Peripheral Artery Disease & Stroke

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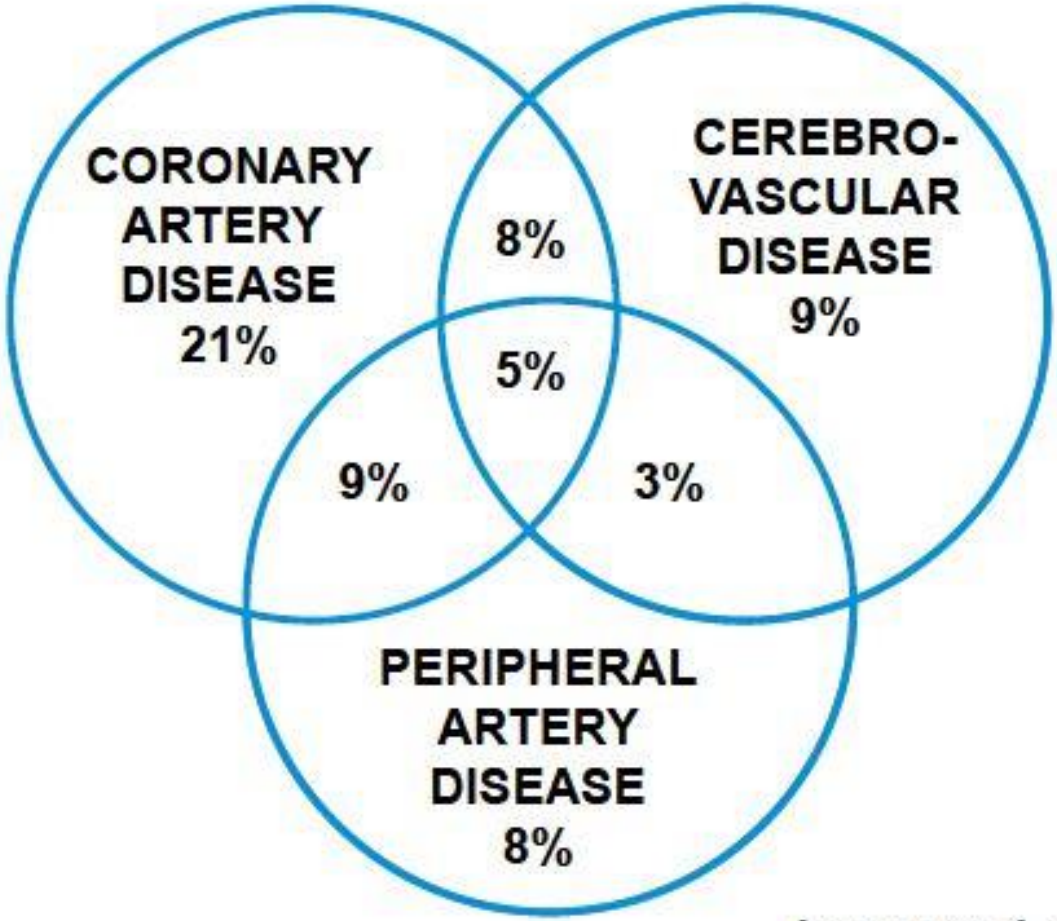
Outline

- Peripheral artery disease rehabilitation
- Cardiac rehabilitation roles in stroke
- Case study

Peripheral Artery Disease

Peripheral Artery Disease

Atherosclerosis – a systemic disease



Coexistance of CAD, PAD and CVD in 1886 patients ≥ 62 years in nursing homes

Aronow et al. *Am J Cardiol.* 1994; 74: 64-65

PAD Symptoms

- Asymptomatic
- Intermittent claudication
  - Calf pain, increasing with walking, disappear quickly at rest
  - More proximal level i.e. the aortoiliac segment, pain extension into thighs and buttocks
  - Edinburgh Claudication Questionnaire is a standardized method to screen and diagnose intermittent claudication, with a 80–90% sen & 95% spec

PAD Symptoms

- Ischemic rest pain
  - Pain at rest, in supine position
  - Rest pain often in the foot
  - Permanent coldness in feet
  - Should be distinguished from muscle cramping or arthritis
- Ulceration, gangrene
  - indicate severe ischaemia and begin mostly at the level of toes and distal part of the limb.
  - often complicated by local infection and inflammation

Differential Diagnosis of Leg Pain

- Spinal canal stenosis
- Peripheral neuropathy
- Peripheral nerve pain
  - Herniated disc impinging on sciatic nerve
- Osteoarthritis of the hip or knee
- Venous claudication
- Symptomatic Baker's cyst
- Chronic compartment syndrome
- Muscle spasms or cramps

Clinical Staging of Lower Extremity Artery Disease (LEAD)

Fontaine classification			Rutherford classification		
Stage	Symptoms	↔	Grade	Category	Symptoms
I	Asymptomatic	↔	0	0	Asymptomatic
II	Intermittent claudication	↔	I	1	Mild claudication
			I	2	Moderate claudication
			I	3	Severe claudication
III	Ischaemic rest pain	↔	II	4	Ischaemic rest pain
IV	Ulceration or gangrene	↔	III	5	Minor tissue loss
			III	6	Major tissue loss

Tendera M et al. ESC Guidelines on the diagnosis and treatment of peripheral artery diseases. Eur Heart J. 2011; **32**(22): 2851-906.

Edinburgh Claudication Questionnaire

(1) Do you get a pain or discomfort in your leg(s) when you walk?
Yes
No
I am unable to walk

If you answered "Yes" to question (1) - please answer the following questions.
Otherwise you need not continue.

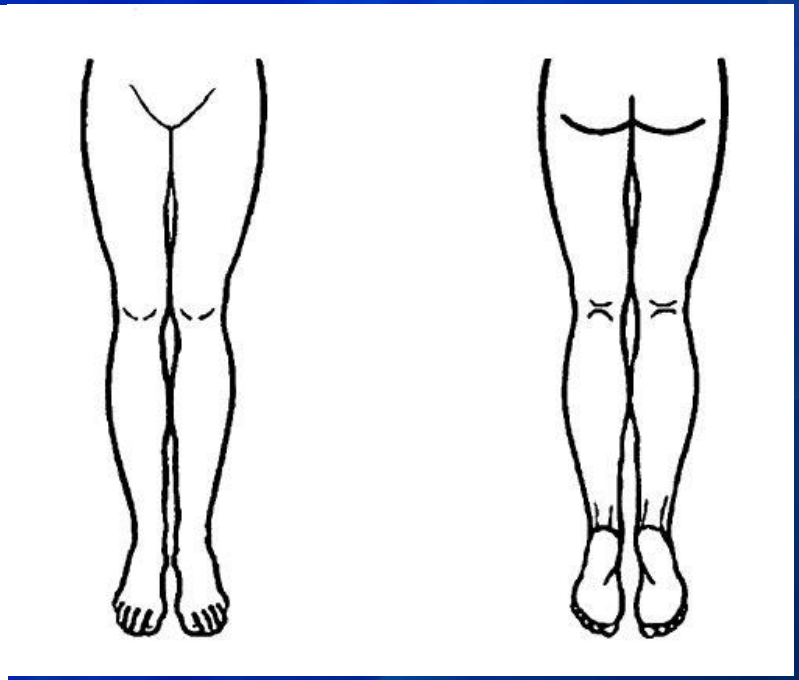
(2) Does this pain ever begin when you are standing still or sitting?
Yes
No

(3) Do you get it if you walk uphill or hurry?
Yes
No

(4) Do you get it when you walk at an ordinary pace on the level?
Yes
No

(5) What happens to it if you stand still?
Usually continues more than 10 minutes
Usually disappears in 10 minutes or less

(6) Where do you get this pain or discomfort? Mark the place(s) with "x" on the diagram below



Tendera M et al. ESC Guidelines on the diagnosis and treatment of peripheral artery diseases. Eur Heart J. 2011; **32**(22): 2851-906.

