

Controlling Heart Disease & Diabetes with Exercise

EXERCISE
ETC. INC.



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PLEASE NOTE:

- Remember to complete this webinar and print the certificate by December 31 of **this year**.
- Certificates with **next year's** date may not be accepted by your credentialing organization.

REMINDER:

Obtain medical clearance and physician's release prior to beginning an exercise program for clients with medical or orthopedic concerns.

Life Expectancy in the USA

- Middle age: 45 – 65 yrs
- Old age: 65 +
- General population: 77.8 years
- Longest expectancy:
 - White women: 80 years
- Shortest:
 - Black men: 69 years



Disease Stats

- 75% of all American deaths due to stroke, CAD, Cancer
- Approximately 85% of Baby Boomers will have at least one chronic disease by age 65:
 - Hypertension, CAD, Diabetes



Circa 1963

Exercise Goals



- Can't fix the disease – Can prevent deconditioning
- Preserve function and independence
- Improve quality of life

General Modifications for all Special Populations

- Physician release and medical clearance
- Low to moderate intensity and longer duration
- Low resistance and higher repetitions
- Observe symptoms
- Monitor discomfort



**The ACSM Risk Factors for CAD,
Revised 2011**

- Age: Men > 45, women > 55
- Blood Pressure > 140/90 (*or on meds*)
- Smokes cigarettes within last 6 months
 - Pre-diabetes
- Elevated Cholesterol (*or on meds*)
 - Family History of CAD
 - Sedentary lifestyle
 - Obese: BMI \geq 30
- *2 or more risk factors require a physician's release*

**Cholesterol,
Diabetes & Heart Disease**

- Hyperlipidemia
 - Elevated triglyceride & cholesterol
- Hypertriglyceridemia
 - Elevated triglycerides only
- Hypercholesterolemia
 - Elevated cholesterol only



**National Cholesterol Education
Program (NCEP) Guidelines**

Triglycerides

- < 150 Normal
- 150-199 Borderline-high
- 200-499 High
- \geq 500 Very high



National Cholesterol Education Program (NCEP) Guidelines

- | | |
|--|---|
| <ul style="list-style-type: none"> • <u>Total cholesterol</u> < 200 Desirable • 200-239 Borderline high • ≥ 240 High <p><u>HDL cholesterol</u></p> <ul style="list-style-type: none"> <40 Low (undesirable) ≥60 High (desirable) | <p><u>LDL cholesterol</u></p> <ul style="list-style-type: none"> <100 Optimal* 100-129 Near or above optimal 130-159 Borderline high 160-189 High ≥ 190 Very high *Clients at very high risk the goal is < 70 <p><u>VLDL cholesterol</u></p> <ul style="list-style-type: none"> <30 (Desirable) |
|--|---|

Hyperlipidemia: Causes & Treatment

Indicator	Causes	Treatment
<ul style="list-style-type: none"> •Low HDL •High LDL •High TGs 	<ul style="list-style-type: none"> •Genetics •Abdominal obesity •Inactivity •Diet •Smoking •Steroid use •Insulin Resistance 	<ul style="list-style-type: none"> •Weight loss •Increased activity •Drug therapy •TLC Diet •Increased fiber intake •Stop smoking

Sample Hyperlipidemia Exercise Program

	Cardio	Strength	Flexibility
Frequency	3 – 7 times per week to burn 1500 – 2000 kcals	2 – 4 times per week	Near daily
Intensity	40 – 70% VO2	10 -15 reps	Point of tension
Duration	Start with 2 short sessions, progress to 40 – 60 minutes	1 – 3 sets	10 – 30 seconds
Type	Low impact if obese	Machines to start	Static, active

Diabetes Stats

- Affects >20 million Americans
- ~6 million undiagnosed
- >800K new cases each year
- Leading cause of blindness, amputation for older adults



Diabetes Mellitus “Sweet Honey Flowing”

- Type 1
 - “Juvenile Diabetes”
 - Insulin Dependent Diabetes Mellitus (IDDM)
 - Treatment:
 - Exogenous Insulin (injected)
 - 5% of all diabetics
- Type 2
 - “Adult Onset Diabetes”
 - Non-Insulin Dependent Diabetes Mellitus (NIDDM)
 - Treatment:
 - Diet
 - Exercise
 - Oral medication
 - 95% of all diabetics

