

## 04: PHYSICAL ACTIVITY AND CARDIOVASCULAR HEALTH

### Ischaemic heart disease

**Primary prevention:** There is a clear inverse relationship between physical activity and cardiovascular disease (CVD) which is dose responsive, with the largest benefits occurring when moving from no activity to low levels of activity. Additional benefits do occur with higher levels of activity. <sup>1</sup> The reduction in cardiovascular mortality is of the order of 20-35%, depending on the level of physical fitness.<sup>2</sup>

Mechanisms which contribute to this effect from exercise interventions are multiple:<sup>3-5</sup>

- Direct cardiovascular effects on the heart
  - Lower heart rate at rest and during exercise
  - Lower blood pressure at rest and during exercise
  - Lower oxygen demand
  - Increased plasma volume
  - Increased stroke volume
  - Increased myocardial oxygen supply
  - Increased myocardial contraction electrical stability
  - Improved vascular endothelial function
  - Decreased blood coagulability
  - Increased coronary blood flow, coronary collateral vessels and myocardial capillary density
- Metabolic effects
  - Increased high density lipids
  - Decreasing harmful low density cholesterol
  - Improved insulin sensitivity

**NICE guideline CG 181<sup>6</sup>** on Cardiovascular disease: risk assessment and reduction, including lipid modification recommend: Lifestyle modifications for the primary and secondary prevention of (CVD)

- Advise people at high risk of or with CVD to do the following every week:
  - At least 150 minutes of moderate intensity aerobic activity or
  - 75 minutes of vigorous intensity aerobic activity or a mixture of moderate and vigorous aerobic activity in line with national guidance for the general population
- Advise people to do muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms) in line with national guidance for the general population
- Encourage people who are unable to perform moderate-intensity physical activity because of comorbidity, medical conditions or personal circumstances to exercise at their maximum safe capacity
- Advice about physical activity should take into account the person's needs, preferences and circumstances. Agree goals and provide the person with written information about the benefits of activity and local opportunities to be active

**Secondary prevention:** in established heart disease, regular adapted exercise is required to reduce mortality, and habitual physical activity has been shown to reduce all-cause mortality by 25-30%.<sup>7</sup> The evidence of cardiac rehabilitation if it is used, is associated with a reduction in morbidity, cardiac mortality (26%), hospital readmissions (18%) and improved health-related quality of life.<sup>8,9</sup>

Despite this, 50% of adults in the UK having had a cardiac event do not attend cardiac rehabilitation exercise programmes.<sup>10</sup>

**NICE guideline CG172** on Myocardial infarction: cardiac rehabilitation and prevention of cardiovascular disease<sup>11</sup> recommend:

- Offer cardiac rehabilitation programmes designed to motivate people to attend and complete the programme. Explain the benefits of attending
- Patients should be advised to undertake regular physical activity sufficient to increase exercise capacity
- They should be advised to be physically active for 20-30 min a day to the point of breathlessness
- Patients not achieving this should be advised to increase their activity in a gradual step-by-step way, aiming to increase their exercise capacity
- They should start at a level that is comfortable, and increase the duration and intensity as they gain fitness
- The benefit of exercise may be enhanced by tailored advice from a suitable qualified professional

#### Contraindications

**Heart disease:** Acute myocardial infarction or unstable angina until stable for at least 5 days, dyspnoea at rest, pericarditis, myocarditis, endocarditis, symptomatic aortic stenosis.<sup>12, 13</sup>

#### Heart failure

Trials support the evidence of the beneficial effect of physical activity training in patients with stable heart failure in New York Heart Association (NYHA) class I, II and III. <sup>12, 14-16</sup>

Although there is no evidence of increased or decreased all-cause mortality in the short term (up to 12 months), the benefits of exercise have been shown by meta-analysis to:<sup>15, 17, 18</sup>

- Physiologically increases the the Maximum Oxygen Consumption (VO2 max)
- Functionally increase walking speed and tolerance
- Significantly reduce hospital admissions
- Improve quality of life.

In addition, there is an emerging trend towards reducing mortality in trials longer than 1 year.<sup>15</sup>

**NICE guideline NG106<sup>19</sup>** on chronic heart failure recommend:

- Offer people with heart failure a personalised, exercise-based cardiac rehabilitation programme, unless their condition is unstable.

