Effect of long-term exercise on haemostasis and inflammation in patients with stable coronary artery disease

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Background

- Cardiovascular disease is the leading cause of death worldwide.
- Exercise training has a central role in the rehabilitation of patients with coronary artery disease (CAD)[1].
- Exercise training reduces the risk of cardiovascular death and hospital admissions, and improves quality of life[2].
- Haemostasis and inflammatory activity in the arterial wall are unfavourable altered in patients with CAD compared with healthy controls.
- The mechanisms explaining the beneficial effects of long-term exercise training in patients with CAD are unknown.

Objectives

Investigate if the beneficial effect of exercise training is partly explained by beneficial effects on haemostasis and inflammation in CAD patients.

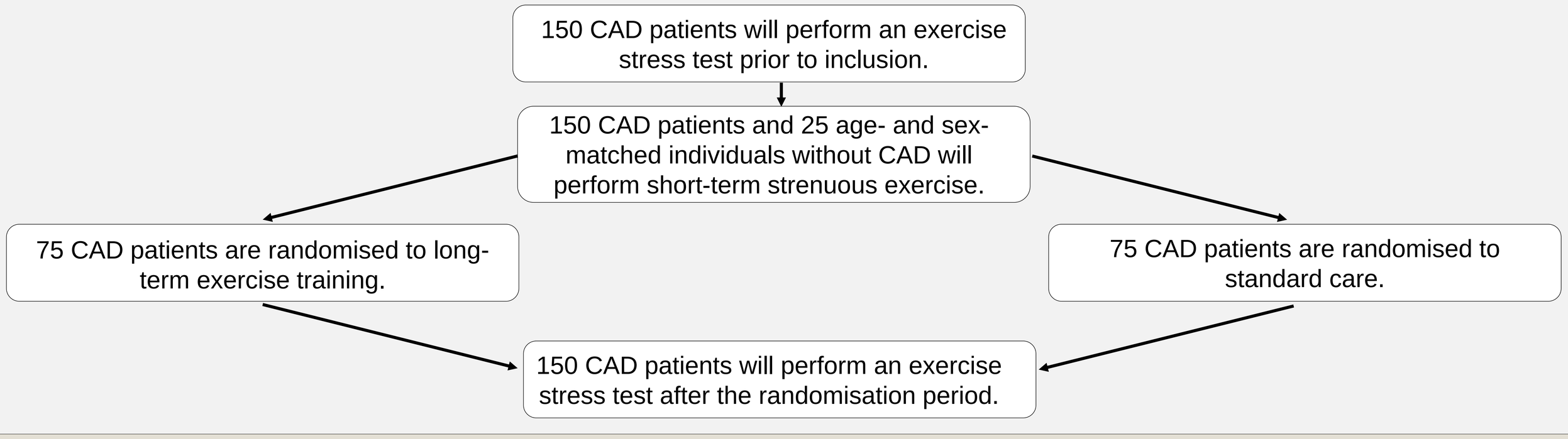
Patient selection

A prospective randomised controlled trial including 150 CAD patients.

Inclusion criteria:
- ≥ 18 years of age
- Angiographically verified CAD with stenosis of at least 50 % or
- Previous percutaneous coronary intervention (PCI)/coronary artery bypass graft (CABG) surgery

Exclusion criteria:
- Inability to perform strenuous exercise
- Anticoagulant treatment
- Acute coronary syndrome within the last 12 months
- Heart failure (ejection fraction <30% or NYHA >II)
- Implanted ICD or CRT
- Serious arrhythmia requiring hospitalisation within the last 6 months
- Severe valvular heart disease
- Chronic obstructive pulmonary disease GOLD IV

Exercise protocol



Methods

- Blood samples obtained in the short-term exercise study: at baseline before exercise, immediately after and 2 hours after exercise.
- Blood samples obtained in the long-term exercise study (both randomised groups): 1, 2, and 3 months after randomisation.
- We will measure:
  - Primary haemostasis: Platelet aggregation by Multiplate® Analyzer and platelet turnover by platelet count, platelet volume, and immature platelet count.
  - Secondary haemostasis: APTT, INR, Factor VIII, von Willebrand factor, and thrombin generation.
  - Fibrinolysis: clot-lysis-assay, fibrin d-dimer, tissue plasminogen activator (t-PA) and plasminogen activator inhibitor-1 (PAI-1).
  - Inflammatory markers: CRP, fibrinogen, IL-2, IL-4, IL-6, IL-8, IL-10, IL-12p70, IL-13, IL-1β, tumor necrosis factor alpha (TNF-α) and interferon gamma (INF-γ).

Outcomes

We will evaluate platelet turnover and aggregation, coagulation, fibrinolysis, and inflammatory markers before and after short- and long-term exercise, and the two randomised groups will be compared.

Perspectives

The present study will explore the effects of short- and long-term exercise on haemostasis and inflammation in CAD patients. Exploring the mechanisms behind the beneficial effects of exercise in CAD patients may increase the priority of exercise in patients with CAD and eventually optimize therapy, quality of life and prognosis in these patients.

Funding

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References:
1. Smith SC, Jr., Benjamin EJ, Bonow RO, et al. AHA/ACCF secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation endorsed by the World Heart Federation and the Preventive Cardiovascular Nurses Association. J Am Coll Cardiol. 2011;58(23):2432-2446.
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