Exercise’ Role in Diabetes Care

- For Type 1 Diabetics, exercise helps to:
 - Enhance blood glucose control by reducing amount of exogenous insulin needed
 - Control weight, preventing “hybrid diabetes”
- For Type 2 Diabetics, exercise helps to:
 - Control blood glucose by
 - enhancing utilization acutely
 - improving insulin sensitivity acutely and chronically by building muscle and decreasing body fat
- For both Type 1 and 2, exercise helps to:
 - Reduce the risk of complications and co-morbidities
 - Improve quality of life

Exercise Adjustments

- Physician may need to adjust insulin dosage in Type 1 Diabetes to prevent hypoglycemia
- If exercise is unplanned or of long duration, encourage use of supplemental carbohydrate to support increased glucose needs
- Replace carbohydrate stores post-exercise (30 minutes)



Exercise & Type 1 Diabetes

- Exercise presents a “risk” for Type 1 Diabetics
 - Hypoglycemia
 - Disease complications
- Program according to general guidelines while managing risks associated with hypoglycemia and presenting complications.
- American Diabetes Association (ADA) is currently formulating a position statement on exercise and type 1 diabetes.

Type 2 Diabetes Exercise Guidelines

American Diabetes Association consensus statement in Diabetes Care June 2006

Medical evaluation is recommended before beginning any exercise program more vigorous than brisk walking for type 2 diabetics.

- **Aerobic Physical Activity**
 - Accumulate a weekly minimum of:
 - 150 minutes of moderate intensity aerobic exercise (50-70% HRmax), and/or
 - 90 minutes of vigorous exercise (>70% HRmax)
 - Exercise should be distributed over at least 3 days, with no more than 2 consecutive days without physical activity

Type 2 Diabetes Exercise Guidelines

American Diabetes Association consensus statement in Diabetes Care June 2006

- **Strength Training**
 - Resistance exercise should be performed 3 times per week, targeting all major muscle groups.
 - Progress to 3 sets of 8 to 10 repetitions with a weight that cannot be lifted more than 8 to 10 times.

Sample Program: Diabetes

	Cardio	Strength	Flex
Frequency	3-6X per wk	2- 3X per week	2-3 X per wk
Intensity	40 – 70% VO2	10 – 15 reps	To the point of tension
Duration	20 - 60 minutes	1-3 sets	10 – 30 seconds
Mode	Any	Free Weights, Machines, Tubing, etc.	Static

Blood Glucose Variations

- **Hyperglycemia, high blood glucose**
 - A risk for those with poor control
 - Lack of insulin causes increase in blood glucose during exercise
- **Hypoglycemia, low blood glucose**
 - A risk for those with good control
 - Insulin concentrations do not decrease with exercise in persons with diabetes taking insulin
- **Delayed hypoglycemia biggest danger**
 - Increased glucose uptake following exercise can cause hypoglycemia 6-15 hours after exercise
 - Insulin sensitivity increases following exercise

Symptoms of Hypoglycemia

- Defined as blood sugar levels <60 mg/dl
 - Dizziness
 - Light headedness
 - Unsteady
 - Confused irritable
 - Nervous
 - Unconscious

Exercise & Blood Glucose

- Client **MUST** self-monitor blood glucose before, during and after exercise, or as directed.
- Type 1 Diabetic
 - <100: defer exercise until it elevates
 - If >300 defer exercise until lowers
 - If >250 and ketones present in urine, no exercise
- Type 2 Diabetic
 - <100: defer exercise until it elevates
 - No upper limit, however exercise should be modified if BG is high to emphasize aerobic training

Carbohydrate Replacement

Intensity	Duration	CHO	Frequency
Mild-Moderate	< 30 min	May not be needed	
Moderate	30-60 min	15-30 grams	Each hour
High	60+ min	30-50 grams	Each hour

Carb Replacement: Number of Carbs per Ounce

M & M candies, plain	20
Wheat crackers	17
Raw carrots	8
Plain popcorn, no butter	21
Raisins	21
Banana	7
Orange juice (concentrate)	11
Orange	3

Reducing Risks of Hypoglycemia

- No exercise during time of peak insulin activity
 - ~30-60 minutes after injection
- Best time to exercise is 1 – 2 hours after breakfast
 - Early in day to avoid nocturnal hypoglycemia
- Have quick acting carbohydrate readily available
- Do not inject insulin into muscles used during exercise
 - Abdominal area considered safest injection site
- Keep exercise predictable, consistent
- Use caution in hot environments
- Avoid bouncing, jarring moves if peripheral or autonomic neuropathy present
- Encourage use of diabetes & personal identification

