

INTRODUCTION

Rationale

- Only 15–25% of patients achieve a significant clinical response, and more than two-thirds experience irAEs.
- Enhancing the proliferation, activation, and tumor infiltration of immune cells is a promising strategy to overcome immunotherapy resistance.
- Exercise improves systemic immunity through various mechanisms; however, exercise trials during immunotherapy are crucially lacking (Figure 1).

Objectives

- To examine the effects of 24-week exercise training in patients with NSCLC receiving immunotherapy on: systemic immune function (NLR; primary); cardiopulmonary fitness, physical function, and patient-reported outcomes (secondary); irAEs and immunotherapy response (exploratory).

Figure 1. Potential Mechanisms of Exercise in Immunotherapy

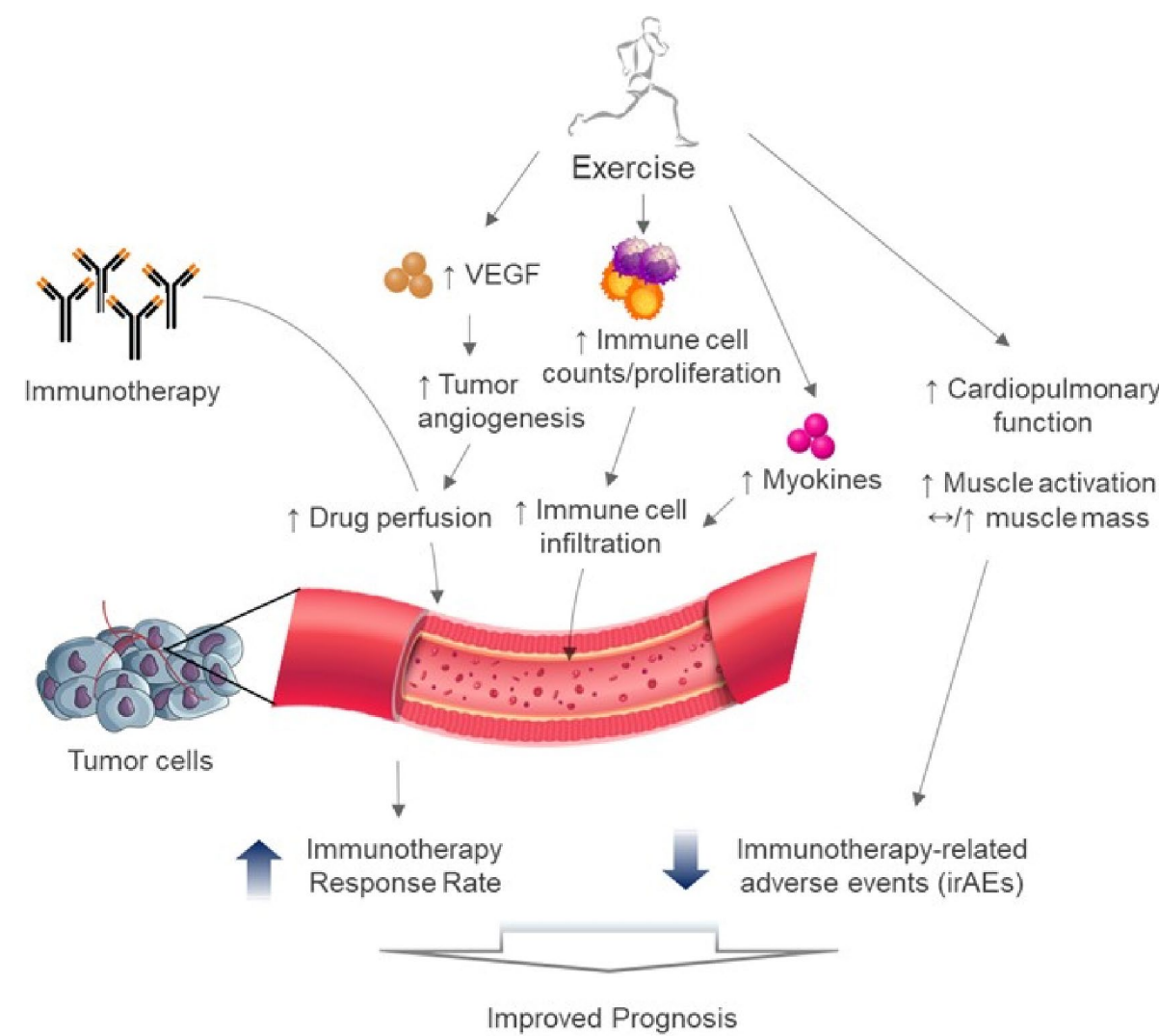
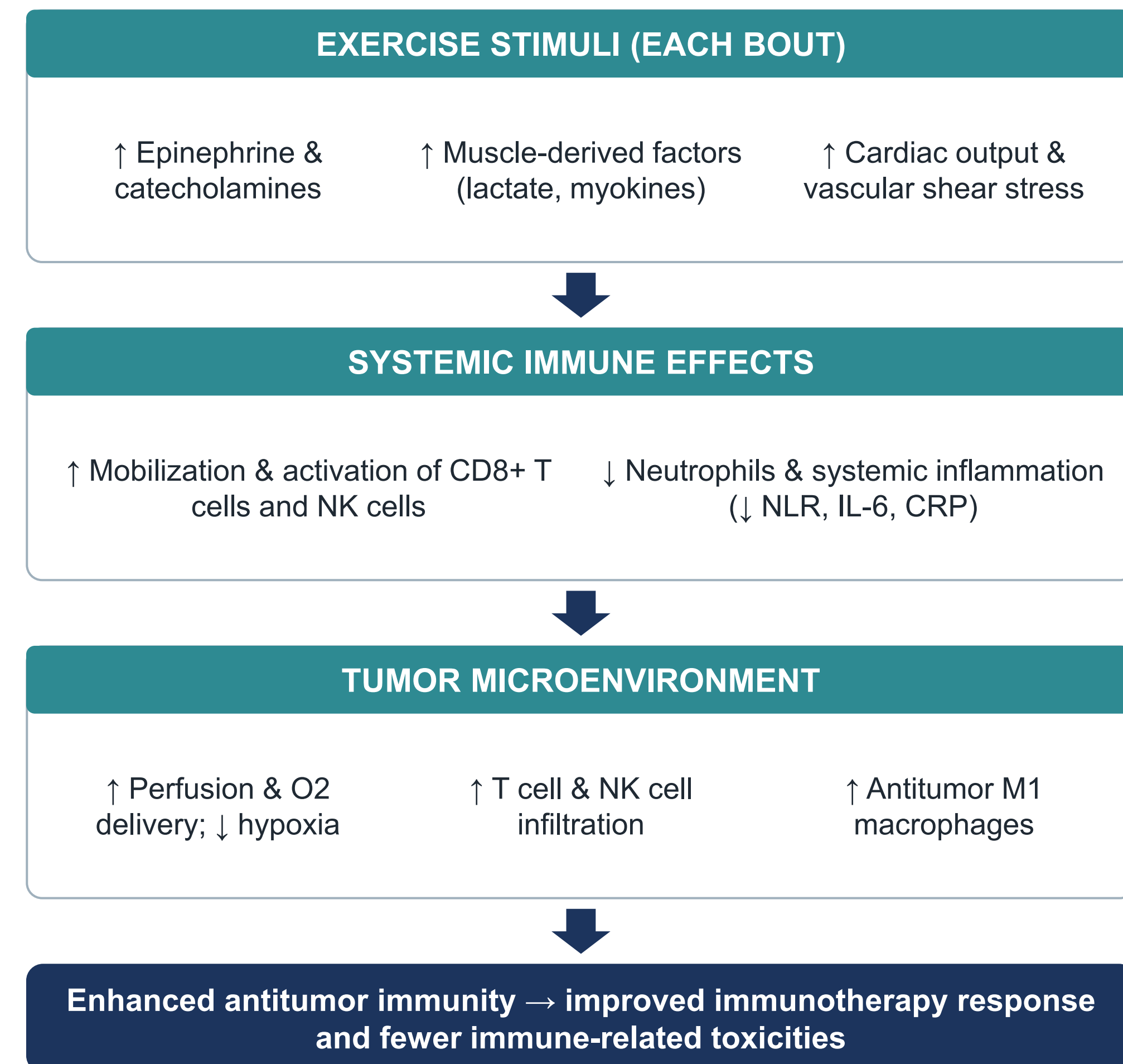


