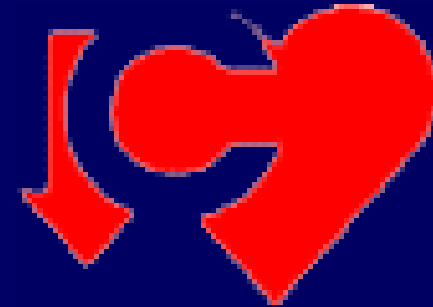


National Cholesterol Education Program



**Adult Treatment Panel III
(ATP III) Guidelines**

New Features of ATP III

Focus on Multiple Risk Factors

- Diabetes: CHD risk equivalent
- Framingham projections of 10-year CHD risk
 - Identify certain patients with multiple risk factors for more intensive treatment
- Multiple metabolic risk factors (metabolic syndrome)
 - Intensified therapeutic lifestyle changes

New Features of ATP III (continued)

Modification of Lipid and Lipoprotein Classification

- LDL cholesterol <100 mg/dL—optimal
- HDL cholesterol <40 mg/dL
 - Categorical risk factor
 - Raised from <35 mg/dL
- Lower triglyceride classification cut points
 - More attention to moderate elevations

New Features of ATP III (continued)

New Recommendation for Screening/Detection

- Complete lipoprotein profile preferred
 - Fasting total cholesterol, LDL, HDL, triglycerides
- Secondary option
 - Non-fasting total cholesterol and HDL
 - Proceed to lipoprotein profile if TC \geq 200 mg/dL or HDL $<$ 40 mg/dL

New Features of ATP III (continued)

More Intensive Lifestyle Intervention (Therapeutic Lifestyle Changes = TLC)

- Therapeutic diet lowers saturated fat and cholesterol intakes to levels of previous Step II
- Adds dietary options to enhance LDL lowering
 - Plant stanols/sterols (2 g per day)
 - Viscous (soluble) fiber (10–25 g per day)
- Increased emphasis on weight management and physical activity

New Features of ATP III (continued)

- For patients with triglycerides ≥ 200 mg/dL
 - LDL cholesterol: primary target of therapy
 - Non-HDL cholesterol: secondary target of therapy

Non HDL-C = total cholesterol – HDL cholesterol

Emerging Risk Factors

- Lipoprotein (a)
- Homocysteine
- Prothrombotic factors
- Proinflammatory factors
- Impaired fasting glucose
- Subclinical atherosclerosis

Risk Assessment

Count major risk factors

- For patients with multiple (2+) risk factors
 - Perform 10-year risk assessment
- For patients with 0–1 risk factor
 - 10 year risk assessment not required
 - Most patients have 10-year risk <10%

Assessing CHD Risk in Men

Step 1: Age

Years	Points
20-34	-9
35-39	-4
40-44	0
45-49	3
50-54	6
55-59	8
60-64	10
65-69	11
70-74	12
75-79	13

Step 2: Total Cholesterol

TC (mg/dL)	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
<160	0	0	0	0	0
160-199	4	3	2	1	0
200-239	7	5	3	1	0
240-279	9	6	4	2	1
≥280	11	8	5	3	1

Step 3: HDL-Cholesterol

HDL-C (mg/dL)	Points
≥60	-1
50-59	0
40-49	1
<40	2

Step 4: Systolic Blood Pressure

Systolic BP (mm Hg)	Points if Untreated	Points if Treated
<120	0	0
120-129	0	1
130-139	1	2
140-159	1	2
≥160	2	3

Step 5: Smoking Status

	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
Nonsmoker	0	0	0	0	0
Smoker	8	5	3	1	1

Step 6: Adding Up the Points

Age	_____
Total cholesterol	_____
HDL-cholesterol	_____
Systolic blood pressure	_____
Smoking status	_____
Point total	_____

Step 7: CHD Risk

Point Total	10-Year Risk	Point Total	10-Year Risk
<0	<1%	11	8%
0	1%	12	10%
1	1%	13	12%
2	1%	14	16%
3	1%	15	20%
4	1%	16	25%
5	2%	≥17	≥30%
6	2%		
7	3%		
8	4%		
9	5%		
10	6%		

Note: Risk estimates were derived from the experience of the Framingham Heart Study, a predominantly Caucasian population in Massachusetts, USA.

