

スポーツの場における喫煙の影響に関する研究
—作業前後の喫煙がパフォーマンスや自律神経に及ぼす影響—

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Effect of Smoking on Performance in Sports
— Effects of Smoking before and after Exercise on Performance
and the Autonomic Nerve System —

by

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ABSTRACT

The purpose of this study was to investigate the acute effects of cigarette smoking on heart rate, vagal-cardiac nerve activity at rest and during a short isometric work (Experiment 1) and peak anaerobic power test of riding a bicycle (Experiment 2), and

of 8-19 days of abstinence from cigarette on the cardiorespiratory capacity (\dot{V}_{O_2} , \dot{V}_E , HR, LA and vagal-cardiac nerve activity during the submaximal and maximal running on a treadmill and at rest (Experiment 3), in healthy adult men. Measurements of vagal-cardiac nerve activity were made at rest and during exercise by use of the technique of spectral analysis of heart rate variability. Smoking provoked the following changes; Heart rate at rest increased 1-22 beats/min. After bicycling peak anaerobic power test, heart rate increasing before cigarette smoking were due to decreasing the level of the vagal-cardiac nerve activity, and heart rate increasing after cigarette smoking were reversely due to increasing the level of the sympathetic nerve activity. Abstinence from cigarette smoking provoked the increase of vagal-cardiac nerve activity of levels and consequently decrease of heart rate during and after treadmill running at almost all stages. However, \dot{V}_{O_2} , \dot{V}_E and LA during submaximal and maximal running were different from subject.

So we would like to suggest that smoking acutely increased the heart rate at rest, as a result of reducing baseline level of vagal-cardiac nerve activity. After the shortest bicycling anaerobic power test, heart rate increased as a result of reducing baseline of vagal-cardiac nerve activity before smoking, and heart rate increasing after smoking were reversely due to increasing sympathetic nerve activity. The abstinence (8-19 days) from smoking reduced the heart rate and increased the vagal-cardiac nerve activity during maximal and submaximal exercise and at rest.

要 旨

本研究は、喫煙習慣（約20本/日）のある健康な男子を対象に、喫煙による安静時や等尺性の短時間の運動中（実験Ⅰ）や自転車駆動による最大無酸素性パワー作業中・後（実験Ⅱ）あるいは喫煙中止による最大下及び最大のトレッドミル走後（実験Ⅲ）の心拍数や副交感神経の活動水準への影響について明かにすることを目的とした。副交感神経の活動水準は心拍の周波数分析によって測定した。その結果、喫煙は心拍数を1～22拍/分高め、最大パワーテストによる心拍数の高まりは喫煙前では副交感神経の活動水準の低下に、喫煙後では逆に交感神経の活動水準の高まりによる。また8～19日の喫煙中止は安静時や

最大下のランニング中の心拍数を低下させ、副交感神経の活動水準を高めるように作用する。しかし、最大及び最大下作業中の \dot{V}_{O_2} 、 \dot{V}_E 、LAへの影響は個人によって異なった。本研究結果から喫煙によって副交感神経は抑制を受け心拍数を高めるが、喫煙後の短時間の無酸素的的最大パワーテストでは、交感神経の活動水準の高まりによって心拍数は高まる。また、喫煙の中止は最大あるいは最大下作業及び安静時において、逆に副交感神経を興奮させ、心拍数を低下させることが明らかとなった。