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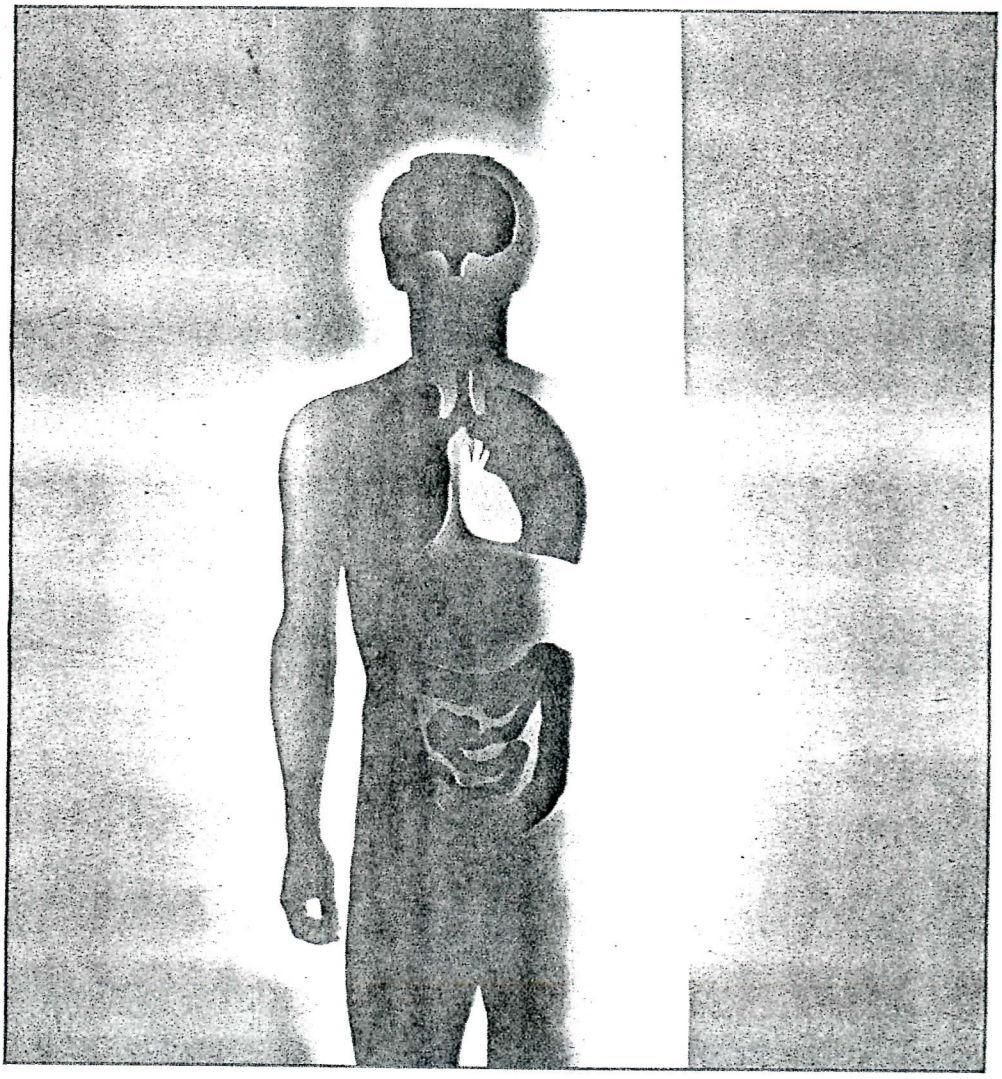

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Heart rate variability and myocardial infarction: acute and subacute phase.

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INTRODUCTION

Heart rate variability (HRV) has been recognized as an important independent prognostic factor after an acute myocardial infarction: survivors of acute myocardial infarction who show low heart rate variability at the time of discharge have a higher mortality rate [1].

A sympatho-vagal unbalance with a relative prevalent sympathetic hypertonus may represent the trigger of the late unfavorable clinical outcome. Despite remarkable advances in the treatment of the acute phase of myocardial infarction [2] a substantial early mortality is present: to quantify the prevalence of the sympathetic tone in the early hours might be useful to appropriately assess the early risk stratification of the patients and to better define specific therapeutical strategies. In patients with myocardial infarction, heart rate variability has been usually explored before discharge [3,4] and late after [5].