Figure 2. Mechanistic Rationale: How Exercise May Enhance Immunotherapy



METHODS

Design

- Phase II, two-arm randomized controlled trial at Fred Hutchinson Cancer Center (Seattle, WA); target N = 100 (Figure 2).
- ClinicalTrials.gov: NCT06983899.

Key Eligibility Criteria

- Histologically diagnosed NSCLC; age ≥18 years.
- On immunotherapy for ≥1 month with ≥24 weeks planned; ECOG 0–2; <150 min/week of moderate-to-vigorous exercise.

Intervention

- Exercise:** 24-week progressive home-based aerobic interval training on a provided stationary bike, supervised 1:1 virtually (Figure 3).
- Attention control:** general healthy lifestyle guidebook and compensation equivalent to the exercise equipment value.

Endpoints

- Primary: change in neutrophil-lymphocyte ratio (NLR) from baseline to Week 26; secondary endpoints in Figure 4.
- Assessments (baseline & Week 26): blood draw, DEXA, pulmonary function, cardiopulmonary exercise testing, physical function tests, and questionnaires.

Statistical Analysis

- Intention-to-treat; ANCOVA adjusting for baseline value, cancer stage, comorbidities, and immunotherapy agent type.

SIGNIFICANCE

Why BOOST Matters

- Among the first randomized trials to test exercise as a non-pharmacological strategy to enhance immune function during immunotherapy in NSCLC (Figure 5).
- Fully home-based, virtually supervised model designed for scalability and equitable access.

What the Trial Will Provide

- Evidence on whether exercise can improve systemic immune function and mitigate treatment-related toxicities during immunotherapy.
- A biobank of serial PBMC and plasma samples enabling mechanistic exercise–immunology analyses.

Future Directions

- Findings will inform a definitive Phase III trial of exercise combined with immunotherapy in lung cancer patients.