Responding to Hypoglycemia

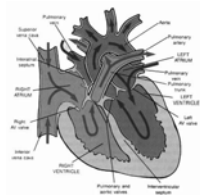
- Consider calling 911
 - Immediate administration of carbohydrate
 - Measure blood glucose if possible:
Symptomatic & blood glucose < 70 mg/dl: provide 15 g of carbohydrate
 - 3-4 glucose tablets
 - ½ cup soda or fruit juice
 - 6 saltine crackers
 - 1 tablespoon sugar or honey
- Wait 15 min & re-measure blood glucose. If < 70 mg/dl administer another 15 grams of carbohydrate

Exercise Contraindications

- Clients with retinopathy should avoid high intensity, jarring, and/or bouncing activities
- Clients with peripheral neuropathy should avoid outdoor walking & jogging to reduce risk of falls
- Clients with severe kidney disease, acute illness, infection or fever should avoid exercising until cleared by physician
- Clients who present with evidence of undiagnosed CAD that has not been medically evaluated should not exercise until cleared by a physician

HEART DISEASE: CAD POPULATIONS

- Hypertension
- PVD
- Mitral Valve Prolapse
- Pacemakers & ICDs
- Angioplasty & Bypass
- Angina
- Congestive Heart Failure
- Post MI



Exercise Program Goals For Clients with CAD

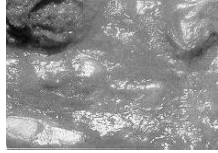
- Increase aerobic capacity
- Decrease HR & BP response at any given workload
- Reduce CAD risk factors
- Increase ability to perform leisure, occupational and daily living activities
- Increase muscle strength & endurance
- Increase confidence and reduce depression, fear & anxiety



Coronary Artery Disease Progression

- Pathophysiology

- Lipid/cholesterol plaque formation
- Inflammation
- Formation of collagen cap
- Reduction in diameter of blood vessel



Understanding Cardio Rehab

- Phase 1
 - Client walks several times a day with physical therapist, nurse or physiologist
- Phase 2
 - Client exercises independently with telemetric monitor
- Phase 3
 - Client exercises without telemetry but is supervised, HR & BP are monitored "as needed"
- Phase 4
 - Client is released to "community" (non-clinical) exercise program

Hypertension

- Affects over 50% of those over age 65
- Affects more men prior to age 50; more women after age 50
- Affects 3 main organs
 - ✓ Brain-strokes
 - ✓ Kidneys-renal failure
 - ✓ Heart-congestive heart failure



Hypertension Definitions

Source: JNC 7: May, 2003

Category	Systolic	Diastolic
Optimal	<120	<80
Pre-hypertension	≥120	≥80
Isolated Systolic Hypertension	≥160	<90
Hypertension		
Stage 1	140-159	90-99
Stage 2	≥160	≥100

Sample Hypertension Program

	Cardio	Strength	Flex
Frequency	3-7X per wk, to burn up to 2000 kcals/wk	2-3X per week	3X per week
Intensity	40-70% VO2	16 – 20 reps, 50 – 60% 1RM	Point of tension
Duration	30 – 60 minutes	1 – 3 sets	10 seconds
Mode	Any type they enjoy	Circuit training	Active, static, tai chi

Peripheral Vascular Disease (PVD)

- Affects the medium and large arteries
- Higher incidence in those with CAD, smokers & diabetics
- Most prominent symptom is pain during weight bearing such as walking
- Most common sites:
 - popliteal artery
 - iliac artery
 - femoral artery



Exercise Programming

- Intermittent walking is the exercise of choice
- Clients should walk until Grade III or IV on the Pain Scale and then rest

ACSM 's Guidelines for exercise testing & prescription. 2000. p. 209.

Grade I	definite discomfort or pain, but only at initial or modest levels
Grade II	moderate discomfort or pain from which the client's attention can be diverted
Grade III	intense pain from which the client's attention can't be diverted
Grade IV	excruciating and unbearable pain

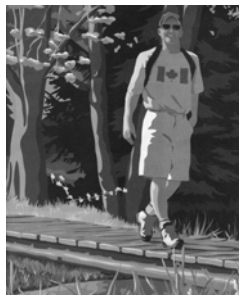
Exercise Programming

- Intensity should stimulate claudication pain within 2 to 6 minutes
- Repeat walking & resting for a total time of 10 to 30 minutes with a goal of increasing continuous exercise time
- Increase intensity or activity time when 8 to 12 minutes of continuous walking can be tolerated