Assessing CHD Risk in Women

Step 1: Age

Years	Points
20-34	-7
35-39	-3
40-44	0
45-49	3
50-54	6
55-59	8
60-64	10
65-69	12
70-74	14
75-79	16

Step 2: Total Cholesterol

TC (mg/dL)	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
<160	0	0	0	0	0
160-199	4	3	2	1	1
200-239	8	6	4	2	1
240-279	11	8	5	3	2
≥280	13	10	7	4	2

Step 3: HDL-Cholesterol

HDL-C (mg/dL)	Points
≥60	-1
50-59	0
40-49	1
<40	2

Step 4: Systolic Blood Pressure

Systolic BP (mm Hg)	Points if Untreated	Points if Treated
<120	0	0
120-129	1	3
130-139	2	4
140-159	3	5
≥160	4	6

Step 5: Smoking Status

	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
Nonsmoker	0	0	0	0	0
Smoker	9	7	4	2	1

Step 6: Adding Up the Points

Age	_____
Total cholesterol	_____
HDL-cholesterol	_____
Systolic blood pressure	_____
Smoking status	_____
Point total	_____

Step 7: CHD Risk

Point Total	10-Year Risk	Point Total	10-Year Risk
<9	<1%	20	11%
9	1%	21	14%
10	1%	22	17%
11	1%	23	22%
12	1%	24	27%
13	2%	≥25	≥30%
14	2%		
15	3%		
16	4%		
17	5%		
18	6%		
19	8%		

Note: Risk estimates were derived from the experience of the Framingham Heart Study, a predominantly Caucasian population in Massachusetts, USA.

Step 1: Age

Men

Years	Points
20-34	-9
35-39	-4
40-44	0
45-49	3
50-54	6
55-59	8
60-64	10
65-69	11
70-74	12
75-79	13

Women

Years	Points
20-34	-7
35-39	-3
40-44	0
45-49	3
50-54	6
55-59	8
60-64	10
65-69	12
70-74	14
75-79	16

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *JAMA*. 2001;285:2486-2497.

Step 2: Total Cholesterol

Men

TC (mg/dL)	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
<160	0	0	0	0	0
160-199	4	3	2	1	0
200-239	7	5	3	1	0
240-279	9	6	4	2	1
≥280	11	8	5	3	1

Women

TC (mg/dL)	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
<160	0	0	0	0	0
160-199	4	3	2	1	1
200-239	8	6	4	2	1
240-279	11	8	5	3	2
≥280	13	10	7	4	2

Note: TC and HDL-C values should be the average of at least two fasting lipoprotein measurements.

Step 3: HDL-Cholesterol

Men

HDL-C (mg/dL)	Points
≥60	-1
50-59	0
40-49	1
<40	2

Women

HDL-C (mg/dL)	Points
≥60	-1
50-59	0
40-49	1
<40	2

Note: HDL-C and TC values should be the average of at least two fasting lipoprotein measurements.

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *JAMA*. 2001;285:2486-2497.

Step 4: Systolic Blood Pressure

Men

Systolic BP (mm Hg)	Points if Untreated	Points if Treated
<120	0	0
120-129	0	1
130-139	1	2
140-159	1	2
≥160	2	3

Women

Systolic BP (mm Hg)	Points if Untreated	Points if Treated
<120	0	0
120-129	1	3
130-139	2	4
140-159	3	5
≥160	4	6

Note: The average of several BP measurements is needed for an accurate measurement of baseline BP. If an individual is on antihypertensive treatment, extra points are added.