ABI

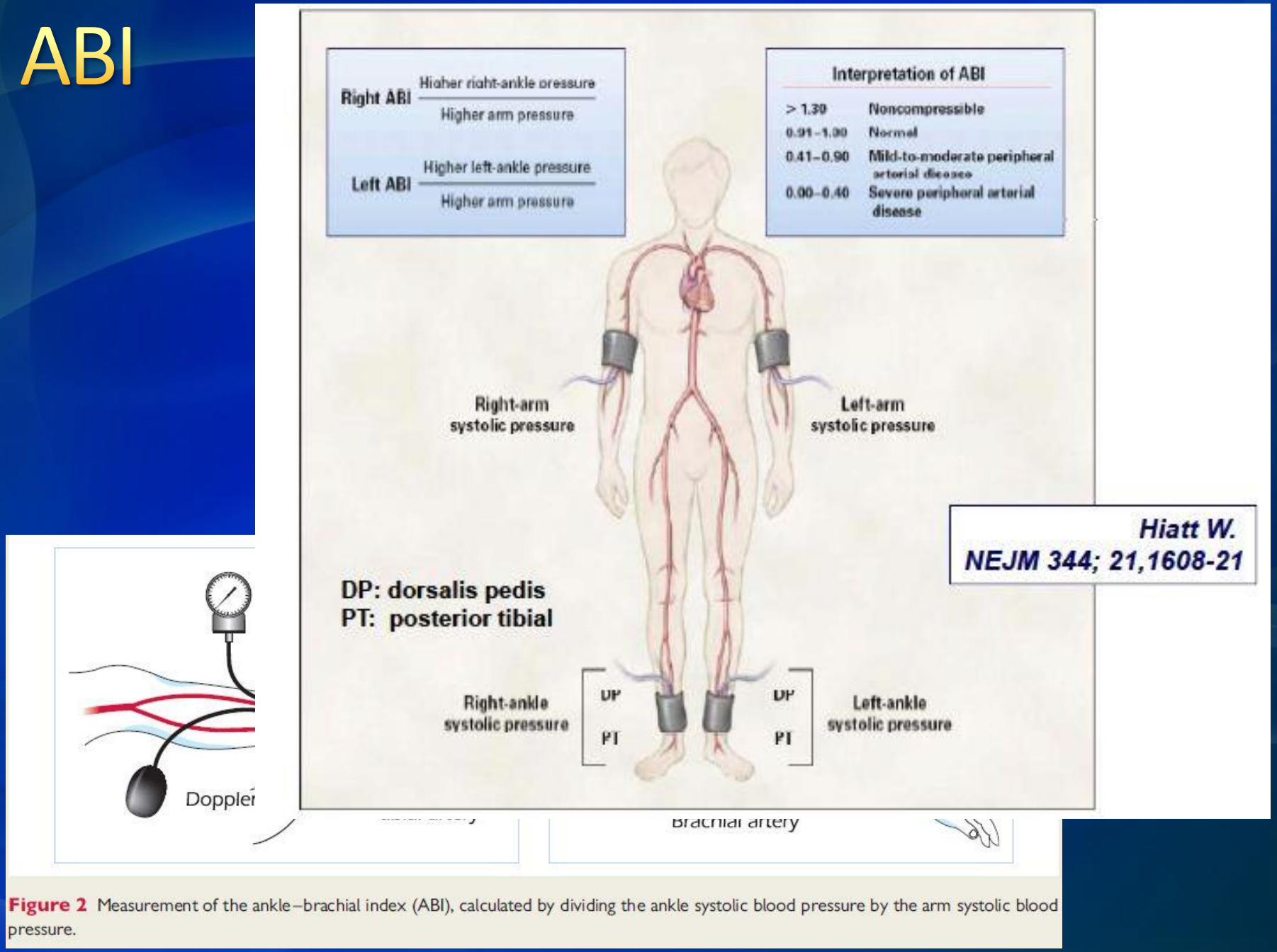


Figure 2 Measurement of the ankle–brachial index (ABI), calculated by dividing the ankle systolic blood pressure by the arm systolic blood pressure.

Treadmill Testing in LEAD

- For diagnostic confirmation and/or baseline quantification of functional severity
- Objective assessment of treatment in patients with intermittent claudication
- Either fixed or graded standardized exercise treadmill test
- Pre and postexercise ABI : differentiate arterial claudication from nonarterial claudication (“pseudoclaudication”).
- **6-minute walk test** : objective assessment of functional limitation and response to therapy in elderly or others not amenable to treadmill testing.

Determination of walking distance: Constant load exercise test

- 3.2 km/h
- 12% slope
- Assess:
  - Pain-free distance
  - Max. walking distance

The integrated use of graded treadmill testing protocols and appropriate questionnaires will permit clinically meaningful changes to be accurately assessed in patients with PAD.

Hiatt WR et al. Circulation. 1995; **92**(3): 614-21.

Examples of Treadmill Testing Protocols for Peripheral Arterial Disease

Time, min	Speed, mph	Hiatt[16] Grade Stage	Gardner[22] Grade Stage	Standard[15] Grade
1	2.0	0%	0%	12.0%
2	2.0	0%	0% 1	12.0%
3	2.0	0% 1	2.0%	12.0%
4	2.0	3.5%	2.0% 2	12.0%
5	2.0	3.5%	4.0%	12.0%
6	2.0	3.5% 2	4.0% 3	12.0%
7	2.0	7.0%	6.0%	12.0%
8	2.0	7.0%	6.0% 4	12.0%
9	2.0	7.0% 3	8.0%	12.0%
10	2.0	10.5%	8.0% 5	12.0%
11	2.0	10.5%	10.0%	12.0%
12	2.0	10.5% 4	10.0% 6	12.0%
13	2.0	14.0%	12.0%	12.0%
14	2.0	14.0%	12.0% 7	12.0%
15	2.0	14.0% 5	14.0%	12.0%
16	2.0	17.5%	14.0% 8	12.0%

Gardner AW et al. Progressive vs single-stage treadmill tests for evaluation of claudication. Med Sci Sports Exerc. 1991; **23**(4): 402-8.