Mitral Valve Prolapse

- If MVP is mild, there are no limitations
- If MVP is severe, no vigorous activity
- Start with intermittent, discontinuous activity
- Non-surgical candidates should focus on ADLs



Exercise, Pacemakers & ICDs*

*Implantable Cardioverter Defibrillators

- Keep intensity below ischemic threshold
- Intensity that is too high may trigger ICD
- Upper body ROM should be limited until incision is healed:
 - Activity may dislodge electric leads



Exercise After Bypass, Angioplasty

- Mild to moderate upper & lower body strength training is recommended
- Walking is preferred cardio activity to start
- Perform ROM exercises including:
 - Shoulder flexion, abduction, rotation
 - Elbow flexion
 - Hip flexion, abduction, rotation
 - Ankle plantarflexion, dorsiflexion, inversion, eversion



Information for Clients with Angina

- How long have symptoms been present??
- A description of the symptoms
- Current medications to control or alleviate the symptoms
- Identification as to what triggers the pain
- Identification as to what relieves the pain
- Is their angina stable or unstable?

Angina Scale

- 1+ Light, barely noticeable
- 2+ Moderate, bothersome
- 3+ Severe, very uncomfortable
- 4+ Most severe or intense pain ever experienced



Responding to Angina

- Stop exercise immediately
- If pain does not subside, client takes 1 nitroglycerin tablet every 5 minutes
- If after taking 3 tablets (or after 15 minutes) the pain persists, or if symptoms of a heart attack become present, call 911
- Seat client & monitor BP after nitroglycerin due to the likelihood of hypotension



Congestive Heart Failure: Symptoms

- Shortness of breath while lying flat, with exercise or other exertion
- Coughing
- Swelling in the legs, feet, or ankles
- Trouble sleeping and a need for more pillows for comfortable breathing
- Waking up short of breath during the night
- Weakness or fatigue after small amounts of effort (e.g., climbing a flight of stairs)
- Symptoms usually develop gradually

Symptoms Requiring Referral

- Increased difficulty breathing
- Infections
- Increased swelling in feet and ankles
- Coughing up pink or blood-tinged sputum
- Changes in blood pressure
- Weight gain of greater than 2 pounds in 24 hours or 5 pounds in a week.

Symptoms of a Heart Attack (MI)

- For Men:
 - Pain & discomfort in the center of the chest
 - Pain in the left arm or jaw
 - Shortness of breath, often before the start of chest pain
 - Cold sweat
- For women:
 - Chest pain that may be sporadic
 - Pain in the stomach, upper back, neck or jaw
 - Light headedness
 - Nausea/vomiting
 - Shortness of breath
 - Cold sweat

Women are more likely to have other conditions prior to the MI such as diabetes, hypertension or congestive heart failure

Questions for Post MI Clients



- Did they have an uncomplicated hospital stay?
- Is there any evidence of resting or exercise ischemia?
- What is their functional capacity?
- Is their ejection fraction > more than 50%?
- Do they have any significant resting or exercise induced ventricular arrhythmias?

Client Information to Obtain from the Medical Community Before Exercise

- Physician release to community based exercise
- Diagnosis
- Are there specific guidelines for HR & BP?
- Any contraindications? Any pain?
- Ischemia? If yes, is it predictable?
- Are there other health issues?
- Medications that affect testing or training

Exercise Guidelines for Clients with CAD

- **Avoid isometrics, decline positions, arms higher than head**
- **No exercise if client forgets to take their medications**
- **Be aware of effects of BP meds on heart rate (Beta Blockers)**
- **Take blood pressure before, during, after exercise**
- **Stop exercise if systolic goes above 250 or diastolic goes above 110**
- **Avoid whirlpools, saunas, steam rooms after exercise**

Lifestyle Modifications



- Body fat management
- Increase physical activity and/or exercise
- Stop smoking
- Monitor alcohol intake
- Avoid excess sodium
- Reduce dietary intake of saturated fat and cholesterol

Exercise Progressions

- Slow gradual progression of duration, frequency, and intensity
- Increase duration every 1-3 wks, with a goal of 30 min at a low intensity
- 4 – 6 month goal- Duration to 40 min at 40-80% VO₂



Special Considerations

- Longer warm up & cool down >10 min.
- Observe for signs of heart failure
 - ✓ Failure of HR to rise or unusual increase based on workload
 - ✓ Failure of systolic BP to rise
 - ✓ Dizziness, light-headedness, weakness, SOB
 - ✓ Chest pain or pressure
 - ✓ Ventricular arrhythmias, premature beats, tachycardia

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