Step 5: Smoking Status

Men

	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
Nonsmoker	0	0	0	0	0
Smoker	8	5	3	1	1

Women

	Points at Age 20-39	Points at Age 40-49	Points at Age 50-59	Points at Age 60-69	Points at Age 70-79
Nonsmoker	0	0	0	0	0
Smoker	9	7	4	2	1

Note: Any cigarette smoking in the past month.

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *JAMA*. 2001;285:2486-2497.

Step 6: Adding Up the Points (Sum From Steps 1–5)

Age	_____
Total cholesterol	_____
HDL-cholesterol	_____
Systolic blood pressure	_____
Smoking status	_____
Point total	_____

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *JAMA*. 2001;285:2486-2497.

Step 7: CHD Risk for Men

Point Total	10-Year Risk	Point Total	10-Year Risk
<0	<1%	11	8%
0	1%	12	10%
1	1%	13	12%
2	1%	14	16%
3	1%	15	20%
4	1%	16	25%
5	2%	≥17	≥30%
6	2%		
7	3%		
8	4%		
9	5%		
10	6%		

Note: Determine the 10-year absolute risk for hard CHD (MI and coronary death) from point total.

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *JAMA*. 2001;285:2486-2497.

Step 7: CHD Risk for Women

Point Total	10-Year Risk	Point Total	10-Year Risk
<9	<1%	20	11%
9	1%	21	14%
10	1%	22	17%
11	1%	23	22%
12	1%	24	27%
13	2%	≥25	≥30%
14	2%		
15	3%		
16	4%		
17	5%		
18	6%		
19	8%		

Note: Determine the 10-year absolute risk for hard CHD (MI and coronary death) from point total.

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *JAMA*. 2001;285:2486-2497.

Major Risk Factors (Exclusive of LDL Cholesterol) That Modify LDL Goals

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

[†] HDL cholesterol \geq 60 mg/dL counts as a “negative” risk factor; its presence removes one risk factor from the total count.

CHD Risk Equivalents

- Risk for major coronary events equal to that in established CHD
- 10-year risk for hard CHD >20%

Hard CHD = myocardial infarction + coronary death

Diabetes as a CHD Risk Equivalent

- 10-year risk for CHD \cong 20%
- High mortality with established CHD
 - High mortality with acute MI
 - High mortality post acute MI

CHD Risk Equivalents

- Other clinical forms of atherosclerotic disease (peripheral arterial disease, abdominal aortic aneurysm, and symptomatic carotid artery disease)
- Diabetes
- Multiple risk factors that confer a 10-year risk for CHD >20%

Three Categories of Risk that Modify LDL-Cholesterol Goals

<u>Risk Category</u>	<u>LDL Goal (mg/dL)</u>
CHD and CHD risk equivalents	<100
Multiple (2+) risk factors	<130
Zero to one risk factor	<160

ATP III Lipid and Lipoprotein Classification

LDL Cholesterol (mg/dL)

<100	Optimal
100–129	Near optimal/above optimal
130–159	Borderline high
160–189	High
≥190	Very high

ATP III Lipid and Lipoprotein Classification (continued)

HDL Cholesterol (mg/dL)

<40	Low
≥60	High

Primary Prevention With LDL-Lowering Therapy

Public Health Approach

- Reduced intakes of saturated fat and cholesterol
- Increased physical activity
- Weight control

Causes of Secondary Dyslipidemia

- Diabetes
- Hypothyroidism
- Obstructive liver disease
- Chronic renal failure
- Drugs that raise LDL cholesterol and lower HDL cholesterol (progestins, anabolic steroids, and corticosteroids)

Secondary Prevention With LDL-Lowering Therapy

- Benefits: reduction in total mortality, coronary mortality, major coronary events, coronary procedures, and stroke
- LDL cholesterol goal: <100 mg/dL
- Includes CHD risk equivalents
- Consider initiation of therapy during hospitalization (if LDL ≥ 100 mg/dL)