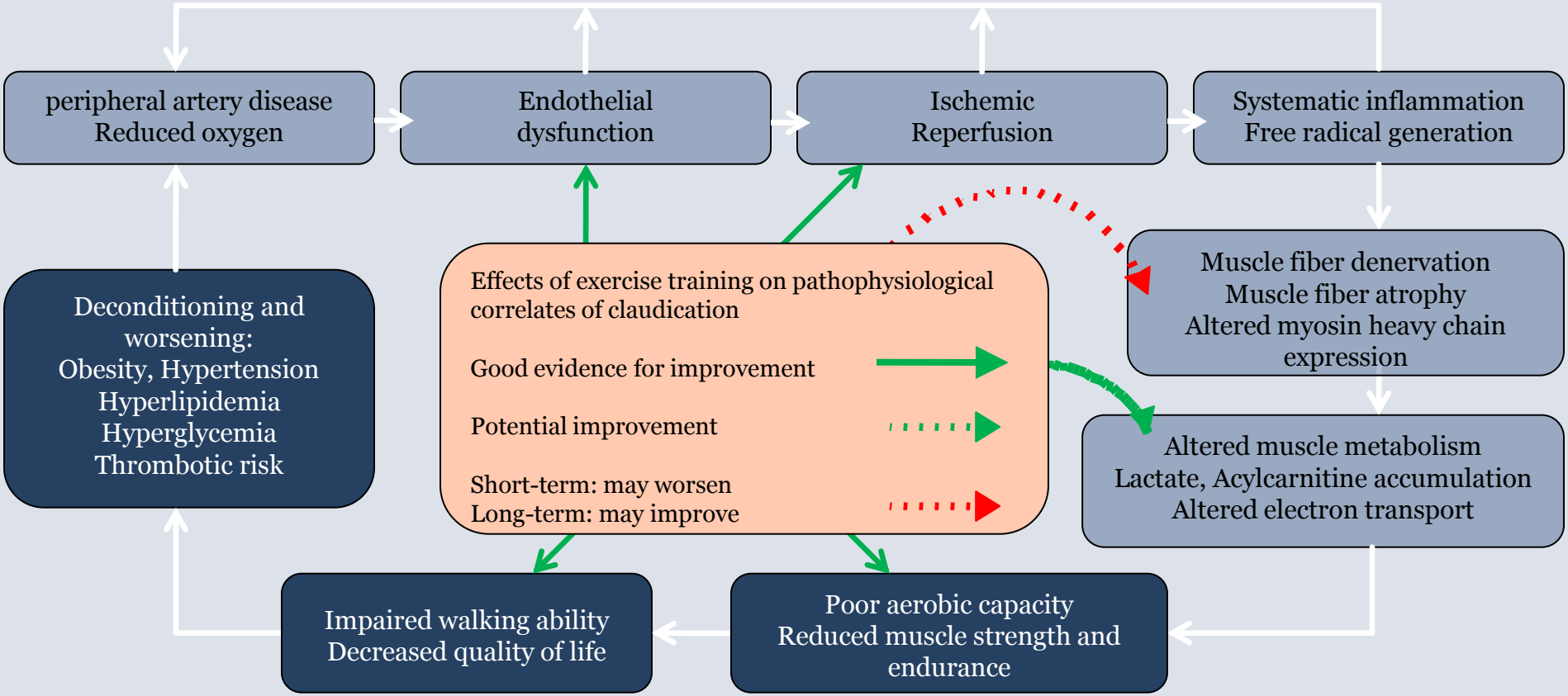
Hiatt WR et al. Clinical trials for claudication. Assessment of exercise performance, functional status, and clinical end points. Vascular Clinical Trialists. Circulation. 1995; **92**(3): 614-21.

2 Major Goals in Treating PAD

Limb Outcomes	Cardiovascular Morbidity & Mortality Outcomes

• Relieve symptoms
  • Increase in peak walking distance, improve exercise capacity
  • Improvement in quality of life
• Prevention of progression to CLI and amputation
	• Decrease mortality/morbidity from MI, stroke, and cardiovascular death

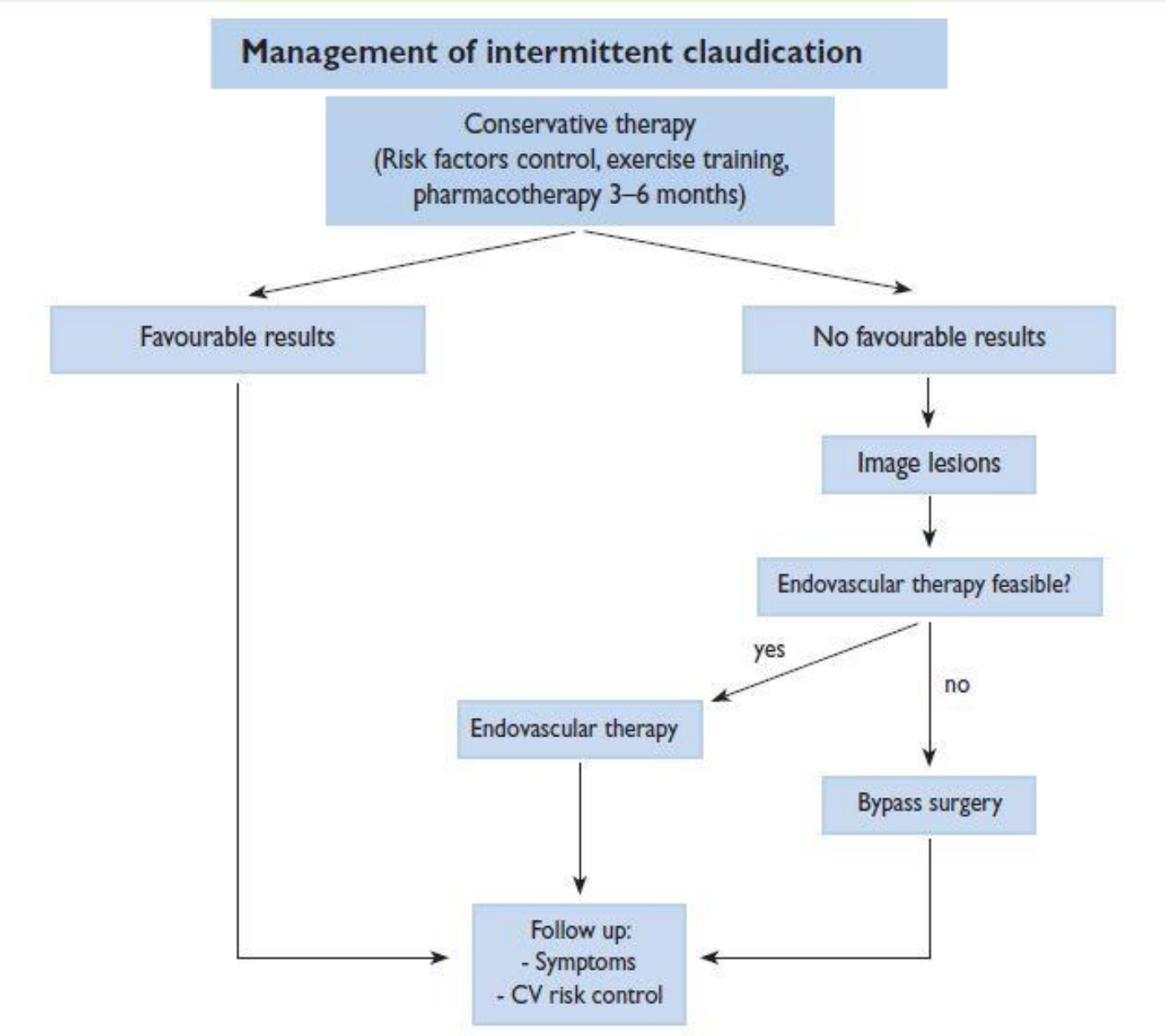
Mechanisms by Which Exercise May Improve Function & Symptoms in Claudication



AACVPR
American Association of Cardiovascular and Pulmonary Rehabilitation
Promoting Health & Preventing Disease

Stewart, Hiatt, Regensteiner, Hirsch. NEJM 347:1941-1957 December 12, 2002.

