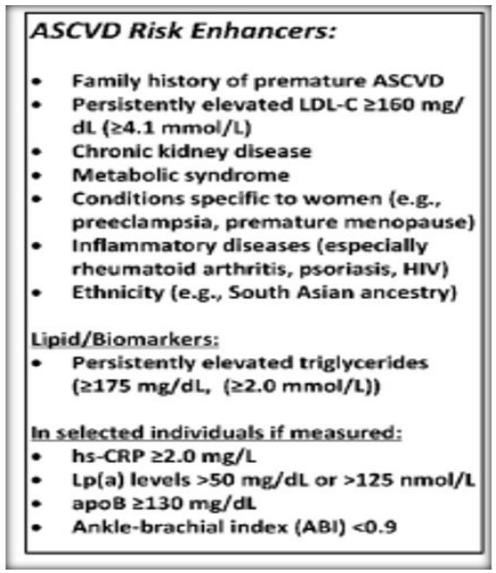
<100 mg/dl

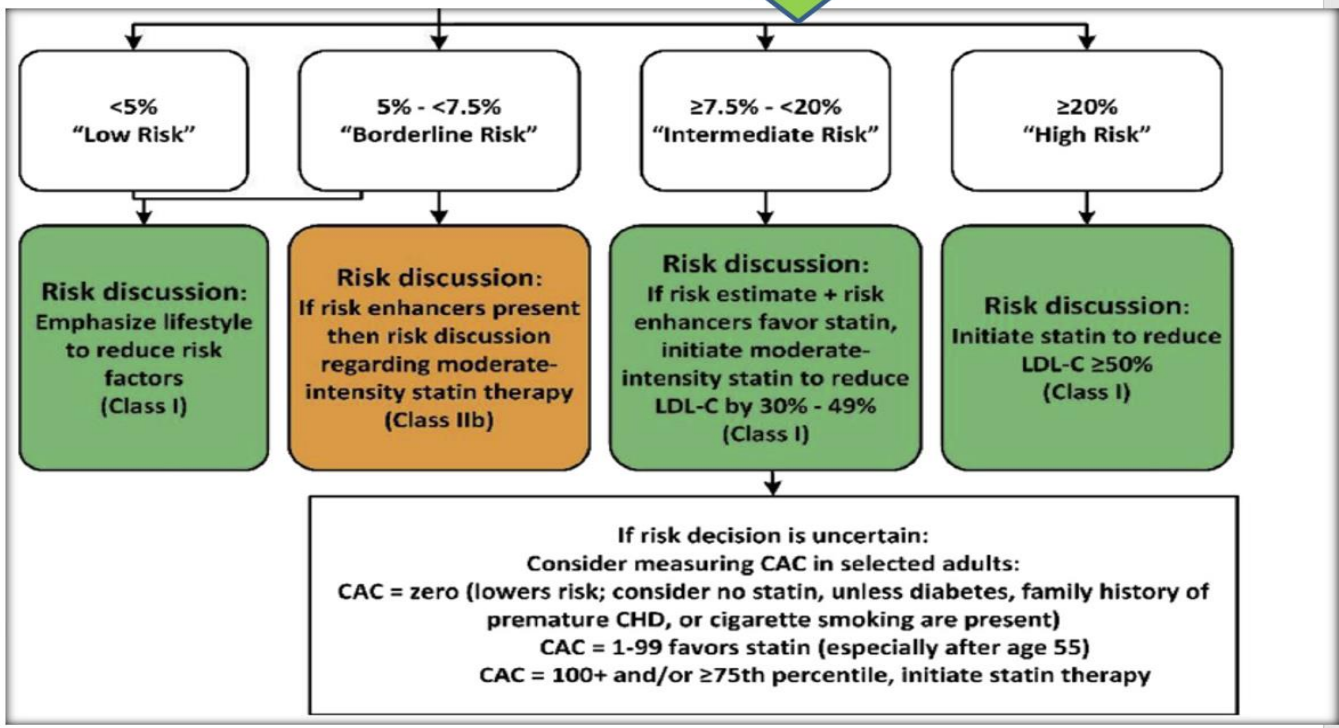
Moderate Intensity Statin

If ASCVD risk 10 y ≥ 10%: **High Intensity**

Step 4







ASCVD risk 10 y: ≥ 20 %

LDL Goal
<100 mg/dl

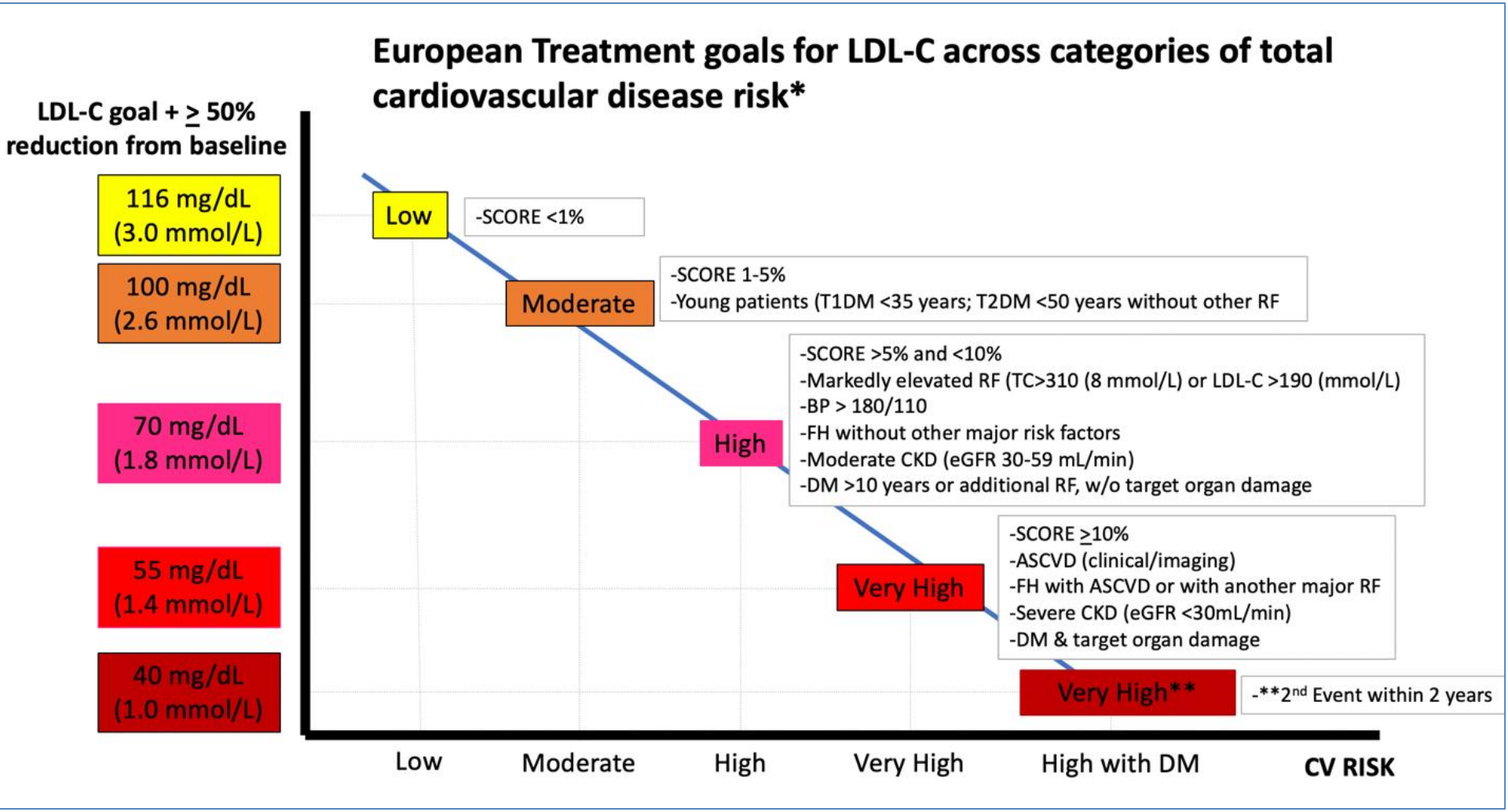
High dose Statin

ASCVD risk 10 y: 7.5-20%
And risk enhancers

LDL Goal
????

