

# The importance of cardiopulmonary exercise test in determining training zones in cardiac rehabilitation and the time course of cardiopulmonary adaptations to high-intensity interval training training in ST-elevation myocardial infarction and non-ST-elevation myocardial infarction patients

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**Introduction:** Functional capacity, also termed maximal oxygen consumption ( $VO_{2max}$ ), or aerobic fitness, has been shown to be an independent risk factor for all-cause and cardiovascular disease mortality. The cardiopulmonary exercise test (CPET) is the golden standard for assessing the functional capacity of the patient and it is becoming the integral part of the growing number of recommendations and guidelines.<sup>1,2</sup> While high-intensity interval training (HIIT) would seem to be more effective than other types of training in improving cardiac performance and function<sup>3</sup>, the time course of functional adaptations to this training in ST-elevation myocardial infarction and non-ST-elevation myocardial infarction patients is still unknown. Therefore, the aim was to assess the progressive cardiopulmonary improvements throughout the process of 12 weeks of individually-prescribed HIIT training.

**Patients and Methods:** 16 STEMI and NSTEMI patients (age  $58 \pm 10$  years;  $VO_{2max}$   $19 \pm 5.3$  ml  $min^{-1}$   $kg^{-1}$ ) underwent 12 weeks of supervised cycling HIIT (4x4 min at 85-95% of HRmax) 3 times per week. Functional capacity ( $VO_{2max}$ ) and all cardiopulmonary parameters were assessed by means of the incremental cardiopulmonary test to exhaustion (CPET) every 4 throughout the training program. Individual training zones were prescribed and adjusted according to the parameters obtained in CPET.

**Results:** Peak  $VO_{2}$  increased significantly by 8% ( $19.2 \pm 5.1$  vs  $20.8 \pm 5.0$  ml  $min^{-1}$   $kg^{-1}$ ,  $P=.002$ ) across the group already after 4 weeks of training. In the same timepoint, anaerobic threshold (AT) and respiratory compensation point (RCP) significantly improved by 15% ( $12.4 \pm 3.1$  vs  $14.3 \pm 3.0$  ml  $min^{-1}$   $kg^{-1}$ ,  $P<.001$ ) and 19% ( $15.5 \pm 4.2$  vs  $18.6 \pm 4.3$  ml  $min^{-1}$   $kg^{-1}$ ,  $P<.001$ ), respectively. The absolute improvement in  $VO_{2peak}$  at the end of the 12-week training was 32% ( $19.2 \pm 5.1$  vs  $25.5 \pm 4.9$  ml  $min^{-1}$   $kg^{-1}$ ,  $P<.001$ )

**Conclusion:** 4 weeks of HIIT are enough to induce significant functional adaptations like  $VO_{2max}$ ,  $VO_{2}$  at AT and RCP in STEMI and NSTEMI patients provided that patients are trained at the same in terms of volume, but at individually tailored intensity. Moreover, across 12 weeks of training, HIIT has proven to be effective training method in increasing functional capacity as well as exercise tolerance in STEMI and NSTEMI patients.

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## LITERATURE

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