LDL Cholesterol Goals and Cutpoints for Therapeutic Lifestyle Changes (TLC) and Drug Therapy in Different Risk Categories

Risk Category	LDL Goal (mg/dL)	LDL Level at Which to Initiate Therapeutic Lifestyle Changes (TLC) (mg/dL)	LDL Level at Which to Consider Drug Therapy (mg/dL)
CHD or CHD Risk Equivalents (10-year risk >20%)	<100	≥100	≥130 (100–129: drug optional)
2+ Risk Factors (10-year risk ≤20%)	<130	≥130	10-year risk 10–20%: ≥130
			10-year risk <10%: ≥160
0–1 Risk Factor	<160	≥160	≥190 (160–189: LDL-lowering drug optional)

LDL Cholesterol Goal and Cutpoints for Therapeutic Lifestyle Changes (TLC) and Drug Therapy in Patients with CHD and CHD Risk Equivalents (10-Year Risk >20%)

LDL Goal	LDL Level at Which to Initiate Therapeutic Lifestyle Changes (TLC)	LDL Level at Which to Consider Drug Therapy
<100 mg/dL	≥100 mg/dL	≥130 mg/dL (100–129 mg/dL: drug optional)

LDL Cholesterol Goal and Cutpoints for Therapeutic Lifestyle Changes (TLC) and Drug Therapy in Patients with Multiple Risk Factors (10-Year Risk $\leq 20\%$)

LDL Goal	LDL Level at Which to Initiate Therapeutic Lifestyle Changes (TLC)	LDL Level at Which to Consider Drug Therapy
<130 mg/dL	≥ 130 mg/dL	10-year risk 10–20%: ≥ 130 mg/dL
		10-year risk <10%: ≥ 160 mg/dL

LDL Cholesterol Goal and Cutpoints for Therapeutic Lifestyle Changes (TLC) and Drug Therapy in Patients with 0–1 Risk Factor

LDL Goal	LDL Level at Which to Initiate Therapeutic Lifestyle Changes (TLC)	LDL Level at Which to Consider Drug Therapy
<160 mg/dL	≥160 mg/dL	≥190 mg/dL (160–189 mg/dL: LDL-lowering drug optional)

LDL-Lowering Therapy in Patients With CHD and CHD Risk Equivalents

Baseline LDL Cholesterol: ≥ 130 mg/dL

- Intensive lifestyle therapies
- Maximal control of other risk factors
- Consider starting LDL-lowering drugs simultaneously with lifestyle therapies

LDL-Lowering Therapy in Patients With CHD and CHD Risk Equivalents

Baseline (or On-Treatment) LDL-C: 100–129 mg/dL

Therapeutic Options:

- LDL-lowering therapy
 - Initiate or intensify lifestyle therapies
 - Initiate or intensify LDL-lowering drugs
- Treatment of metabolic syndrome
 - Emphasize weight reduction and increased physical activity
- Drug therapy for other lipid risk factors
 - For high triglycerides/low HDL cholesterol
 - Fibrates or nicotinic acid

LDL-Lowering Therapy in Patients With CHD and CHD Risk Equivalents

Baseline LDL-C: <100 mg/dL

- Further LDL lowering not required
- Therapeutic Lifestyle Changes (TLC) recommended
- Consider treatment of other lipid risk factors
 - Elevated triglycerides
 - Low HDL cholesterol
- Ongoing clinical trials are assessing benefit of further LDL lowering

LDL-Lowering Therapy in Patients With Multiple (2+) Risk Factors and 10-Year Risk $\leq 20\%$

10-Year Risk 10–20%

- LDL-cholesterol goal < 130 mg/dL
- Aim: reduce both short-term and long-term risk
- Immediate initiation of Therapeutic Lifestyle Changes (TLC) if LDL-C is ≥ 130 mg/dL
- Consider drug therapy if LDL-C is ≥ 130 mg/dL after 3 months of lifestyle therapies