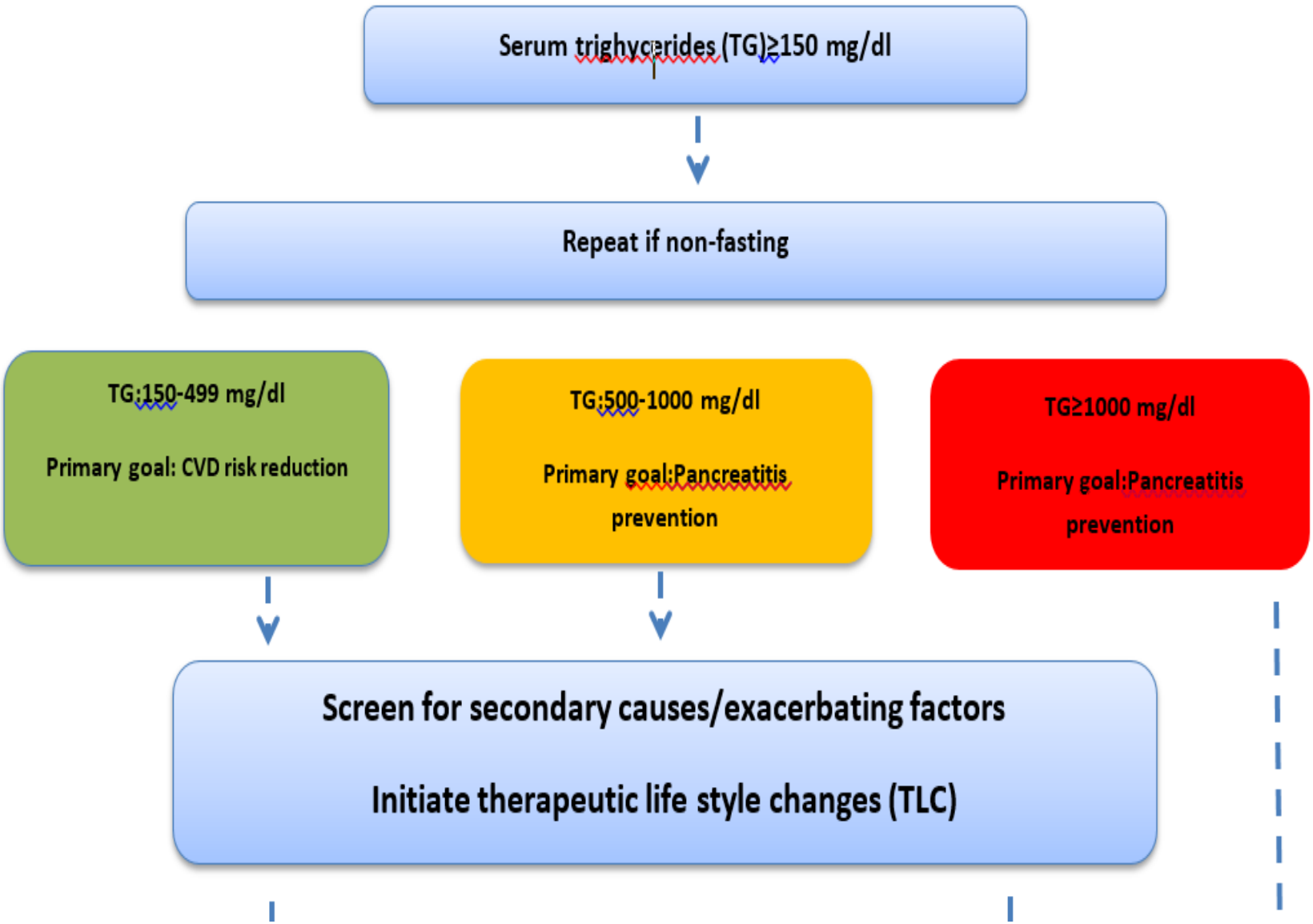
Moderate dose Statin

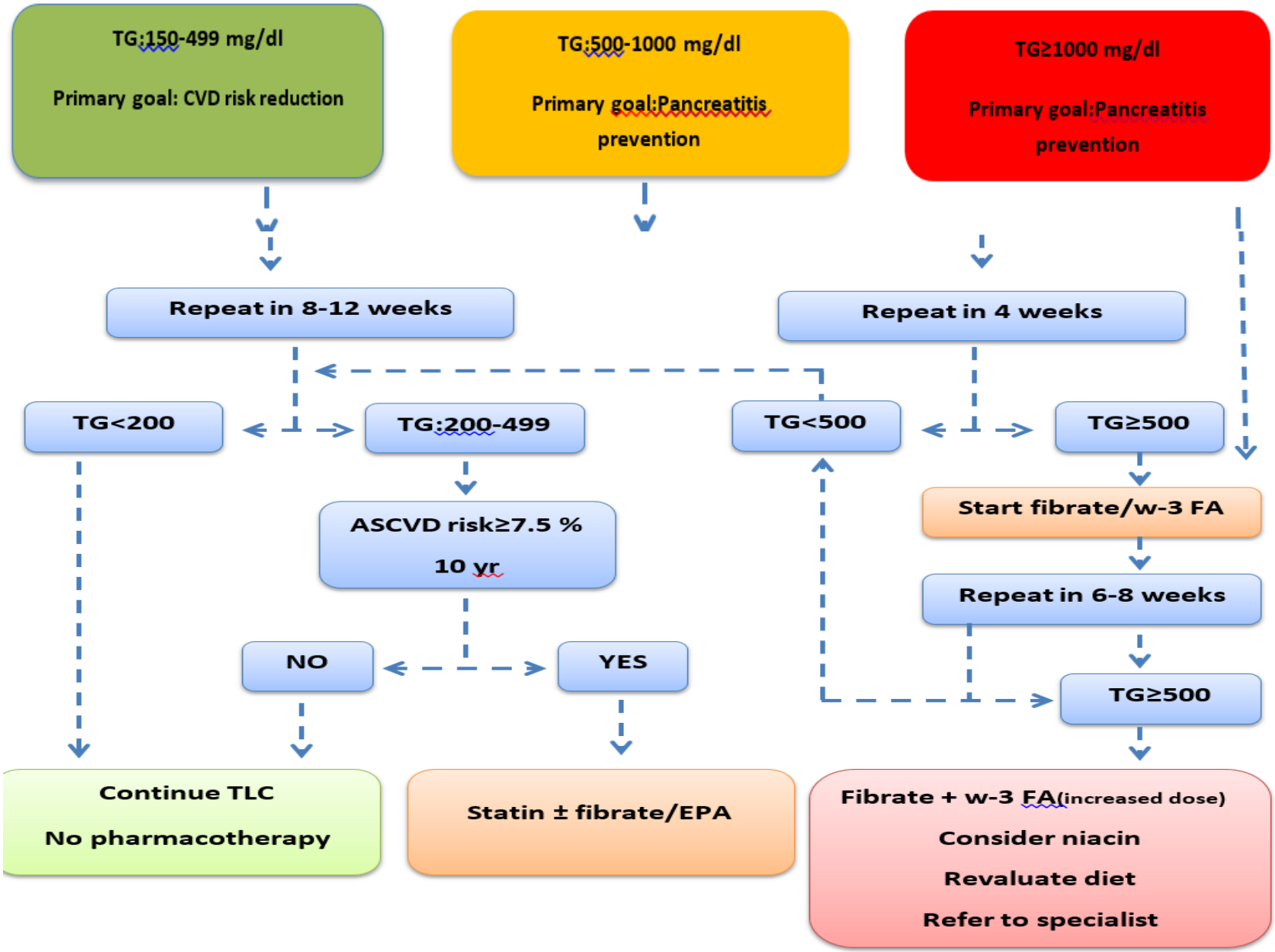
ESC 2019



2019 ESC/EAC Guidelines for the management of dyslipidemia : lipid modification to reduce cardiovascular risk

Risk group	Risk group Definition	LDL Goal mg/dl	Statin Dose
Very Very High	ASCVD 2th Event during 2 years	< 40	High
Very High	ASCVD + other RF DM + TOD Severe CKD (GFR <30 cc/min)	<55	High
High	ASCVD (ACS , MI, PCI, CABG, Stroke ,TIA ,PAD ,AAA) DM > 10yr / with other RF Moderate CKD (GFR 30-59 cc/min) LDL ≥ 190 mg/dl Risk 10 yr CAD ≥ 20%	<70	High
Moderate	DM <35 yrs DMT2 <50 yrs without other RF Risk 10 yr CAD :10-20%	<100	moderate
Low	Risk 10 yr CAD <10%	<116*	low


Serum trighycerides (TG)≥150 mg/dl
Repeat if non-fasting
TG:150-499 mg/dl
Primary goal: CVD risk reduction
TG:500-1000 mg/dl
Primary goal:Pancreatitis prevention
TG≥1000 mg/dl
Primary goal:Pancreatitis prevention
Screen for secondary causes/exacerbating factors
Initiate therapeutic life style changes (TLC)


TG:150-499 mg/dl
Primary goal: CVD risk reduction
TG:500-1000 mg/dl
Primary goal:Pancreatitis prevention
TG≥1000 mg/dl
Primary goal:Pancreatitis prevention
Repeat in 8-12 weeks
Repeat in 4 weeks
TG<200
TG:200-499
TG<500
TG≥500
ASCVD risk≥7.5 %
10 yr
Start fibrate/w-3 FA
Repeat in 6-8 weeks
NO
YES
TG≥500
Continue TLC
No pharmacotherapy
Statin ± fibrate/EPA
Fibrate + w-3 FA(increased dose)
Consider niacin
Revaluate diet
Refer to specialist

بیمار ۱

خانم ۴۲ ساله بدون بیماری زمینه ای و بدون سابقه مصرف دارو با آزمایشات زیر مراجعه کردند:

Chol: 210 **TG: 310** HDL:41 LDL:110

آیا نیازی به درمان تری گلیسرید بالای ایشان می باشد؟

Diagnosis

- **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)

UpToDate®

بیمار ۱ ـ ادامه

پس از گذشت دو هفته بیمار فوق مجدد مراجعه کرد. نتایج آزمایشات ناشتای بیمار به صورت زیر است:

Chol: 200 TG: 150 HDL:30

آیا آزمایشات بیمار کامل است؟

❑ **Standard** serum lipid profile measurement: **CHOL, HDL ,TG**

✓ LDl estimate by of LDL **Friedewald**

✓ LDL=Chol –(VLDL + HDL)

✓ VLDL=$\frac{TG}{5}$

$$\textbf{LDL} = \textbf{Chol} - \left(\frac{TG}{5} + \textbf{HDL}\right)$$

❑Error in Friedewald formula

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

Serum Lipids Levels

	Normal	High Normal	High	Very High
Chol (mg/dl)	<200	200-239	≥ 240	
TG(mg/dl)	<150	150-174	175-499 Moderate	≥500 Severe
LDL(mg/dl)	According To patients comorbidity			≥190
HDL(mg/dl)	Low : in M<40 , F<50 cardioprotective : > 60 mg/dl			