#### Contraindications

Heart failure which is uncontrolled or NYHA class 1V <sup>14</sup>



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### Hypertension

The evidence supports an inverse relationship between physical activity and the incidence of hypertension, with inactive individuals who are less active and fit having a 30-50% greater risk of high blood pressure.<sup>20</sup> Apart from prevention, it is also effective in treatment with clinically relevant reductions in blood pressure.

- The acute effect of physical activity causes a decrease in blood pressure lasting 4-10 hours, but may last up to 22 hours; thus, daily activity may achieve clinically significant improvement<sup>2,21</sup>
- For a long-term effect, regular maintenance exercise is required
- The effect seems to be greatest in those with established hypertension
- Review data support the observation that physical activity training, with all forms of exercise, in hypertensive patients can show a reduction of 3-10 mmHg in systolic and 2-6 mmHg in diastolic blood pressure respectively<sup>22</sup>
- The main recommendation is for aerobic fitness training but dynamic resistance and isometric resistance at moderate intensity training is also beneficial<sup>22,23,24</sup>
- Reductions of this magnitude have important clinical implications
  - They are of a similar magnitude to conventional medication
  - A 2mmHg reduction in systolic blood pressure is associated with reductions of 10% and 7% in the risks of stroke and coronary heart disease respectively<sup>5</sup>

**NICE guideline CG127**<sup>26</sup> on the clinical management of primary hypertension in adults recommends that appropriate guidance and written or audio-visual materials to promote lifestyle changes are offered.

#### Contraindications

Blood pressures of a systolic >180 or diastolic >100 or higher should receive medication before regular physical activity<sup>13</sup>, with particular restrictions on heavy weights strength conditioning which can create particularly high pressures.<sup>24</sup>

#### Pharmacology v physical activity

There is plenty of strong randomized controlled trial data showing reductions in stroke risk in those taking antihypertensive medication.<sup>27</sup> There is less evidence that they significantly reduce the risk of all-cause mortality and myocardial infarction, with the exception of thiazide diuretics and angiotensin-converting enzyme inhibitors.<sup>28</sup> However, there is strong prospective cohort evidence that regular physical activity can reduce the risks of all-cause mortality and cardiovascular mortality.<sup>29</sup>

The comparison of the mortality and morbidity risk reduction between long-term antihypertensive medication and physical activity is made below and reinforces of the need for physical activity as a treatment in hypertensive patients.<sup>28</sup>

**Table 1:** Mortality and morbidity risk reductions with long-term anti-hypertensive medication and physical activity<sup>28</sup>

Intervention	All-cause mortality	Cardio-vascular mortality	Myocardial infarction
ACE-I *	10%	19%	NR
Thiazide *	9%	NR	22%
β-blocker *	6% (NS)	NR	8% (NS)
Ca2+ channel blockers *	-6% (NS)	NR	29% (NS)
Regular physical activity (self-reported) #	29%	30%	NR
Regular physical activity (fitness tests) #	41%	57%	NR

NS: Not significant; NR: Not reported. \*: Randomised control trials. #: Prospective cohort studies

### Lipids

Isolated hypercholesterolaemia and mixed dyslipidaemia with Low Density Lipoprotein (LDL) cholesterol, high triglycerides and High Density Lipoprotein (HDL) cholesterol are associated with an elevated risk of atherosclerosis.

Aerobic fitness training has been shown to be beneficial in reducing triglycerides<sup>30,31</sup> and elevating the protective HDL cholesterol,<sup>32</sup> with some effect in also lowering LDL cholesterol.<sup>30</sup>

Best results are achieved with regular daily moderate intensity aerobic exercise or vigorous exercise at slightly higher volumes of the present UK guidelines, expending 1200-2000 kcal per week which equates to 360 minutes moderate activity per week. This workload is

associated with a 5-8% increase in HDL cholesterol and a decrease in triglycerides of approximately 10%.<sup>34</sup> It should still supplement other interventions.