PAD
PERIPHERAL ARTERY DISEASE
COALITION
AN INITIATIVE of the VASCULAR DISEASE FOUNDATION



Tendera M et al. ESC Guidelines on the diagnosis and treatment of peripheral artery diseases Eur Heart J. 2011; **32**(22): 2851-906.

Essentials of PAD Management

Risk Factor Normalization

- Tobacco use
  - Goal complete cessation
- Lipid management
  - Goal LDL <100 mg/dL or 70 if high risk
- Blood pressure control
  - Goal <140/90 mm Hg
  - Goal <130/80 mm Hg (DM, CKD)
- Blood sugar control (patients with diabetes)
  - Goal A1C <7%
- BW control

Antiplatelet Therapy

Clopidogrel, ASA

Claudication Therapy

- Blood pressure control
- Supervised exercise rehabilitation
- Cilostazol (1st line)
- Pentoxifylline
- Revascularization therapy

Claudication Pain Scale

1	Minimal
2	Moderate
3	Intense
4	Unbearable pain

*

1	No Pain
2	Onset of Pain
3	Mild Pain
4	Moderate Pain
5	Severe Pain

Goals of Medical Evaluation before PAD Exercise Rehabilitation

- To confirm diagnosis of PAD and intermittent claudication
- To confirm absence of
  - Critical limb ischemia
  - Unstable angina
  - Decompensated heart failure
  - Uncontrolled cardiac arrhythmias
  - Severe or symptomatic valvular disease
  - Other conditions that could be aggravated by exercise including, but not limited to, severe joint disease, uncontrolled diabetes, or uncontrolled hypertension
  - Poor healing or non-healing wound of legs and feet which could limit exercise training
- To screen for exercise-induced myocardial ischemia & arrhythmias
  - Exercise stress testing is preferred
  - Careful questioning for symptoms is an alternative

Pre-exercise Functional Evaluation

- Options
  - Formal treadmill testing protocols
  - 6 minute walk test
  - Observation during initial treadmill exercise session
  - Telemetry monitoring at least during initial sessions
- Goal is to determine
  - Claudication threshold
  - Cardiovascular response to exercise
  - Establish parameters for the exercise prescription

PAD Exercise Prescription

- **Frequency**: 3-5 times/week
- **Intensity**: Initial treadmill speed & grade – elicits claudication pain (3-4 of 5) in 3-5min until “near maximum pain”, maintain for 8-10 min then stand or sit. Resume walking immediately when the pain is gone as a cycle.
- **Type**: treadmill, track walking
- **Timing**: Initially, accumulate 30 min of walking in bouts of 8-10 min each. Progress to 30-45 min, including 5 minutes warm up and cool down. Goal 45-60 min, including rest periods

Total Time: At least 12 weeks

Warm-up and cool-down: 5 min each -10 min if cold

PAD Exercise Rehabilitation

- **Progression:** After the participant can exercise for at least 8 min without stopping for 3-4/5 claudication pain & cumulative exercise duration of 50 min including rest periods

-> Increase inclination by 1-2% maintain the same speed

- Advance speed and inclination over time to maintain a claudication stimulus to exercise training

PAD Exercise Rehabilitation

- After 12 wk, continue daily walking, treadmill
- Clinical benefits have been observed after 4-8 wk of program & increase over 12 wk.
- Outcome: Pain-free distance, Maximum walking distance

Options

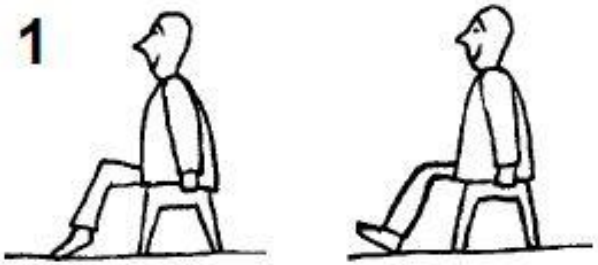
- Coordination/balance training (Impaired from leg pain), intrinsic foot exer, Accelerometer feedback, arm exercise in patients who can not walk
- Resistance training is used, as tolerated, for general fitness is complementary to, **but not a substitute for walking.**

Anderson JL et al. Management of patients with peripheral artery disease (compilation of 2005 and 2011 ACCF/AHA guideline recommendations): Circulation. 2013; **127**(13): 1425-43.

Additional advice for home training

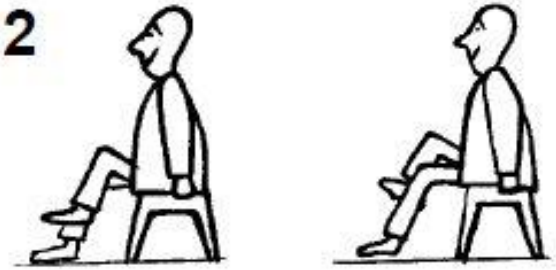
Warm up

1



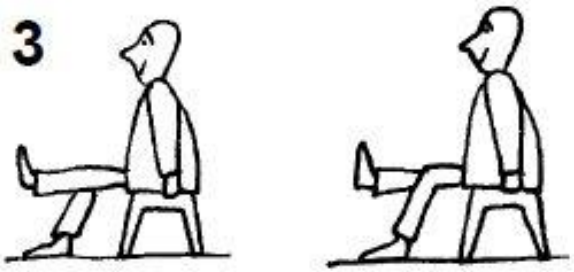
roll the feet from tip toe to heel position

2



intermittend extension of right and left leg; thigh remains in contact with seat

3

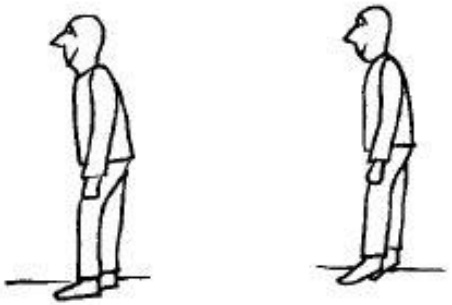


intermittent crossing of left and right leg

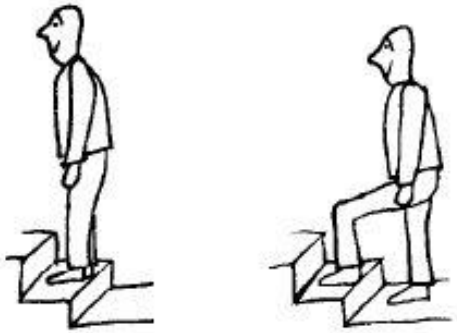
4

massage the leg from the knee down to the ankles

Strength training:



Repetition of tiptoe standing (approx. 1/sec.): distribute your weight evenly between the two legs



Stepping:
exercise always until symptoms appear, then stop and pause until pain has disappeared completely

Stretching of calf

Stretching of thigh

massage the leg from the knee down to the ankles

Multisite Artery Disease

- Patients with LEAD associated with CAD are at twice the level of risk as those presenting with CAD alone.
- Lowering the target for LDL cholesterol from 100 to 70 mg/dl should be considered.
- Strict control of risk factors

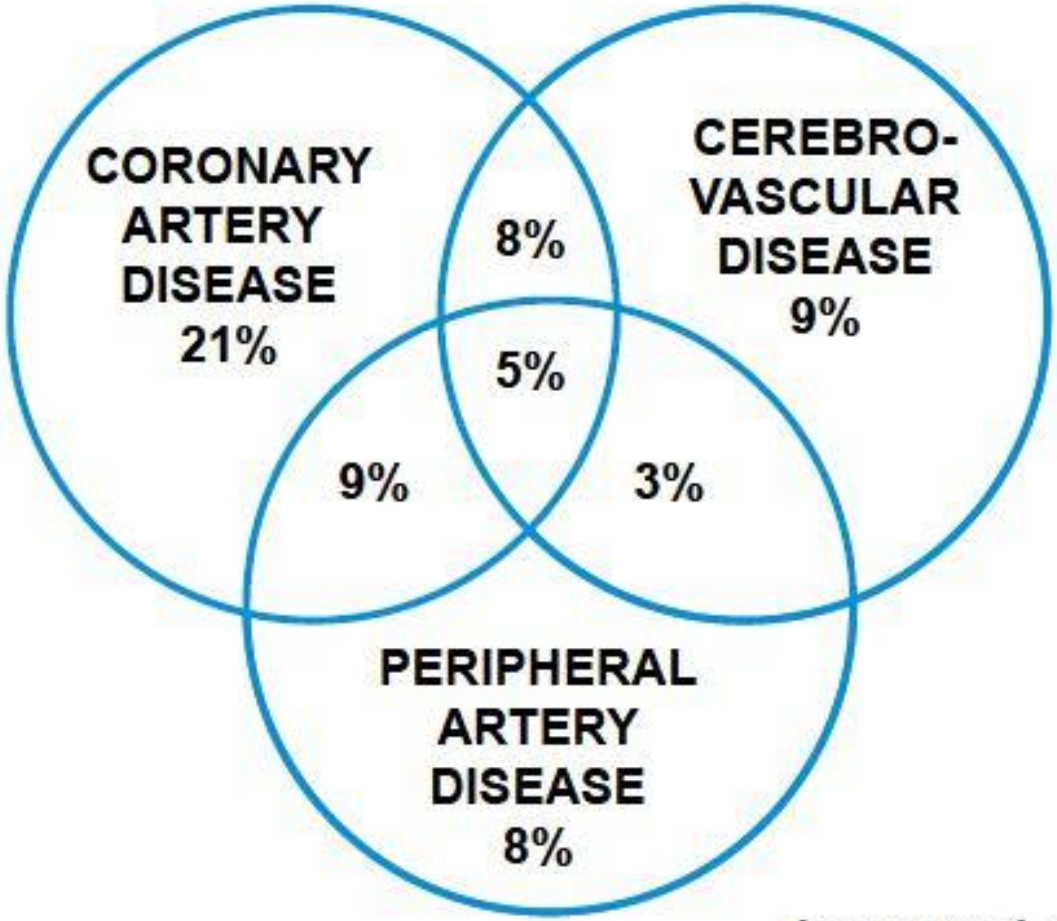
Assessing Outcomes and Program Effectiveness

- Treadmill Testing (graded or constant)
- Six Minute Walk Test
- Shuttle Walk Test
- Four Meter Walking Velocity
- Repeated Chair Rise
- Standing Balance
- Quality of Life Questionnaire
- Program Demographics
- Attendance

Stroke

Cerebrovascular Disease (CVD)

Atherosclerosis – a systemic disease



Coexistance of CAD, PAD and CVD in 1886 patients ≥ 62 years in nursing homes

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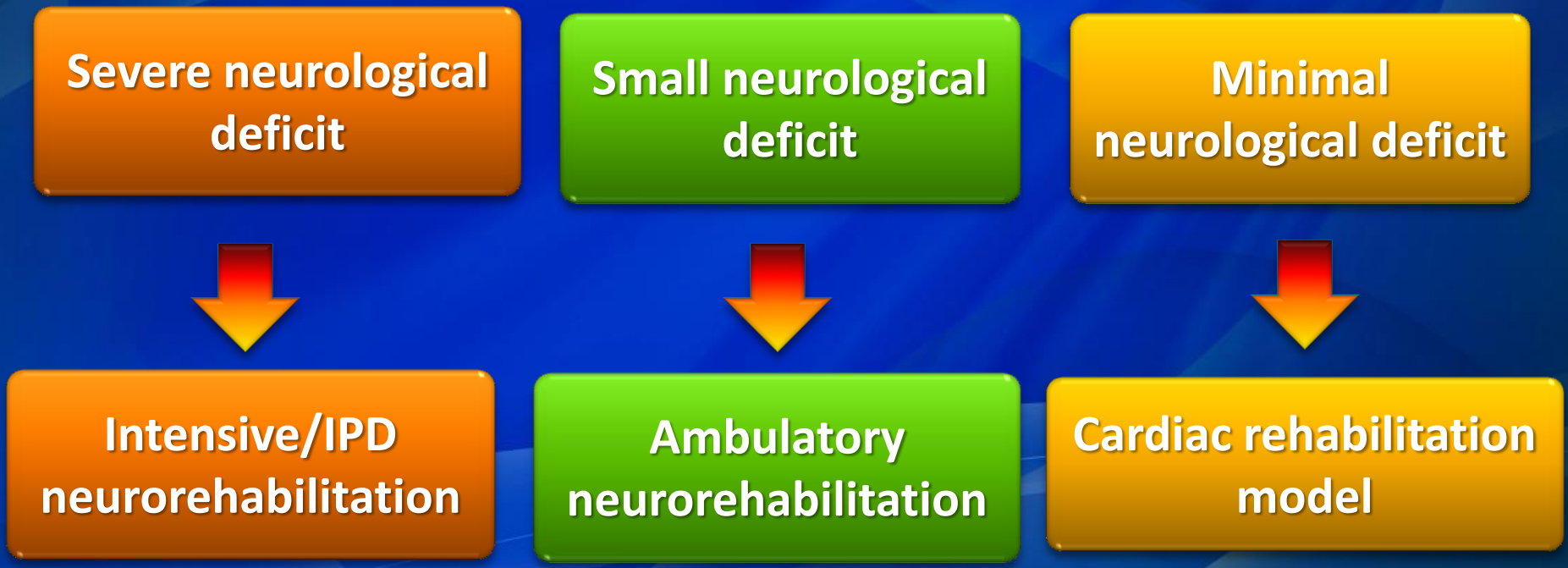
Patients after Hospitalisation from CVD



Goals of Physical Activity and Exercise Prescription for Stroke Survivors

- Prevent complications of prolonged inactivity
- Decrease recurrent stroke and cardiovascular events
- Increase aerobic fitness

Gordon NF et al. Physical activity and exercise recommendations for stroke survivors: an AHA scientific statement from the Council on Clinical Cardiology, Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention; the Council on Cardiovascular Nursing; the Council on Nutrition, Physical Activity, and Metabolism; and the Stroke Council. Circulation. 2004; **109**(16): 2031-41.