بیمار ۲

بیمار آقای ۵۳ ساله با آزمایشات زیر مراجعه کرد. **بیمار علامتی ندارد.**

Chol: 150 TG: 200 HDL:41 LDL:200

آیا نیاز به درمان است؟

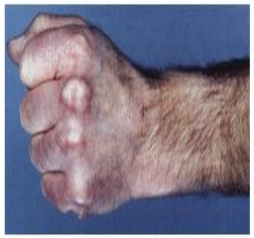
Sign and Symptom

No symptoms :

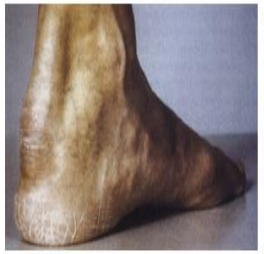
- ✓ Symptomatic vascular disease: CAD, Stroke, PAD
- ✓ Acute pancreatitis

No sign :

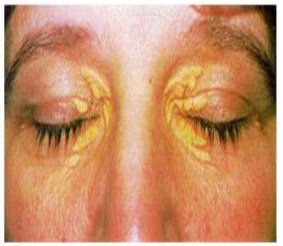
- ✓ may be Xanthoma



Tendon xanthomata

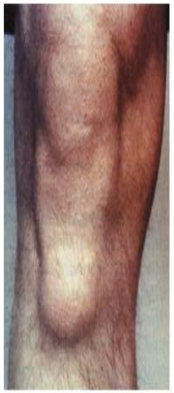


Achilles tendon xanthoma

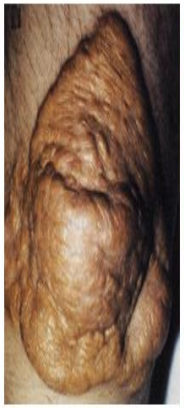


Xanthelasma

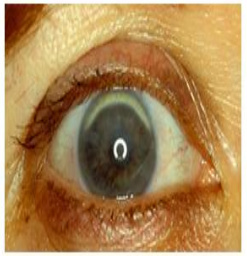
UpToDate®



Subperiosteal xanthomata

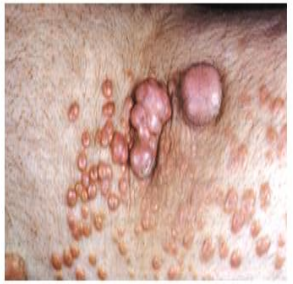


Planar xanthoma

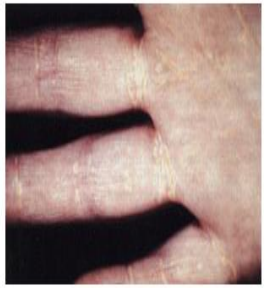


Early corneal arcus

Mature corneal arcus



Tuberoeruptive xanthomata

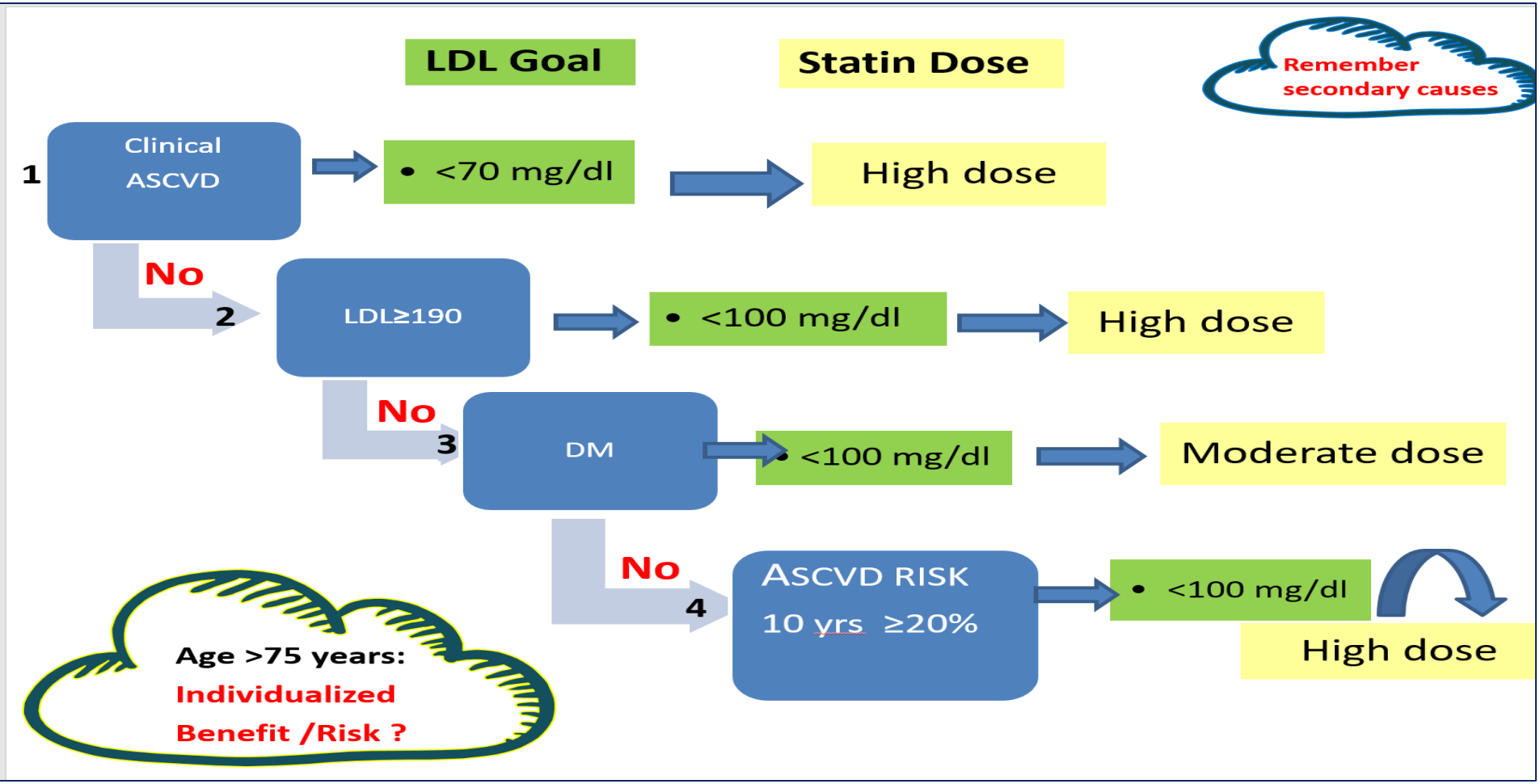


Palmar xanthomata

بیمار آقای ۵۳ ساله با آزمایشات زیر مراجعه کرد. **بیمار علامتی ندارد.**

Chol: 150 TG: 200 HDL:41 LDL:200

آیا نیاز به درمان است؟



بیمار شماره ۳

44 YO woman

C.C:

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

PMH:

Negative

DH:

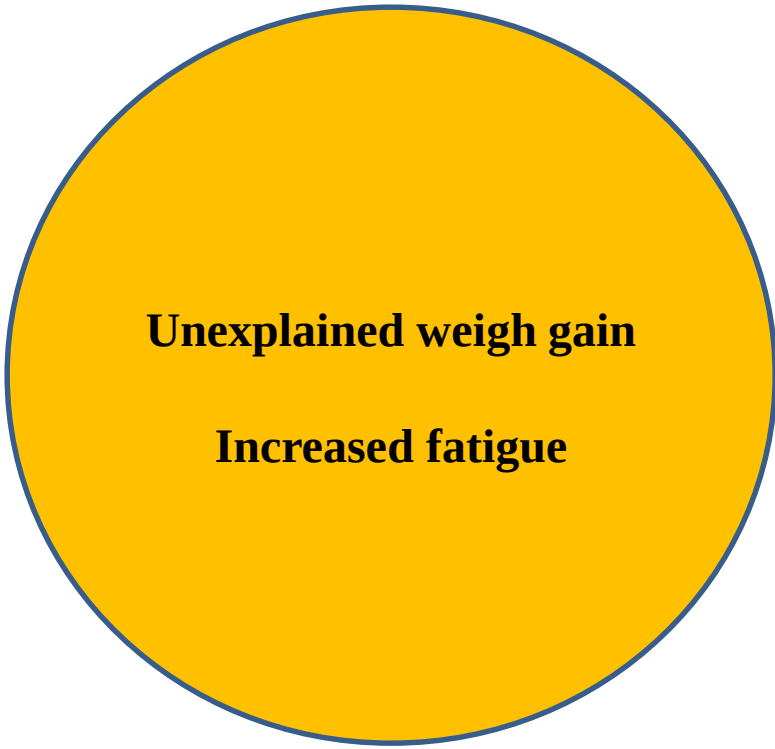
Negative

Lab data:

TC: 150 mg/dl TG:112 mg/dl HDL:54 mg/dL LDL:155 mg/dL

Secondary Causes of Lipoprotein Abnormalities

- **Hypothyroidism**
- Obstructive liver disease
- Nephrotic syndrome
- Anorexia nervosa
- Acute Intermittent Porphyria
- Drugs



Drug induced DLP

	LDL Cholesterol	Triglycerides	HDL Cholesterol
Cardiovascular /Endocrine			
Amiodarone	↑Variable	↔	↔
β-Blockers***	↔	↑10-40%	↓5-20%
Loop diuretics	↑5-10%	↑5-10%	↔
Thiazide diuretics (high dose)	↑5-10%	↑5-15%	↔
Sodium-glucose co-transporter 2 (SGLT2) inhibitors	↑3-8%	↔↓	↑Variable
Steroid Hormones/Anabolic Steroids			
Estrogen	↓7-20%	↑40%	↑5-20%
Select progestins	↑Variable	↓Variable	↓15-40%
Selective Estrogen Receptor Modulators	↓10-20%	↑0-30*	↔
Danazol	↑10-40%	↔	↓50%
Anabolic steroids	↑20%	↔	↓20-70%
Corticosteroids	↑Variable	↑Variable	↔