LDL-Lowering Therapy in Patients With Multiple (2+) Risk Factors and 10-Year Risk $\leq 20\%$

10-Year Risk $< 10\%$

- LDL-cholesterol goal: < 130 mg/dL
- Therapeutic aim: reduce long-term risk
- Initiate therapeutic lifestyle changes if LDL-C is ≥ 130 mg/dL
- Consider drug therapy if LDL-C is ≥ 160 mg/dL after 3 months of lifestyle therapies

LDL-Lowering Therapy in Patients With 0–1 Risk Factor

- Most persons have 10-year risk $<10\%$
- Therapeutic goal: reduce long-term risk
- LDL-cholesterol goal: <160 mg/dL
- Initiate therapeutic lifestyle changes if LDL-C is ≥ 160 mg/dL
- If LDL-C is ≥ 190 mg/dL after 3 months of lifestyle therapies, consider drug therapy
- If LDL-C is 160–189 mg/dL after 3 months of lifestyle therapies, drug therapy is optional

LDL-Lowering Therapy in Patients With 0–1 Risk Factor and LDL-Cholesterol 160-189 mg/dL (after lifestyle therapies)

Factors Favoring Drug Therapy

- Severe single risk factor
- Multiple life-habit risk factors and emerging risk factors (if measured)

Benefit Beyond LDL Lowering: The Metabolic Syndrome as a Secondary Target of Therapy

General Features of the Metabolic Syndrome

- Abdominal obesity
- Atherogenic dyslipidemia
 - Elevated triglycerides
 - Small LDL particles
 - Low HDL cholesterol
- Raised blood pressure
- Insulin resistance (\pm glucose intolerance)
- Prothrombotic state
- Proinflammatory state

Therapeutic Lifestyle Changes in LDL-Lowering Therapy

Major Features

- TLC Diet
 - Reduced intake of cholesterol-raising nutrients (same as previous Step II Diet)
 - ◆ Saturated fats <7% of total calories
 - ◆ Dietary cholesterol <200 mg per day
 - LDL-lowering therapeutic options
 - ◆ Plant stanols/sterols (2 g per day)
 - ◆ Viscous (soluble) fiber (10–25 g per day)
- Weight reduction
- Increased physical activity

Therapeutic Lifestyle Changes

Nutrient Composition of TLC Diet

Nutrient

- Saturated fat
- Polyunsaturated fat
- Monounsaturated fat
- Total fat
- Carbohydrate
- Fiber
- Protein
- Cholesterol
- Total calories (energy)