To define the time course of autonomic tone during the first week of a myocardial infarction, 24-h heart rate variability was assessed in the acute (less than 48 hours since the onset of symptoms) and subacute phase (before discharge, at least 7 days after the acute event).

PATIENTS AND METHODS

A multicenter study on psycho-neurological risk factors in acute myocardial infarction was conducted betwen January 1991 and December 1993.

For this preliminary work, a group of 215 patients was selected out of 451 enrolled.

To be included, patients had a diagnosis of acute myocardial infarction based on electrocardiographic and enzymatic criteria.

All patients admitted to the Coronary Care Unit within 24 hours from the onset of chest pain, who had sinus rhythm without pacemaker interference at the time of the study and were less than 65 years were eligible.

The site of infarction was based on electrocardiographic criteria. All patients underwent two recordings/ the first one within 48 hours from the onset of symptoms, the second one at discharge (7-10 days after).

The 24-hour recordings were digitized at 250 samples per second. and processed to extract their features. The following time domain HRV indices were computed (and averaged on the 24h period): mean 24-h RR interval, standard deviation of all normal RR (SD), pNN50, r-MSSD, the mean of the 3 minutes RR standard deviation (SDRR), the standard deviation of the mean of the RR for all 3-minute segments (SDNN).

Heart rate power spectrum analysis was computed by using an autoregressive method (model order 12) [6].

The following power spectral indices were computed : RR total power, very low frequency (VLF, .003-.03 Hz), low (LF, .03-.15 Hz), and high frequency (HF, .15-.4 Hz) power, as well as LF/HF ratio.

Student's t test for paired observations was used. A 'p' value < .05 was considered significant.

RESULTS

The clinical characteristics of the population are summarized in Table I.

Table I. Characteristics of the patients

		N°	%
Age (M±SD) yrs	55±8		
Sex (Male/Female)		192/23	89/11
Type of MI	*Q*	172	80
	non Q	43	20
Site of MI	*Anterior*	78	36
	Lateral	44	20
	Inferior	93	43

Minor arrhythmias were present in both recordings (in 15 patients in the first and in 17 in the second one). In a larger number of patients (65 vs 45; NS) major arrhythmias (Lown class >2) were present with a higher incidence in the first recording.

Table II. Time domain indices
Values are showed as mean ± SD; A:<48hrs, D: at discharge; *: p<.01.

	A		D
RR (msec)	862±123	*	912±131
SD (msec)	78±28	*	109±30
pNN50 (%)	4±6	*	5±6
r-MSSD (msec)	16±7	*	19±7
SDRR (msec)	40±16	*	46±15
SDNN (msec)	66±38	*	96±30

No changes in the incidence of ischemic episodes were detectable in the two recordings.

Time and frequency domain measures showed significant changes between the acute and subacute phase, as reported in Table II and III.

Table III Power spectral analysis results
Values are showed as mean ± SD; A:<48hrs, D: at discharge; *: p<.01.

		A		D
LF power	($msec^2$)	354±358	*	495±403
HF power	($msec^2$)	217±268	*	296±397
LF/HF		2.92±3.65	ns	2.73±2.59

DISCUSSION

These results indicate that long and short term heart rate variability indices are markedly low in the acute phase of myocardial infarction.

A recovery of the sympatho-vagal balance directed to the heart, possibly due to an increase in vagal tone, when present, seems to start early after the myocardial infarction.

Apparently, there is no correlation between the early autonomic dysfunction and the prevalence of arrhythmic and ischemic complications. The recordings at discharge show a pattern of changes in all parameters of heart rate variability: an improvement of all time domain indices, indicating a restoration of both circadian rhythm and beat-to-beat heart rate variability.

Moreover, the changes of the spectral component seem to indicate a trend to amelioration of respiratory sinus arrhythmia and baroreflex markers, whose impairment has been described in the first week after an acute event [7,8].

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