Drug induced DLP

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

بیمار ۴

P.T., a 68 yo woman

PMH:

HTN,hyperlipidemia, presents with an acute MI

DH:

metoprolol succinate 50 mg/day, enalapril 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

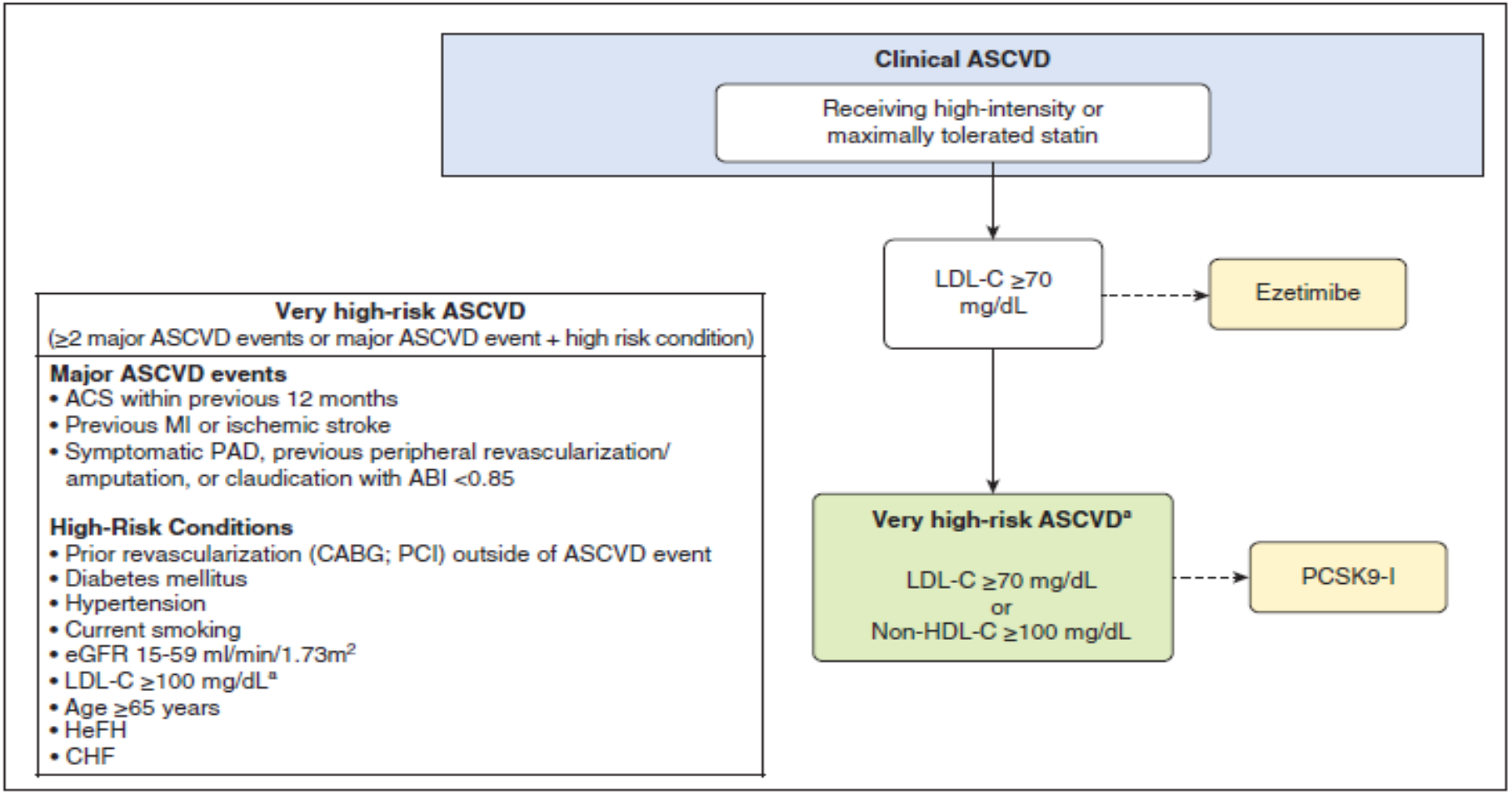
A. Add alirocumab 75 mg subcutaneously every 2 weeks

B. Add ezetimibe 10 mg/day

C. Add niacin extended release 500 mg/night

D. Continue atorvastatin 20 mg/day

Step 1



Clinical ASCVD

ACS (AMI ,UA)
CABG ,PCI
PAD
Carotid Disease
Chronic Stable Angina
Stroke ,TIA
Abdominal Aortic Aneurysm
Revascularization of other Arteries

LDL Goal
<70 mg/dl

High Intensity Statin

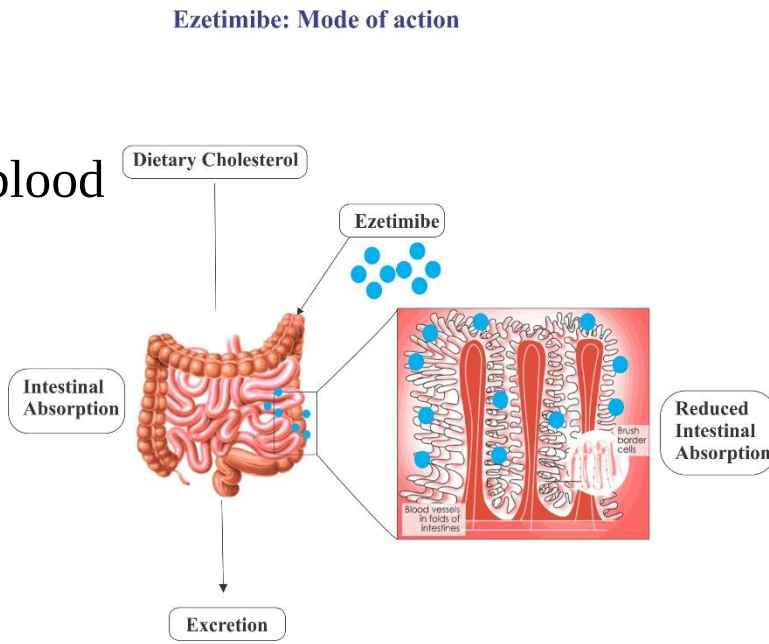
Ezetimibe

- 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

Arthralgias

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

بیمار شماره ۵

43-yo woman

CC:

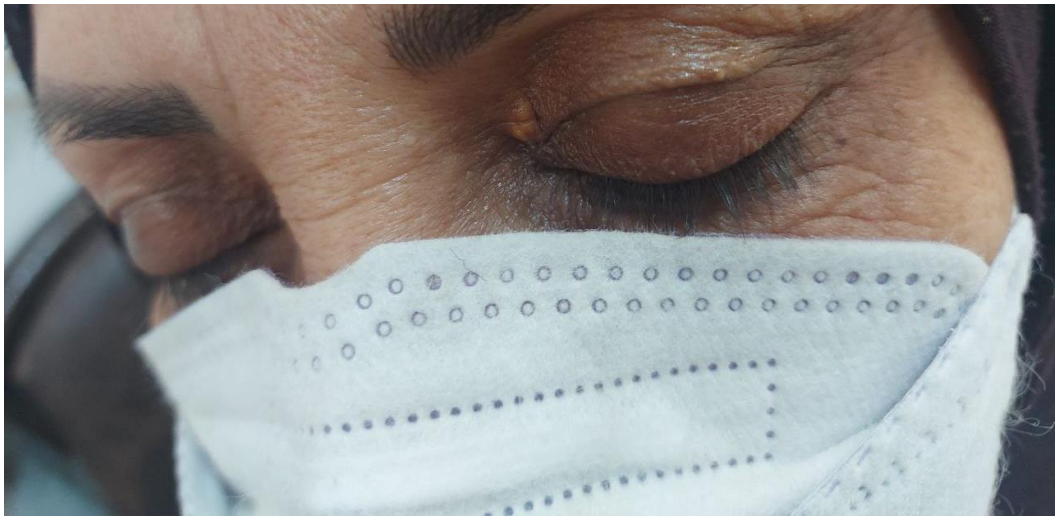
For routine monitoring

PMH:

HTN

FH:

hypercholesterolemia



Lab data:

TC 267 mg/dL, TG 143 mg/dL ,HDL 38 mg/dL, **LDL 200 mg/d**

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

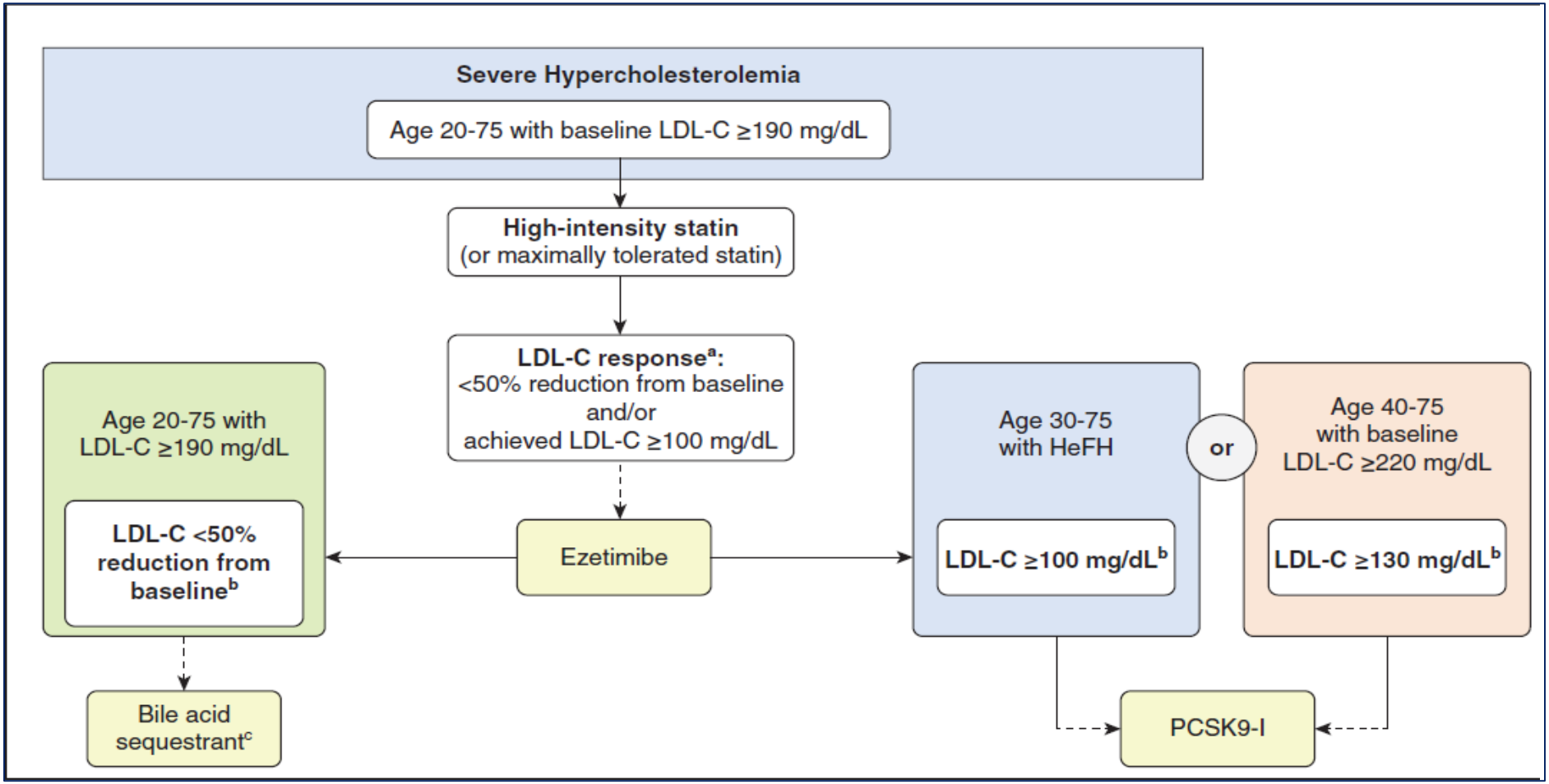
A. Initiate cholestyramine

B. Initiate atorvastatin 40 mg/day

C. Initiate ezetimibe 10 mg/day

D. Initiate simvastatin 20 mg/day

Step 2



Severe Hypercholesterolemia

LDL ≥ 190

LDL Goal

<100 mg/dl

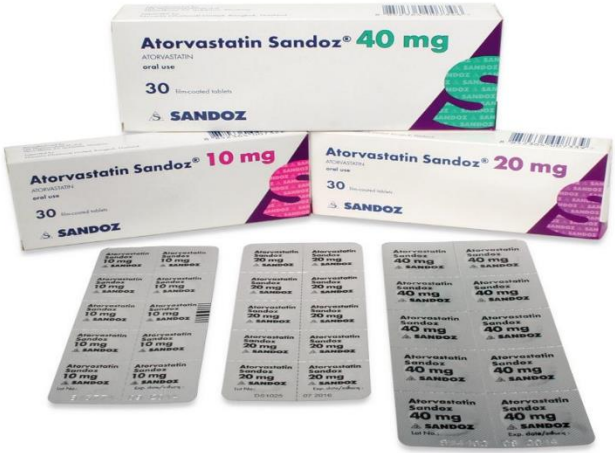
High Intensity Statin

Statin intensity

	High Intensity	Moderate Intensity	Low Intensity
LDL-C lowering†	≥50%	30%-49%	<30%
Statins	**Atorvastatin (40 mg‡) 80 mg** **Rosuvastatin 20 mg (40 mg)**	**Atorvastatin 10 mg** (20 mg) **Rosuvastatin** (5 mg) **10 mg** **Simvastatin 20-40 mg§**	Simvastatin 10 mg
	…	**Pravastatin 40 mg** (80 mg) **Lovastatin 40 mg** (80 mg) Fluvastatin XL 80 mg **Fluvastatin 40 mg BID** Pitavastatin 1-4 mg	**Pravastatin 10-20 mg** **Lovastatin 20 mg** Fluvastatin 20-40 mg

STATIN

- Atorvastatin
  - Tab:10-20-40
- Rosuvastatin
  - Tab:5,10,20
- Simvastatin
  - Tab:10,20
- Lovastatin
  - Tab:20



Medscape® www.medscape.com

Effect of Lipid-Lowering Drugs on Lipid Profile

	LDL	HDL	TG
Statins	**↓18 to ↓55%**	**↑5 to ↑15%**	**↓7 to ↓30%**
Ezetimibe	**↓18 to ↓20%**	↑1 to ↑5%	↓5 to ↓11%
Bile Acid Sequestrants	**↓15 to ↓30%**	↑3 to ↑5%	**↓1 to ↑1%**
Fibric-acid derivatives	↓5 to ↓20%	**↑10 to ↑35%**	**↓20 to ↓50%**
Nicotinic Acid	↓5 to ↓25%	**↑15 to ↑35%**	**↓20 to ↓50%**
Omega 3	↑0.7%	↑3.4%	**↓30%**

بیمار شماره ۶

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

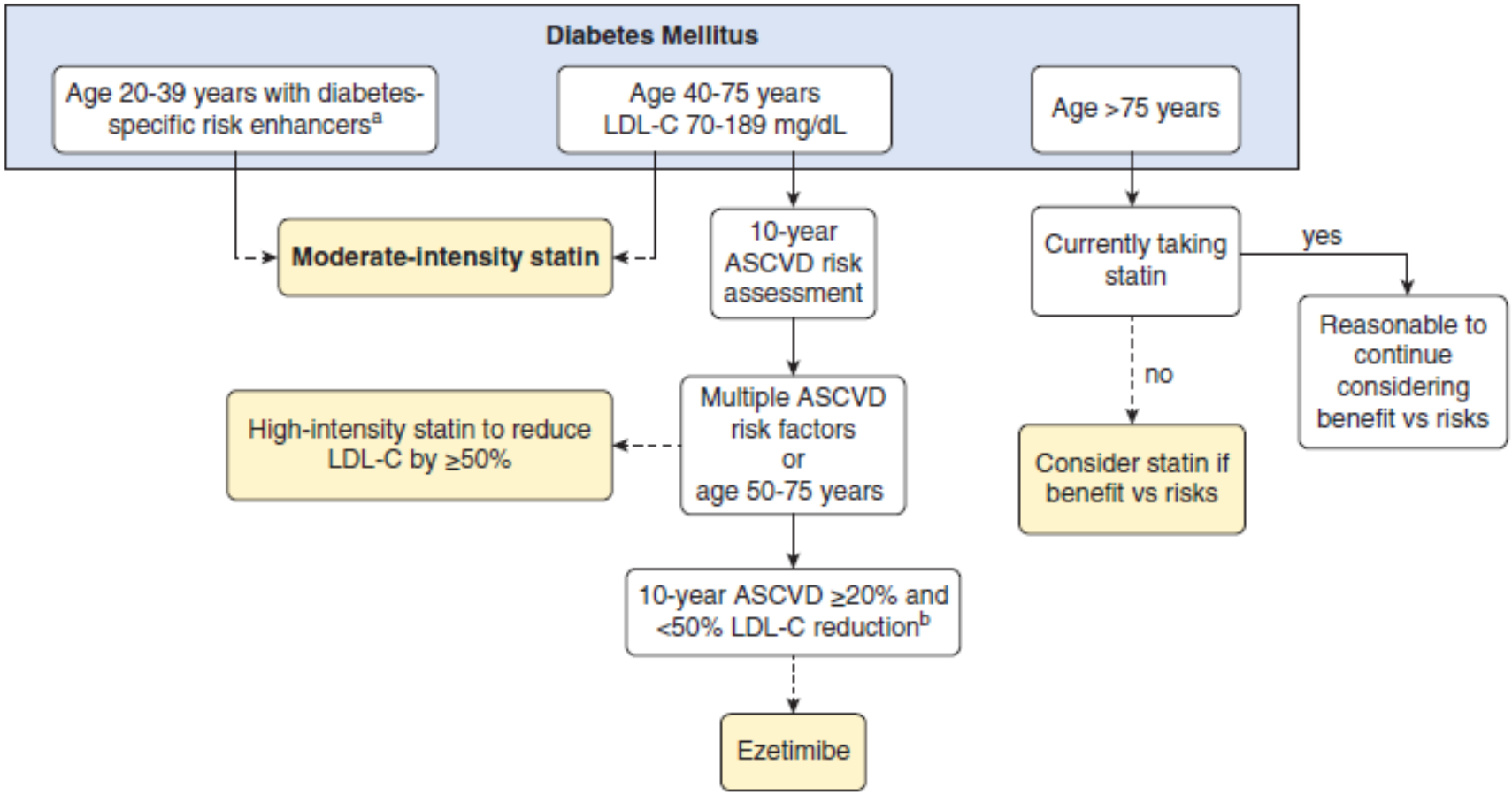
A. Add fenofibrate 200 mg/day

B. Change atorvastatin to rosuvastatin 20 mg/day

C. Increase pravastatin to 80 mg/day

D. Add ezetimibe 10 mg/day

Step 3



Hx of DM

LDL Goal

<100 mg/dl

Moderate Intensity Statin

If ASCVD risk 10 y ≥ 10%: **High Intensity**

بیمار شماره ۷

A 69 yo woman with **Hx AMI ,**DM, HTN, and GERD is referred to your lipid clinic because of statin intolerance.