Cardiorespiratory Response to Acute Exercise in Stroke Survivors

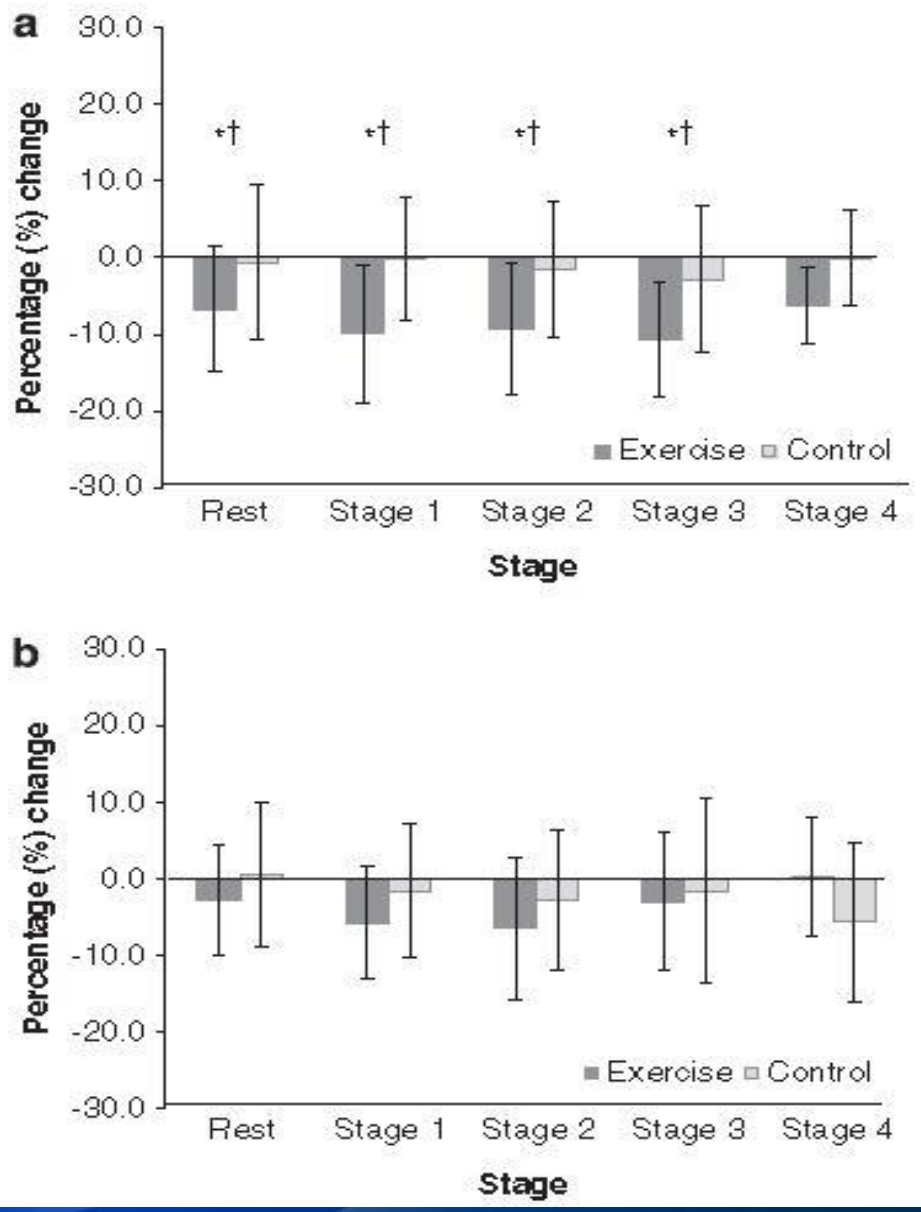
- Lower maximal workload, HR, BP responses than control subjects during progressive exercise testing due to volitional fatigue
- Peak oxygen uptake is reduced, compared with healthy subjects.

Effects of Exercise Training and Rehabilitation Programs in Stroke Survivors

- Evidence now suggests that the exercise trainability of stroke survivors may be comparable to that of their age matched, healthy counterparts.
- Aerobic capacity is lower in stroke than in cardiac patients, but similar post CR program improvement in VO2 peak and anaerobic threshold.

Mean (±SD) % change in SBP (a), and DBP (b)

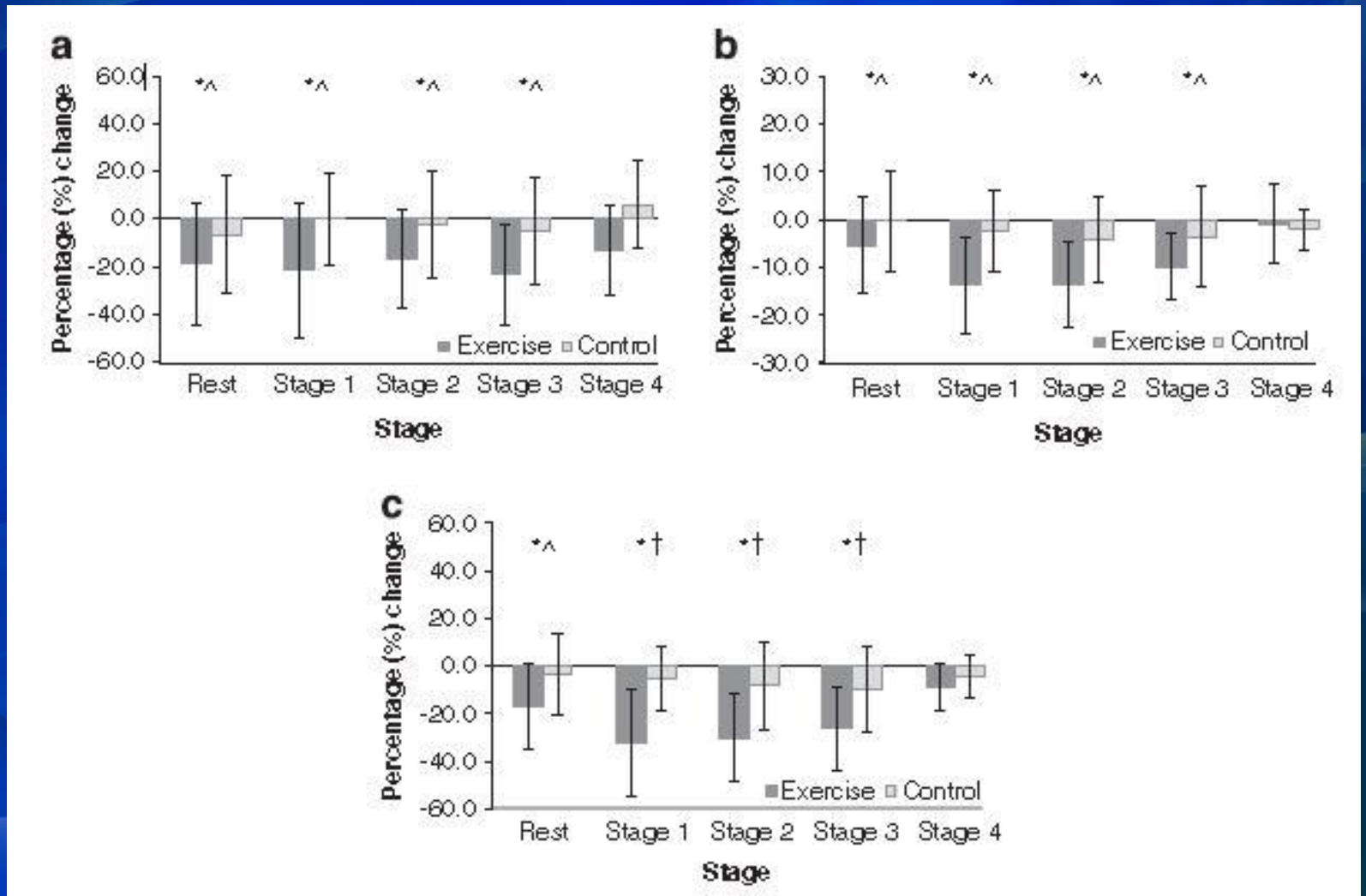
between baseline and post exercise 8 wk for exercise and control groups