Recommended Intake

Less than 7% of total calories

Up to 10% of total calories

Up to 20% of total calories

25–35% of total calories

50–60% of total calories

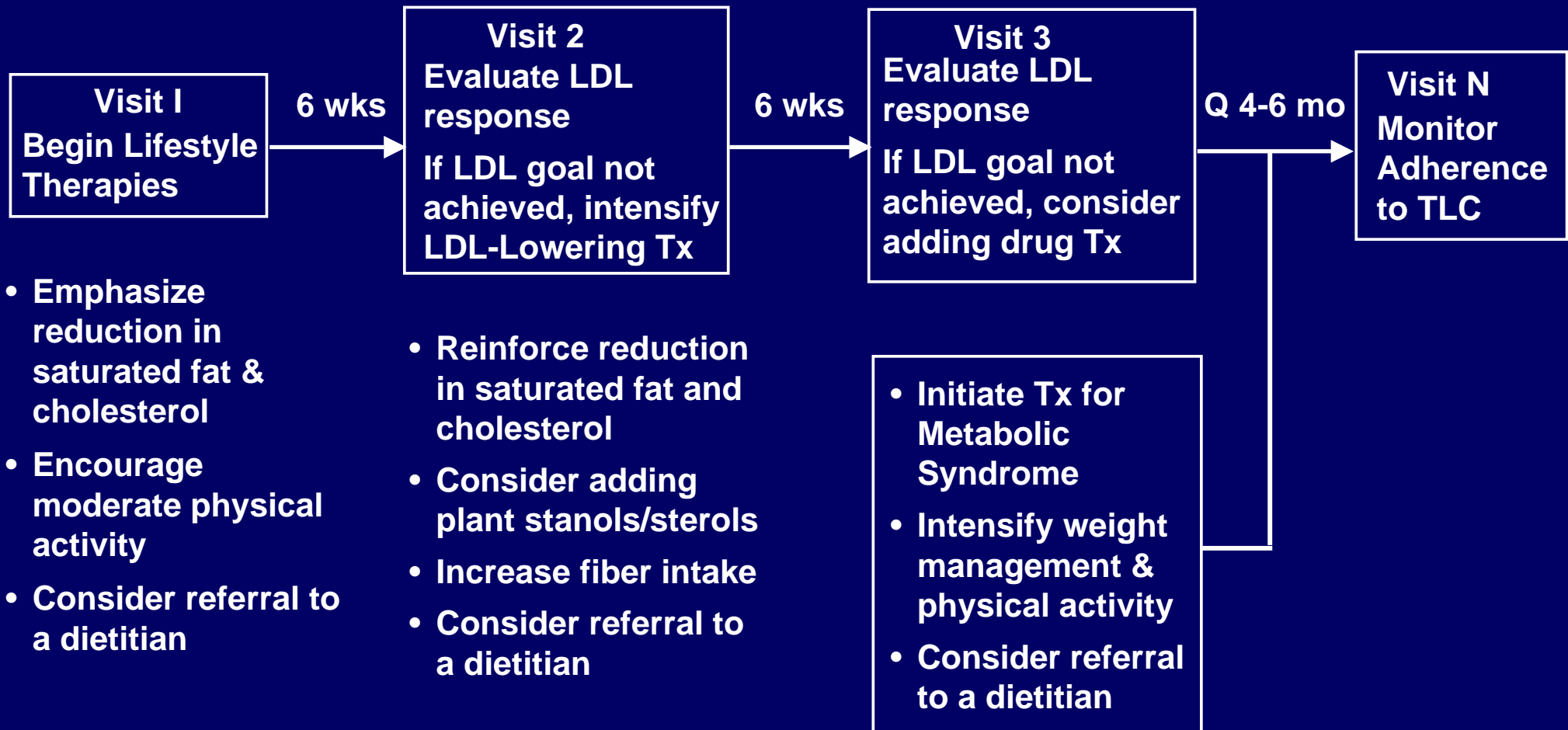
20–30 grams per day

Approximately 15% of total calories

Less than 200 mg/day

Balance energy intake and expenditure to maintain desirable body weight/ prevent weight gain

A Model of Steps in Therapeutic Lifestyle Changes (TLC)



Steps in Therapeutic Lifestyle Changes (TLC)

First Visit

- Begin Therapeutic Lifestyle Changes
- Emphasize reduction in saturated fats and cholesterol
- Initiate moderate physical activity
- Consider referral to a dietitian (medical nutrition therapy)
- Return visit in about 6 weeks

Steps in Therapeutic Lifestyle Changes (TLC) (continued)

Second Visit

- Evaluate LDL response
- Intensify LDL-lowering therapy (if goal not achieved)
 - Reinforce reduction in saturated fat and cholesterol
 - Consider plant stanols/sterols
 - Increase viscous (soluble) fiber
 - Consider referral for medical nutrition therapy
- Return visit in about 6 weeks

Steps in Therapeutic Lifestyle Changes (TLC) (continued)

Third Visit

- Evaluate LDL response
- Continue lifestyle therapy (if LDL goal is achieved)
- Consider LDL-lowering drug (if LDL goal not achieved)
- Initiate management of metabolic syndrome (if necessary)
 - Intensify weight management and physical activity
- Consider referral to a dietitian