She reports **myalgia**s 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, Atorvastatin 20 mg/d

Lab data:

TC 238 mg/dL, TG 151 mg/dL, HDL 44 mg/dL, **LDL 110** mg/dL,

Which is the best recommendation at this time to further reduce her ASCVD risk?

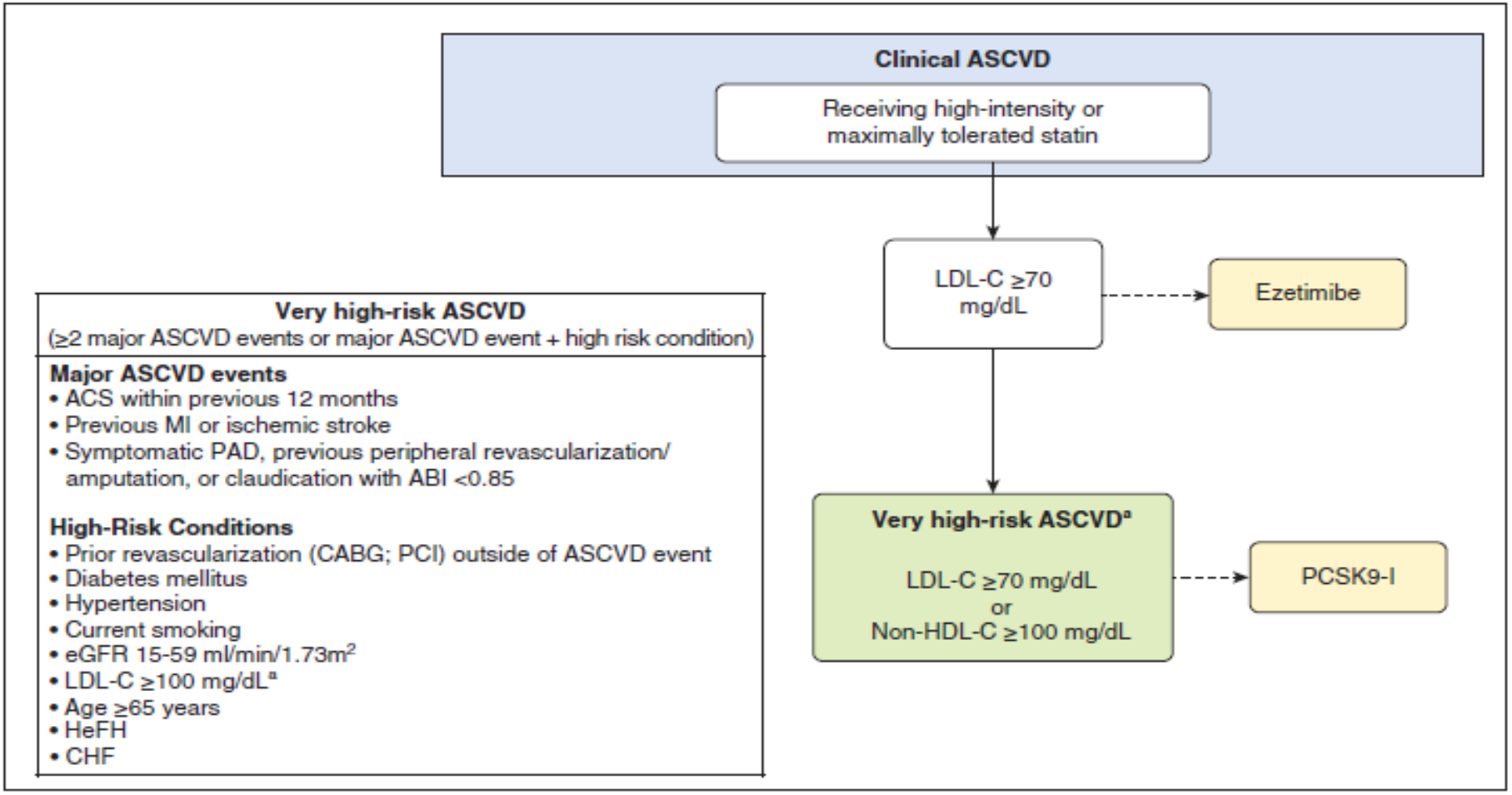
A. Add cholestyramine

B. Add evolocumab 140 mg SC every 2 weeks

C. Add fenofibrate 200 mg/day

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

Step 1



Clinical ASCVD

ACS (AMI ,UA)
CABG ,PCI
PAD
Carotid Disease
Chronic Stable Angina
Stroke ,TIA
Abdominal Aortic Aneurysm
Revascularization of other Arteries

LDL Goal
<70 mg/dl

High Intensity Statin

PCSK9 Inhibitors

- Evolocumab

  Solution for injection:140mg/ml

  SC injection

- Can be administered bi-weekly or once-monthly
- Most common adverse effect reported are injection site reactions
- Evolocumab is FDA-approved for use as monotherapy in primary hyperlipidemia

بی‌مار شماره ۸

۶-آاقای ۵۷ ساله به کلینیک لیپید ارجاع شده است. سابقه هیپرتانسیون از ۵سال قبل را میدهد وروزی یک بسته سیگار می کشد.سمع قلب و ریه نرمال است. , HR=68
BP= 165/95 mmhg

او روزانه یک لوزارتان ۵۰ مصرف میکند.

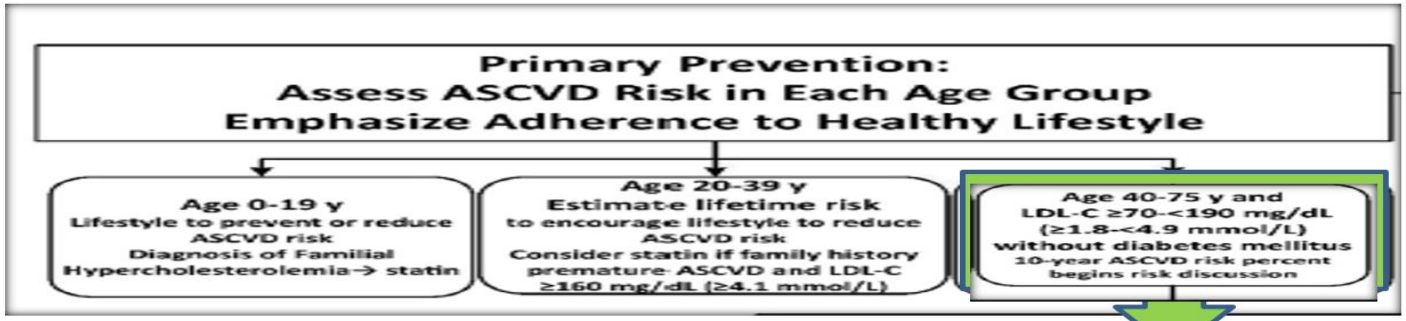
آزمایشات :

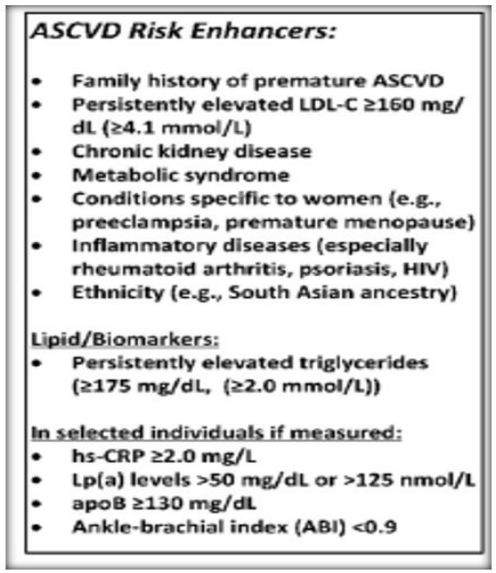
FBS =90 TC: 248 mg/dl TG:200 mg/dl HDL:39 mg/dL, LDL =176

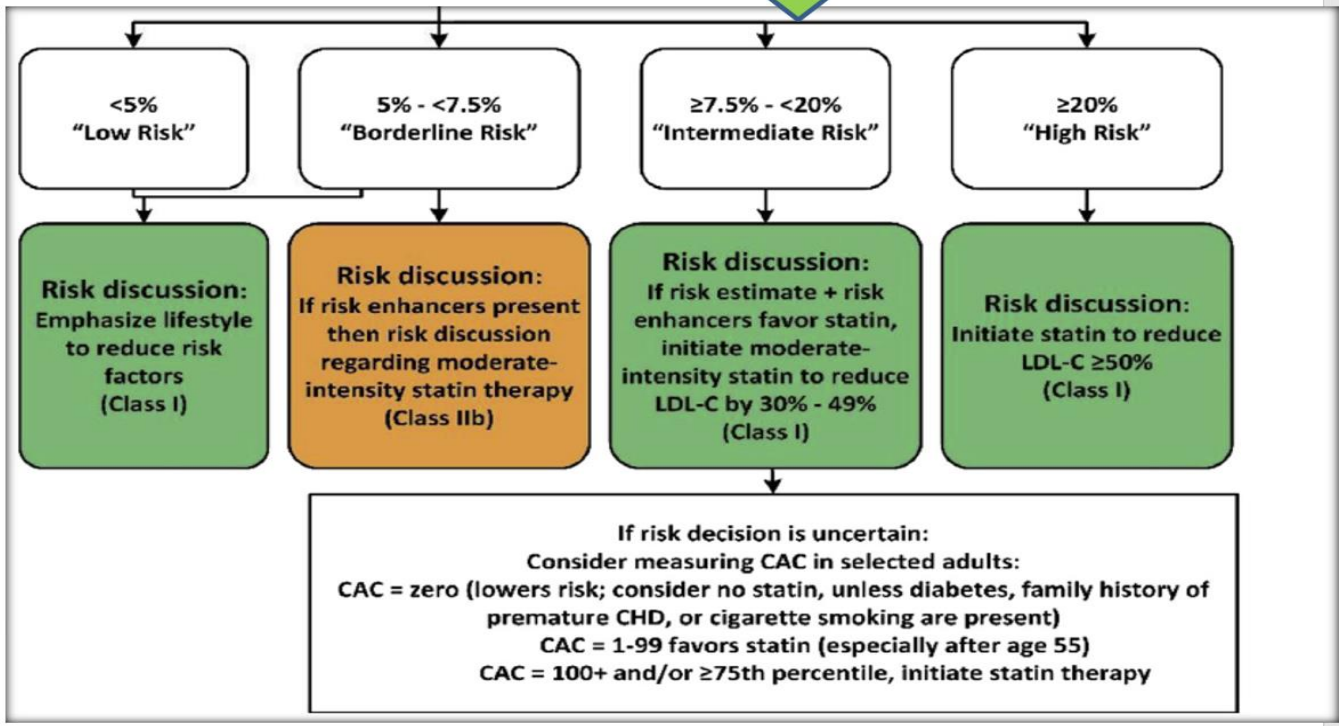
الف--ازمایشات بیمار را تفسیر کنید.