Faulkner J, et al. The effect of a short-term exercise programme on haemodynamic adaptability; a randomised controlled trial with newly diagnosed transient ischaemic attack patients. J Hum Hypertens. 2013.

Mean (±SD) % change in Pulse Pressure (a), and HR (b) and Double Product (c)

baseline and post exercise 8 wk for exercise and control groups



- The large cohort of TIA/MNDS (Mild nondisabling stroke) patients to undergo systematic investigation in CCR
- Prospective cohort, no control group
- 88 attended exercise program, 80 patients completed CCR
- 64 attended the facility-based exercise option, with mean sessions attended 33.9 (4–60; SD, 10.9), or 67.8% of the standard 50 sessions.
- 24 enrolled in home-based exercise.

Stroke
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association | American Stroke Association

Comprehensive Cardiac Rehabilitation for Secondary Prevention After Transient Ischemic Attack or Mild Stroke: I: Feasibility and Risk Factors

Peter L. Prior, Vladimir Hachinski, Karen Unsworth, Richard Chan, Sharon Mytka, Christina O'Callaghan and Neville Suskin

Stroke. 2011;42:3207-3213; originally published online September 22, 2011;
doi: 10.1161/STROKEAHA.111.620187

Mean Intermediate Outcome: Exit VS Intake

Outcome	n	Target	Intake, Mean (SD)	Exit, Mean (SD)	Change, Units (%)	*P*
METs	82	≥7.00	6.49 (3.07)	8.53 (3.36)	2.04 (31.4)	<0.001*
TC, mmol/L	79	<4.00	4.41 (1.16)	4.11 (0.94)	−0.30 (−6.8)	0.008*
LDL, mmol/L	79	<2.00	2.33 (1.03)	2.09 (0.79)	−0.24 (−10.3)	0.015
HDL, mmol/L	79	>1.00	1.35 (0.41)	1.41 (0.39)	0.06 (4.4)	0.069
TC/HDL	79	<4.00	3.44 (0.98)	3.04 (0.71)	−0.40 (−11.6)	<0.001*
TG, mmol/L	79	<1.80	1.62 (1.15)	1.35 (0.67)	−0.27 (−16.5)	0.003*
FBG, mmol/L						
All	79	<6.00	5.96 (1.66)	5.95 (1.32)	−0.01 (−0.2)	0.95
Nondiabetic	59	<6.00	5.32 (0.74)	5.49 (0.79)	0.17 (3.2)	0.022*
Diabetic	20	<7.00	7.83 (2.16)	7.28 (1.64)	−0.55 (−7.0)	0.365
BP, mm Hg						
All SBP	82	<140	132.02 (13.80)	128.82 (13.33)	−3.21 (−2.4)	0.098
All DBP	82	<90	78.04 (9.35)	75.70 (8.50)	−2.34 (−3.0)	0.061
Nondiabetic SBP	61	<140	130.43 (13.45)	129.10 (13.93)	−1.33 (−1.0)	0.546
Nondiabetic DBP	61	<90	78.51 (9.78)	76.05 (8.75)	−2.46 (−3.1)	0.094
Diabetic SBP	21	<130	136.67 (14.07)	128.0 (11.66)	−8.67 (−6.3)	0.032
Diabetic DBP	21	<80	76.67 (8.03)	74.67 (7.83)	−2.00 (−2.7)	0.413
WC, cm	80	Males <102; females <88	100.25 (10.89)	97.81 (11.00)	−2.44 (−2.4)	<0.001*
BMI, kg/m^2	80	<25	29.57 (4.60)	29.03 (4.53)	−0.53 (−1.8)	0.003*
Body weight, kg	80	n/a	81.74 (13.81)	80.32 (13.77)	−1.43 (−1.7)	0.001*

METs indicates metabolic equivalents; TC, total cholesterol; LDL, low-density lipoprotein; HDL, high-density lipoprotein; TG, triglycerides; FBG, fasting blood glucose; BP, blood pressure; SBP, systolic blood pressure; DBP, diastolic blood pressure; WC, waist circumference; BMI, body mass index; SD, standard deviation.

*Statistically significant.

Physical Fitness Training for Stroke Patients

- **Objectives**
- To determine whether fitness training after stroke reduces death, dependence, and disability. The secondary aims were to determine the effects of training on physical fitness, mobility, physical function, quality of life, mood, and incidence of adverse events.
- **Selection criteria**
- Randomised trials comparing either cardiorespiratory training or resistance training, or both, with no intervention, a non-exercise intervention, or usual care in stroke survivors.
- 45 trials, 2188 participants, which comprised cardiorespiratory (22 trials, 995 participants), resistance (8 trials, 275 participants), and mixed training interventions (15 trials, 918 participants).

Saunders DH et al. Cochrane Database Syst Rev. 2013; **10**: CD003316.

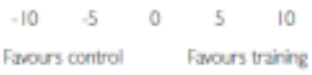
Analysis 1.8. Comparison 1 Cardiorespiratory training versus control - end of intervention, Outcome 8 Physical fitness - peak VO2 (ml/kg/min).