Drug Therapy

HMG CoA Reductase Inhibitors (Statins)

- Reduce LDL-C 18–55% & TG 7–30%
- Raise HDL-C 5–15%
- Major side effects
 - Myopathy
 - Increased liver enzymes
- Contraindications
 - Absolute: liver disease
 - Relative: use with certain drugs

HMG CoA Reductase Inhibitors (Statins) (continued)

Demonstrated Therapeutic Benefits

- Reduce major coronary events
- Reduce CHD mortality
- Reduce coronary procedures (PTCA/CABG)
- Reduce stroke
- Reduce total mortality

Drug Therapy

Bile Acid Sequestrants

- Major actions
 - Reduce LDL-C 15–30%
 - Raise HDL-C 3–5%
 - May increase TG
- Side effects
 - GI distress/constipation
 - Decreased absorption of other drugs
- Contraindications
 - Dysbetalipoproteinemia
 - Raised TG (especially >400 mg/dL)

Bile Acid Sequestrants (continued)

Demonstrated Therapeutic Benefits

- Reduce major coronary events
- Reduce CHD mortality

Drug Therapy

Nicotinic Acid

- Major actions
 - Lowers LDL-C 5–25%
 - Lowers TG 20–50%
 - Raises HDL-C 15–35%
- Side effects: flushing, hyperglycemia, hyperuricemia, upper GI distress, hepatotoxicity
- Contraindications: liver disease, severe gout, peptic ulcer

Nicotinic Acid (continued)

Demonstrated Therapeutic Benefits

- Reduces major coronary events
- Possible reduction in total mortality

Drug Therapy

Fibric Acids

- Major actions
 - Lower LDL-C 5–20% (with normal TG)
 - May raise LDL-C (with high TG)
 - Lower TG 20–50%
 - Raise HDL-C 10–20%
- Side effects: dyspepsia, gallstones, myopathy
- Contraindications: Severe renal or hepatic disease

Fibric Acids (continued)

Demonstrated Therapeutic Benefits

- Reduce progression of coronary lesions
- Reduce major coronary events

Secondary Prevention: Drug Therapy for CHD and CHD Risk Equivalents

- LDL-cholesterol goal: <100 mg/dL
- Most patients require drug therapy
- First, achieve LDL-cholesterol goal
- Second, modify other lipid and non-lipid risk factors

Secondary Prevention: Drug Therapy for CHD and CHD Risk Equivalents (continued)

Patients Hospitalized for Coronary Events or Procedures

- Measure LDL-C within 24 hours
- Discharge on LDL-lowering drug if LDL-C ≥ 130 mg/dL
- Consider LDL-lowering drug if LDL-C is 100–129 mg/dL
- Start lifestyle therapies simultaneously with drug

Progression of Drug Therapy in Primary Prevention



Drug Therapy for Primary Prevention

First Step

- Initiate LDL-lowering drug therapy
(after 3 months of lifestyle therapies)
- Usual drug options
 - Statins
 - Bile acid sequestrant or nicotinic acid
- Continue therapeutic lifestyle changes
- Return visit in about 6 weeks

Drug Therapy for Primary Prevention

Second Step

- Intensify LDL-lowering therapy (if LDL goal not achieved)
- Therapeutic options
 - Higher dose of statin
 - Statin + bile acid sequestrant
 - Statin + nicotinic acid
- Return visit in about 6 weeks

Drug Therapy for Primary Prevention (continued)

Third Step

- If LDL goal not achieved, intensify drug therapy or refer to a lipid specialist
- Treat other lipid risk factors (if present)
 - High triglycerides (≥ 200 mg/dL)
 - Low HDL cholesterol (< 40 mg/dL)
- Monitor response and adherence to therapy (Q 4–6 months)