ب-ایا بیمار اختلال لیپید دارد؟ اگر بلی داروی پیشنهادی شما چیست؟

Step 4







ASCVD risk 10 y: ≥ 20 %

LDL Goal
<100 mg/dl

High dose Statin

ASCVD risk 10 y: 7.5-20%
And risk enhancers

LDL Goal
????

Moderate dose Statin

ASCVD (Atherosclerotic Cardiovascular Disease) 2013 Risk Calculator from AHA/ACC ☆

Determines 10-year risk of heart disease or stroke.

INSTRUCTIONS

Our ASCVD Risk Algorithm is a step-wise approach for all adult patients – including those with known ASCVD. This calculator is for use only in adult patients without known ASCVD and LDL 70-189 mg/dL (1.81-4.90 mmol/L).

When to Use | Pearls/Pitfalls | Why Use

Age
This calculator only applies to individuals 40-75 years of age.
57 years

Diabetes: No | Yes

Sex: Female | Male

Moderate- to high-intensity statin recommended because 10-year risk >7.5%

To view statin dosages by intensity, see Evidence section.

29.9%
Risk of cardiovascular event (coronary or stroke death or non-fatal MI or stroke) in next 10 years.

4.3%
10-year cardiovascular risk if risk factors were optimal.

Copy Results | Next Steps

Framingham Risk Score for Hard Coronary Heart Disease ☆

Estimates 10-year risk of heart attack.

INSTRUCTIONS

There are several distinct Framingham risk models. MDCalc uses the 'Hard' coronary Framingham outcomes model, which is intended for use in **non-diabetic** patients age 30-79 years with no prior history of coronary heart disease or intermittent claudication, as it is the most widely applicable to patients without previous cardiac events. See the official Framingham website for additional Framingham risk models.

When to Use | Pearls/Pitfalls

Age: 57 years

Sex: Female | Male

Smoker: No | Yes

Total cholesterol: 248 mg/dL

34.2 %
10-year risk of MI or death for this patient

13 %
Average 10-year risk of MI or death

Copy Results | Next Steps

بیمار شماره ۹

W.D. is 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?

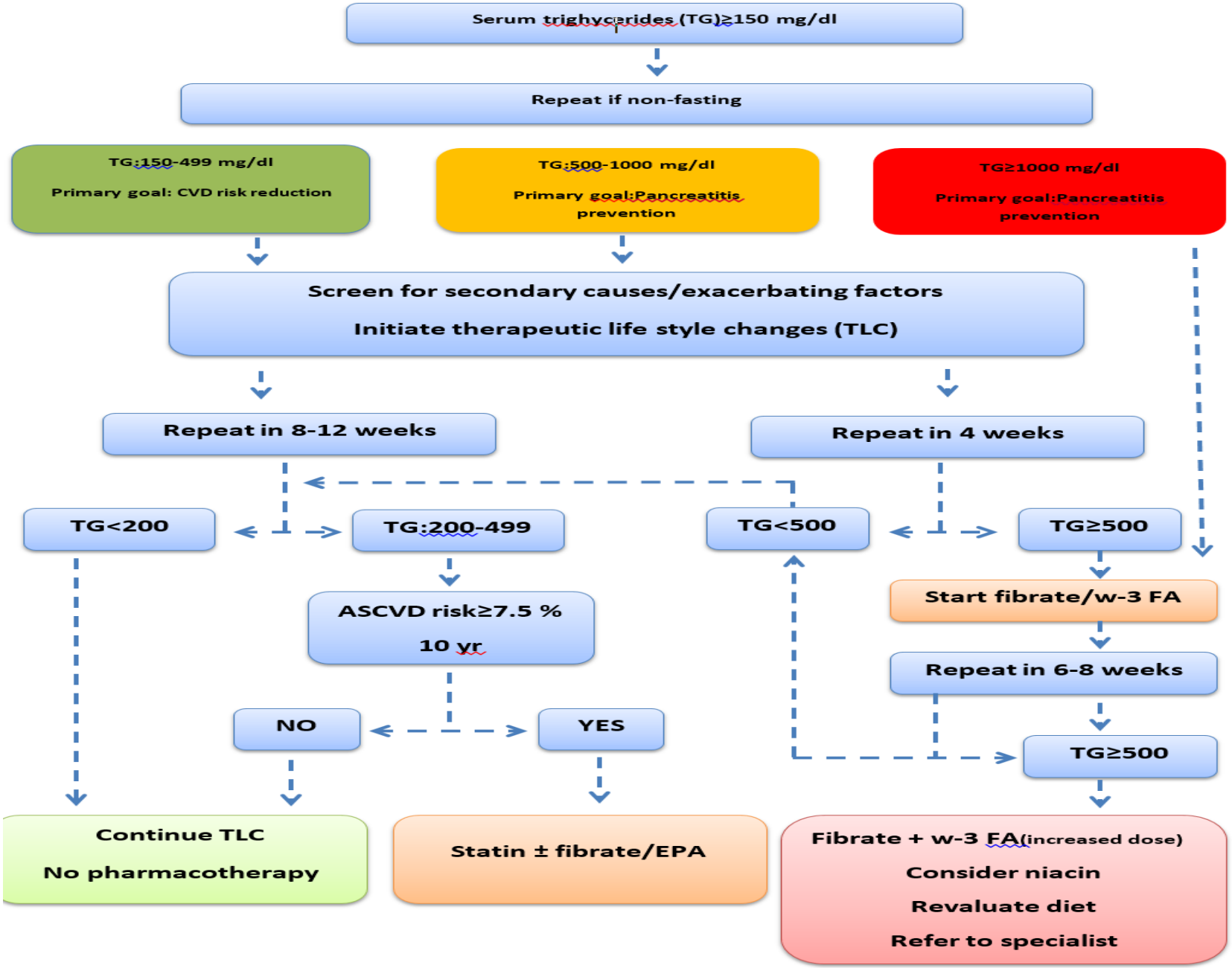
Answer:

A. Alcohol consumption, poorly controlled DM, amlodipine.

B. Alcohol consumption, rosuvastatin, weight loss.

C. Obesity, alcohol consumption, HCTZ

D. Obesity, poorly controlled DM, metformin.


Serum trighycarides (TG)≥150 mg/dl
Repeat if non-fasting
TG:150-499 mg/dl
Primary goal: CVD risk reduction
TG:500-1000 mg/dl
Primary goal:Pancreatitis prevention
TG≥1000 mg/dl
Primary goal:Pancreatitis prevention
Screen for secondary causes/exacerbating factors
Initiate therapeutic life style changes (TLC)
Repeat in 8-12 weeks
Repeat in 4 weeks
TG<200
TG:200-499
TG<500
TG≥500
ASCVD risk≥7.5 %
10 yr
Start fibrate/w-3 FA
Repeat in 6-8 weeks
NO
YES
TG≥500
Continue TLC
No pharmacotherapy
Statin ± fibrate/EPA
Fibrate + w-3 FA(increased dose)
Consider niacin
Revaluate diet
Refer to specialist

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

بیمار شماره ۱۰

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/da**y , losartan 100 mg/day, multivitamin.

Lab data

TC 210 mg/dL, TG 653 mg/dL, HDL 39 mg/dL ,LDL100mg/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.

Fibric Acid Derivatives

Gemfibrozil
- Cap:300 mg
- Tab:450mg

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

بیمار شماره ۱۱

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?

Answer:D

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.


Lipid Management Options During Pregnancy
Healthy Lifestyle
Weight Management
BP Control
Diet and Omega-3 Fatty Acids
LDL Apheresis
Discussion on Potential Teratogenic Lipid Agents
Bile Acid Resins

Pregnancy

- 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

I	C-LD	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).
I	C-LD	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 Polyunsaturated Fatty Acids (PUFA)

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

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

بیمار شماره ۱۱

A.D., a 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?