#### Peripheral Arterial Disease

Risk factors for peripheral arterial disease (PAD) are similar to cardiovascular disease and are an important marker of overall cardiovascular disease, with about 65% of patients with PAD also having clinically relevant cerebral or coronary artery disease.<sup>34</sup>

There is a strong consensus view that physical training in the form of walking is important in the management of peripheral arterial disease.<sup>34-37</sup> This is important as the disease responds poorly to pharmacotherapy.<sup>34</sup> Meta-analysis reviews conclude that physical

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exercise increased the walking distance to the onset of pain by 89.29 m and the maximum walking distance by 108.99 m.<sup>36</sup> Exercise should continue lifelong, with expected improvement in walking distance, higher quality of life and reduced pain. It may also slow the progression of further atherosclerotic disease.

**NICE guideline CG 147** on lower limb peripheral artery disease recommend:<sup>38</sup>

- Offering a supervised exercise programme to all patients with intermittent claudication.
- Consider providing a supervised exercise programme which involves:
  - 2 hours of supervised exercise a week for a three-month period
  - **Encouraging people to exercise to the point of maximal pain**

### Stroke

**Primary prevention:** the benefits of physical activity on the prevention of stroke are well documented.<sup>2, 12, 39, 40, 41</sup> Risk factors for stroke include hypertension, type 2 diabetes and hyperlipidaemia all of which are beneficially affected by physical activity. It is not surprising then that there is a clear inverse relationship between activity and risk of stroke. It is also clearly dose dependent and depending on the amount of activity, the effect is a 20 - 35% lowering of risk.<sup>42</sup>

**Secondary prevention:** the adverse vascular disease profile of many stroke patients remains after a first stroke and, physical activity should continue to be encouraged. Meta-analysis has shown exercise reduces mortality following a stroke and when compared head to head exercise interventions have also been shown to be more effective than anticoagulants and antiplatelet agents.<sup>43</sup>

**Treatment:** there is a huge variation in the degree of disability after a stroke. Once stabilised, an individualised aerobic fitness training programme can increase the endurance for day to day activities.

This can improve self-confidence of patients to take part in physical activity themselves.<sup>44</sup> Similarly, muscle strengthening of the lower limbs has been shown to increase function thereby improving quality of life.<sup>41</sup>

**NICE guideline CG 162** on stroke rehabilitation recommend:<sup>45</sup>

### Strength training:

- Consider strength training for people with muscle weakness after stroke
- Include progressive strength building through increasing repetitions of body weight activities (for example, sit-to-stand repetitions), weights (for example, progressive resistance exercise), or resistance exercise on machines such as stationary cycles

### Fitness training:

- Encourage people to participate in physical activity after stroke
- Cardiorespiratory and resistance training for people with stroke should be started by a physiotherapist
- Aim that the person continues the programme independently based on the physiotherapist's instructions
- Physiotherapists should supply any necessary information about interventions and adaptations so that where the person is using an exercise provider, the provider can ensure their programme is safe and tailored to their needs and goals.

### Walking therapies:

- Offer walking training to people after stroke who are able to walk, with or without assistance, to help them build endurance and move more quickly
- Consider treadmill training as one option of walking training for people after stroke including those who require body support.

### Key message:

Exercise is an essential part of any treatment plan for a patient with stable cardiovascular disease. It can improve their quality of life, enhance the management of their condition, reduce the risks of cardiac events and lead to fewer hospital admissions and drug prescriptions.

### Consider:

1. Auditing your ischaemic heart disease patients to see if they have been offered a cardiac rehabilitation or exercise referral scheme programme.
2. Auditing and monitoring your ischaemic heart disease and hypertensive patients to determine their present physical activity levels.
3. Advise on diagnosis and reviews of the importance of this lifestyle approach for their own well-being.

### Benefits to health professionals:

Reduced admissions, drug costs, tests, appointments and visits.

### Signposting to support resources such as those found at:

<https://www.bhf.org.uk/heart-health/preventing-heart-disease/staying-active>

<http://www.benefitfromactivity.org.uk/>

*Extracted from the Wales HEIW CPD module on physical activity [Motivate2Move](#). Now part of the RCGP Clinical Priority on physical activity and lifestyle. Review date Dec 2020*



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