


Effect of physical training on myocardial ventricular heterogeneity. Role of parasympathetic postganglionic neurons

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I. Introduction. Physical training could prevent against cardiac sudden death, which is produced in the most cases by ventricular fibrillation (VF). Although the underlying exact mechanisms are not completely known, some authors have involved the heterogeneity and refractoriness changes produced by training. On the other hand, the direct participation of parasympathetic postganglionic neurons is not well-known either. We hypothesized that physical training decreases myocardial ventricular heterogeneity and that parasympathetic postganglionic neurons are implicated in the training-induced changes.

II. Methods. Eleven NZW rabbits were submitted to a six-week endurance training program and eleven controls were not trained. After training, rabbits were anaesthetized (ketamine, 10 mg/kg i.v.), killed and their hearts excised, isolated and perfused in a Langendorff system. A pacing electrode and a plaque with 240 recording electrodes were positioned on the left ventricle. VF was induced, without interrupting perfusion, by pacing at increasing frequencies (2Hz·min⁻¹) and maintained during 330 s. Then, VF was reverted. After atropine administration (1 μM), VF was again induced and maintained during 330 s. Recordings were processed in consecutive segments of 4 s and the spectrum of each segment and electrode was obtained. Determinations: a) Dominant frequency (DF) of VF by spectral analysis and b) the spectrum normalized energy (NE), defined as the spectral energy in a window centered on the DF (FD ± 1Hz) and normalized by the spectrum energy in the band of interest (5-35Hz). A two-way ANOVA with repeated measures was applied for statistical analysis

III. Results. Results are shown in the table.

		0 s	30 s	60 s	90 s	120 s	150 s	180 s	240 s	300 s
Control (n=10)	DF	20,7±4	18,8±4	18,1±4	17,1±3	16,8±4	16,9±4	16,4±4	16±4	15,2±3
	NE	0,34±0,1	0,31±0,1	0,32±0,1	0,34±0,1	0,34±0,1	0,36±0,1	0,35±0,1	0,38±0,1	0,37±0,1
Trained (n=8)	DF	16,5±3*	15,2±2*	14,4±2*	13,9±2*	13,5±1*	13,6±1*	13,3±2*	13,4±2	13,6±2
	NE	0,37±0,1*	0,41±0,1*	0,40±0,1*	0,40±0,1	0,41±0,1*	0,42±0,1*	0,40±0,1	0,42±0,1	0,42±0,1

DF and NE values at different times of VF. *p<0,05 respect to control values at the same moment of the experiment.

DF of VF was lower in the trained group and NE was higher in the trained group. Although data are not showed, no differences were observed after parasympathetic blockade in the control group. However, atropine decreased NE in the trained group.

IV. Conclusions. physical training decreases ventricular heterogeneity. Parasympathetic postganglionic neurons seem to be implicated in part of these changes.

Palabras clave (máximo 3): sudden death, physical training, electrophysiological heterogeneity.