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

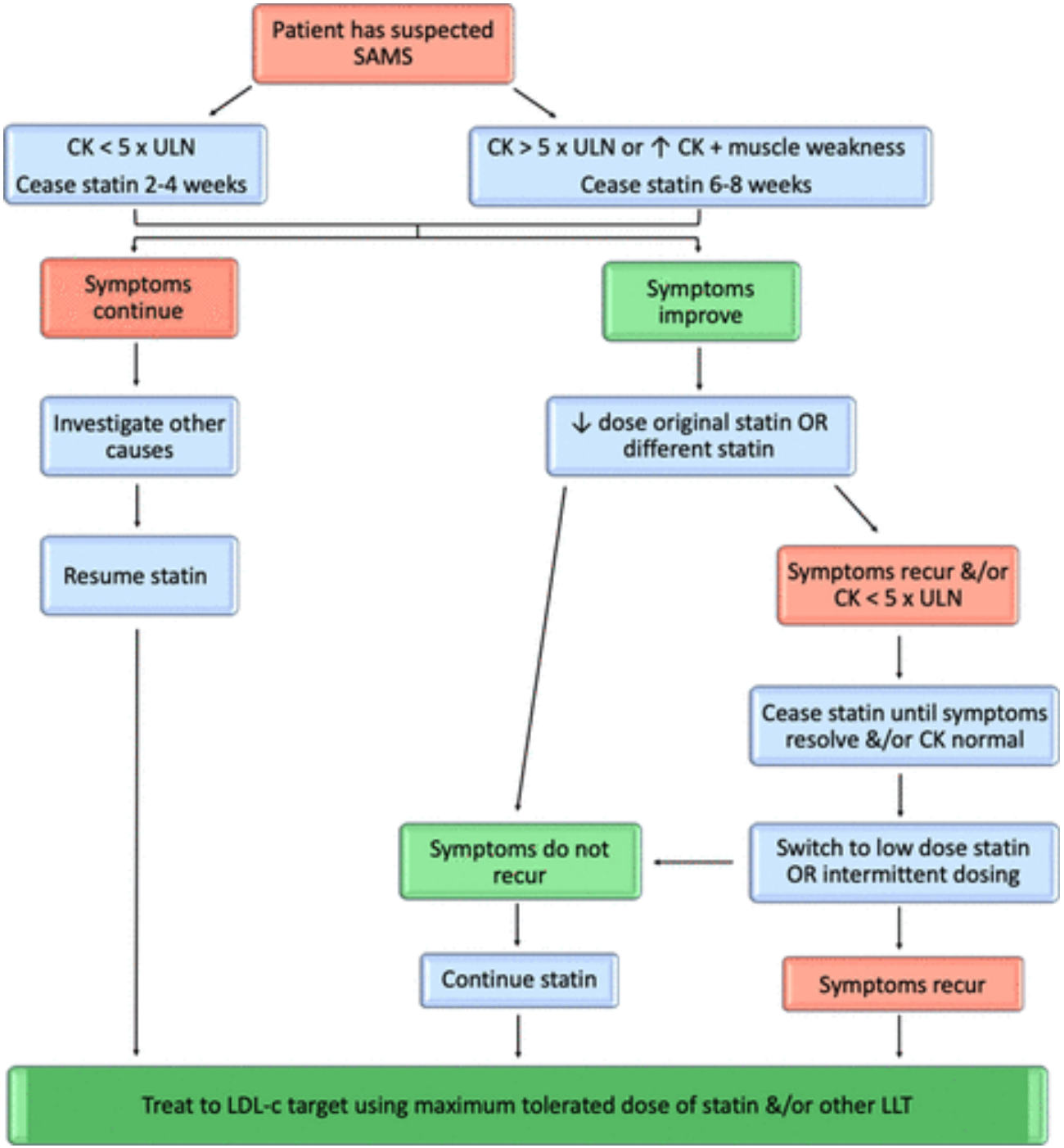
The risk of rhabdomyolysis is ≈0.01% and is potentially preventable by prompt cessation of statin treatment

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


Patient has suspected SAMS
CK < 5 x ULN
Cease statin 2-4 weeks
CK > 5 x ULN or ↑ CK + muscle weakness
Cease statin 6-8 weeks
Symptoms continue
Symptoms improve
Investigate other causes
↓ dose original statin OR different statin
Resume statin
Symptoms recur &/or CK < 5 x ULN
Cease statin until symptoms resolve &/or CK normal
Symptoms do not recur
Switch to low dose statin OR intermittent dosing
Continue statin
Symptoms recur
Treat to LDL-c target using maximum tolerated dose of statin &/or other LLT

Statin drug interaction

Strong inhibitors 3A4	Moderate inhibitors 3A4	Strong inducers 3A4	Moderate inducers 3A4
Atazanavir	Amiodarone	Carbamazepine	Dexamethasone
Clarithromycin	Aprepitant	Phenobarbital	St. John's wort
Itraconazole	Cimetidine	Phenytoin	
Ketoconazole	Cyclosporine	Primidone	
Lopinavir	Diltiazem	Rifampin	
Voriconazole	Erythromycin		
	Fluconazole		
	Grapefruit juice		
	Verapamil		

Gemfibrozil

بیمار شماره ۱۲

A.D., a 52-yo man

DH:

Amlodipin , 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?

Answer:A

A.Hold atorvastatinand check LFT after 3 days

B.Continue atorvastatin and check LFT after 3 days

C.Chane 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

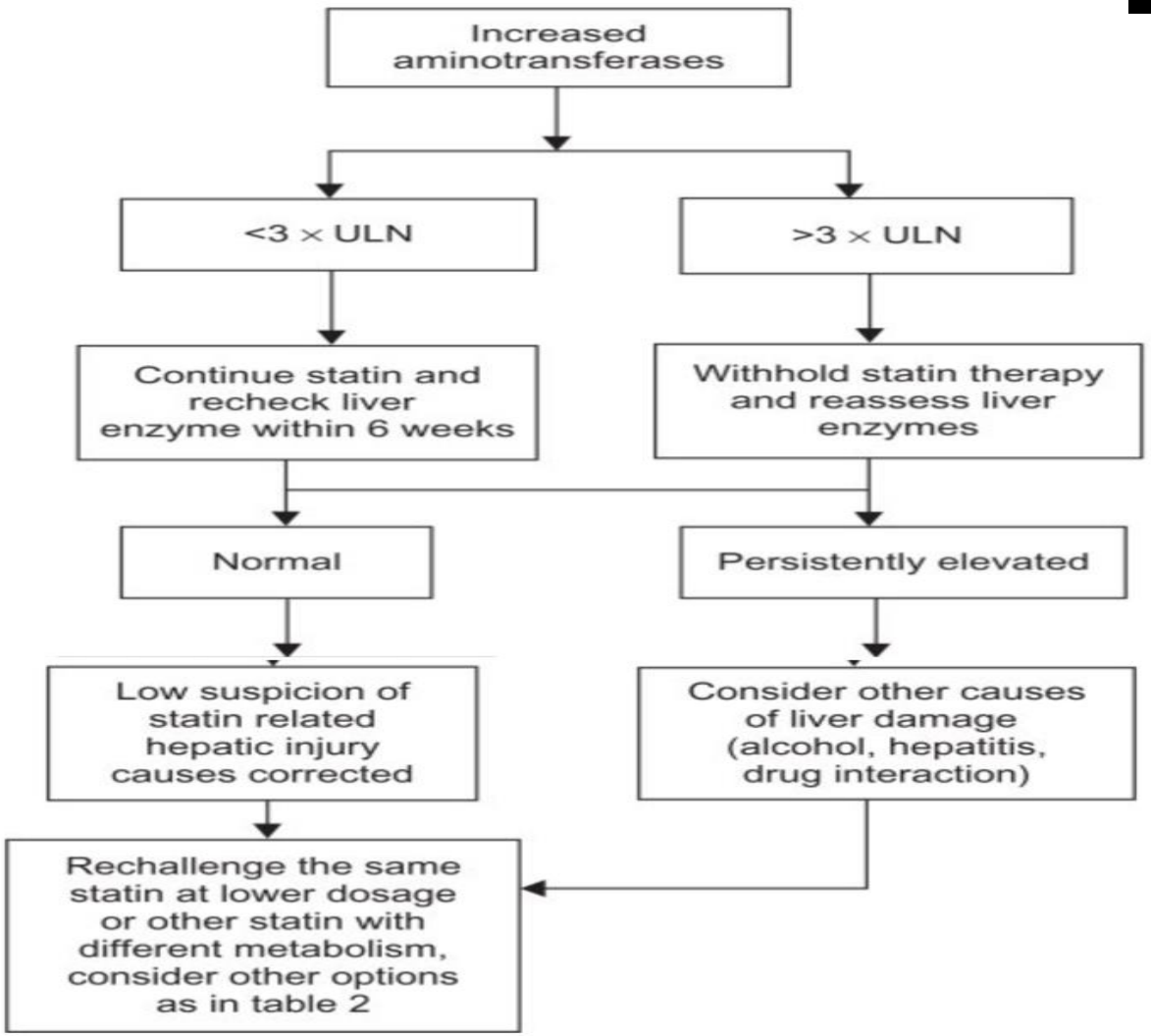
Repeat LFT

If a patient's transaminase levels continue to rise

Or If there is further objective of liver injury

The statin should be discontinued

Increased AST/ALT in statin user



Algorithm for management for abnormal liver enzymes during statin therapy. Abbreviation: ULN, upper limit of normal.

بی‌ماره شماره ۱۳

۱۰-خانم ۵۲ ساله به درمانگاه پزشک خانواده مراجعه کرده است.

سابقه خاصی ندارد. دارو نمیخورد.

آزمایشات به شرح زیر است:

TC 200 mg/dL, TG 100 mg/dL, HDL 30 mg/dL, LDL 91 mg/dL

الفآزمایشات بیمار را تفسیر کنید.

ب-چه دارویی جهت کنترل HDL بیمار شروع میکنید؟

LOW HDL treatment

- **Life style Modification :**

✓ ↓Obesity , ↑ Physical activity , stope 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

Thanks for your attention