Beta-adrenergic blockade effects on aerobic capacity and chronotropic response

Kevin Forton, Michel Lamotte, Alexis Gillet, Vitalie Faoro

European Respiratory Journal 2021 58: PA412; DOI: 10.1183/13993003.congress-2021.PA412

Cardio-pulmonary exercise testing (CPET) and beta-blockers are frequently prescribed in thoracic pre-surgery and pulmonary rehabilitation. However, the effects of these drugs on aerobic capacity (VO₂max) and cardio-vascular variables are still under-understood, possibly leading to incomplete CPET interpretation.

Twenty-one young healthy adults repeated three cyclo-ergometer CPET one week apart. CPET were performed 2h after a random, double blind, cross over single dose intake of 2.5 mg or 5 mg of a cardio-selective β -blocker (bisoprolol) or placebo. Gaz exchange, heart rate (HR), blood pressure (BP) were measured and oxygen pulse were calculated as VO₂/HR.

CPET maximal performance remained unaffected by any treatment, with a maximal respiratory exchange ratio above 1.15 in all tests and identical maximal workload or VO₂. Dose-dependent effects of beta-blockers were observable on resting and maximal HR and BP associated with decreased chronotropic response, assessed by the HR/VO₂ slope.

	Placebo	2,5mg	5 mg
HR @ Max (bpm)	183 $\pm$ 8	160 $\pm$ 11***	151 $\pm$ 12***\$\$
Mean BP @ Max (mmHg)	119 $\pm$ 11	111 $\pm$ 13*	102 $\pm$ 12***\$
VE/VCO ₂ @ VT1	28 $\pm$ 3	28 $\pm$ 4	28 $\pm$ 4
HR/VO ₂ slope (bpm/ml/min/kg)	2,9 $\pm$ 0,4	2,4 $\pm$ 0,5***	2,3 $\pm$ 0,4***
VO ₂ max (mL/kg/min)	39 $\pm$ 5	39 $\pm$ 5	37 $\pm$ 5
O ₂ Pulse Max (ml/b)	15,0 $\pm$ 3,2	17,1 $\pm$ 3,7*	17,3 $\pm$ 3,7*

* Placebo vs both other groups, \$ inter B-blocker groups. *:p<0,05; **:p<0,01; ***:p<0,001;
VE:ventilation; VCO₂:carbon dioxide

The present results suggest that a single dose of beta-blockers unaffected exercise ventilation and aerobic capacity with higher O₂ Pulse compensating lower HR in healthy subjects. A lower chronotropic response or HR/VO₂ slope should be taken into account during CPET interpretation.