Review: Physical fitness training for stroke patients

Comparison: 1 Cardiorespiratory training versus control - end of intervention

Outcome: 8 Physical fitness - peak VO_2 (ml/kg/min)

Study or subgroup	Training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
1 During usual care							
da Cunha 2002	6	11.55 (2.76)	6	8.12 (2.3)		16.2 %	3.43 [0.56, 6.30]
Subtotal (95% CI)	**6**		**6**			**16.2 %**	**3.43 [0.56, 6.30]**
Heterogeneity: not applicable							
Test for overall effect: Z = 2.34 (P = 0.019)							
2 After usual care							
Potempa 1995	19	18.8 (4.79)	23	15.2 (4.32)		16.9 %	3.60 [0.82, 6.38]
Lennon 2008	23	12 (2.2)	23	11.1 (1.9)		41.9 %	0.90 [-0.29, 2.09]
Moore 2010	10	18 (5.4)	10	16 (7.1)		5.4 %	2.00 [-3.53, 7.53]
Ivey 2010	29	16.6 (5.64)	24	12.8 (24)		1.8 %	3.80 [-6.02, 13.62]
Ivey 2011	19	17.4 (6.99)	19	12.8 (4.5)		10.7 %	4.60 [0.86, 8.34]
Globas 2012	18	24.4 (6.6)	18	20.9 (7.8)		7.2 %	3.50 [-1.22, 8.22]
Subtotal (95% CI)	**118**		**117**			**83.8 %**	**2.32 [0.81, 3.84]**
Heterogeneity: Tau^2 = 0.88; Chi^2 = 6.59, df = 5 (P = 0.25); I^2 =24%							
Test for overall effect: Z = 3.00 (P = 0.0027)							
Total (95% CI)	**124**		**123**			**100.0 %**	**2.46 [1.12, 3.80]**
Heterogeneity: Tau^2 = 0.75; Chi^2 = 7.83, df = 6 (P = 0.25); I^2 =23%							
Test for overall effect: Z = 3.59 (P = 0.00033)							
Test for subgroup differences: Chi^2 = 0.44, df = 1 (P = 0.50), I^2 =0.0%							



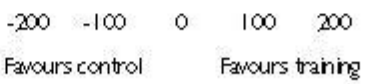
Analysis 1.14. Comparison 1 Cardiorespiratory training versus control - end of intervention, Outcome 14 Mobility - gait endurance (6-MWT metres).

Review: Physical fitness training for stroke patients

Comparison: 1 Cardiorespiratory training versus control - end of intervention

Outcome: 14 Mobility - gait endurance (6-MWT metres)

Study or subgroup	Training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
Globas 2012	18	332.1 (138)	18	265.9 (189)		2.6 %	66.20 [-41.91, 174.31]
Ivey 2011	19	242.62 (125.57)	19	197.21 (106.68)		5.4 %	45.41 [-28.68, 119.50]
Moore 2010	10	226 (130)	10	201 (134)		2.3 %	25.00 [-90.71, 140.71]
Mudge 2009	31	282 (117)	27	200 (99)		9.0 %	82.00 [26.41, 137.59]
Salbach 2004	44	249 (136)	47	209 (132)		9.2 %	40.00 [-15.13, 95.13]
Subtotal (95% CI)	**190**		**155**			**39.9 %**	**44.09 [17.20, 70.98]**
Heterogeneity: $Tau^2 = 0.0$; $Chi^2 = 3.65$, df = 6 (P = 0.72); $I^2 = 0.0\%$							
Test for overall effect: Z = 3.21 (P = 0.0013)							
Total (95% CI)	**251**		**217**			**100.0 %**	**26.99 [9.13, 44.84]**
Heterogeneity: $Tau^2 = 113.82$; $Chi^2 = 11.42$, df = 10 (P = 0.33); $I^2 = 12\%$							
Test for overall effect: Z = 2.96 (P = 0.0031)							
Test for subgroup differences: $Chi^2 = 2.06$, df = 1 (P = 0.15), $I^2 = 52\%$							



(1) Ada 2013 2 month training group with 50% of the control participants

(2) Ada 2013 4 month training group with 50% of the control participants

Main Results

Authors' conclusions

- The effects of training on death and dependence after stroke are unclear.
- Cardiorespiratory training reduces disability after stroke and this may be mediated by improved mobility and balance.
- There is sufficient evidence to incorporate cardiorespiratory and mixed training, involving walking, within post-stroke rehabilitation programs to improve the speed and tolerance of walking; improvement in balance may also occur.
- There is insufficient evidence to support the use of resistance training. Further well-designed trials are needed to determine the optimal content of the exercise prescription and identify long-term benefits.

Preexercise Evaluation

- It is recommended that stroke patients undergo graded exercise testing with ECG monitoring as part of a medical evaluation before beginning an exercise program.
- Careful medical history and physical examination to rule out contraindication of exercise
- Cognitive, communication evaluation
- If no exercise testing, start low intensity, similar to CAD patients

Gordon NF, et al. Physical activity and exercise recommendations for stroke survivors: an AHA scientific statement from the Council on Clinical Cardiology, Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention; the Council on Cardiovascular Nursing; the Council on Nutrition, Physical Activity, and Metabolism; and the Stroke Council. Circulation. 2004; **109**(16): 2031-41.

Exercise Recommendations for Stroke

TABLE 1. Summary of Exercise Programming Recommendations for Stroke Survivors*

Mode of Exercise	Major Goals	Intensity/Frequency/Duration
Aerobic		
• Large-muscle activities (eg, walking, treadmill, stationary cycle, combined arm-leg ergometry, arm ergometry, seated stepper)	• Increase independence in ADLs • Increase walking speed/efficiency • Improve tolerance for prolonged physical activity • Reduce risk of cardiovascular disease	• 40%–70% peak oxygen uptake; 40%–70% heart rate reserve; 50%–80% maximal heart rate; RPE 11–14 (6–20 scale) • 3–7 d/wk • 20–60 min/session (or multiple 10-min sessions)
Strength		
• Circuit training • Weight machines • Free weights • Isometric exercise	• Increase independence in ADLs	• 1–3 sets of 10–15 repetitions of 8–10 exercises involving the major muscle groups • 2–3 d/wk
Flexibility		
• Stretching	• Increase ROM of involved extremities • Prevent contractures	• 2–3 d/wk (before or after aerobic or strength training) • Hold each stretch for 10–30 seconds
Neuromuscular		
• Coordination and balance activities	• Improve level of safety during ADLs	• 2–3 d/wk (consider performing on same day as strength activities)

ADLs indicates activities of daily living; RPE, rating of perceived exertion; and ROM, range of motion.

*From references 67, 71, 73, 75, 94, 95, and 96.

Recommended intensity, frequency, and duration of exercise depend on each individual patient's level of fitness. Intermittent training sessions may be indicated during the initial weeks of rehabilitation.

Secondary Prevention after Stroke/TIA

- BP reduction
- Glucose control
- Cholesterol and statin therapy
- Lifestyle modification
  - Smoking cessation
  - Limited alcohol consumption
  - Weight control
  - **Regular aerobic physical activity**
  - Salt restriction, and a diet that is rich in fruits, vegetables, and low-fat dairy products
- Antiplatelet agents : aspirin/clopidrogel

Comprehensive Secondary Prevention Program

Physical training, Exercise prescription

Optimized medical treatment

Dietary management

Multidisciplinary Team Approach

Psychosocial support

Risk factor modification

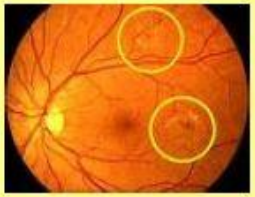
Smoking cessation

Future Direction
Modern Secondary Prevention Center

Ambulatory cardiac rehabilitation programme

- coronary heart disease

- diabetes



- PAD

- obesity

- ischemic stoke

modern secondary prevention center

Thank You