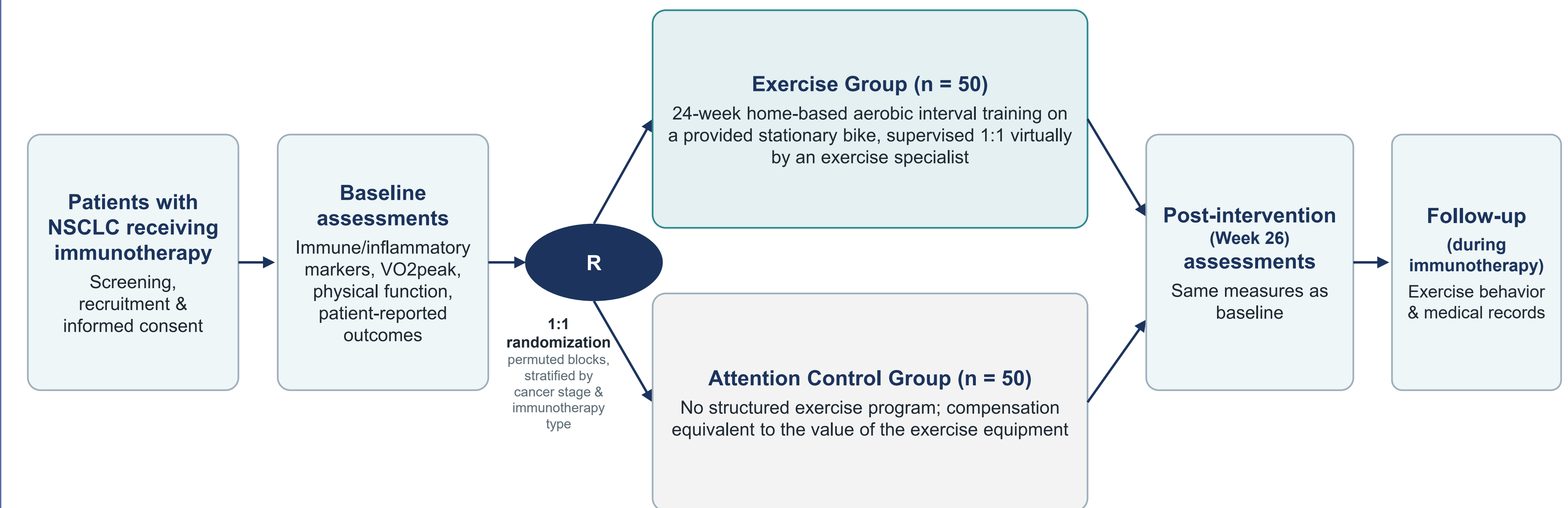
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STUDY DESIGN & INTERVENTION

Figure 3. BOOST Trial Study Schema



Mid-point assessment (Week 13, remote): exercise behavior and immunotherapy-related adverse events (irAEs). Both groups receive a general healthy lifestyle guidebook.

Figure 4. Macro Periodization of Aerobic Interval Training Prescription

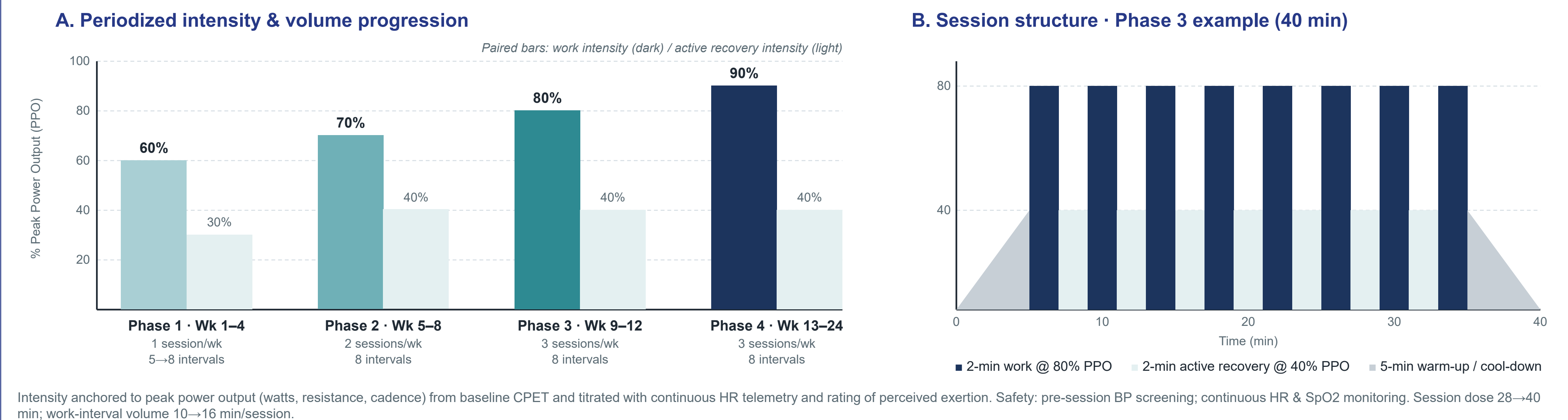


Figure 5. Study Endpoints

