

## Continuous 24 Hour Electrocardiographic Study of Geriatric Patients without Cardio-Pulmonary Disease

(arrhythmia/continuous electrocardiography/geriatrics)

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Continuous 24 hour electrocardiography was recorded in 10 geriatric patients without cardio-pulmonary diseases. Atrial premature beats were observed in all and the frequency ranged from 10 to 306 beats per 24 hours. Ventricular premature beats were evident in three and ranged from 3 to 98 beats per 24 hours. Transient sinus tachycardia was seen in two, and in one, repetitive upper atrioventricular junctional premature beats were also evident.

As for variation of cardiac cycle in diurnal and nocturnal periods, heart rate were significantly decreased at night, but the frequency of premature beats remained unchanged. There was no relationship between occurrence of arrhythmia and subjective symptoms described on a hourly event card, and such included precordial oppressive sensation, chest pain and palpitation.

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Since the continuous long-term electrocardiography was reported by Holter (1), such has been utilized to evaluate disorders in various arrhythmias and to grade anginal pain in the case of coronary heart disease (2–4).

Evolutionary improvements in recorders have included smaller size, greater carrying convenience for the patients, longer recording and multiple channel capabilities.

Various arrhythmias occur in patients with an increase in the occurrences of coronary heart disease due to prolongation of the life and the introduction of western diets.

However, arrhythmia such as supraventricular and ventricular premature beats also occur in patients without any apparent cardio-pulmonary disease.

The present investigation was an attempt to assess the frequency, pattern of premature beats and changes of cardiac cycle in geriatric patients without cardio-pulmonary diseases.

### MATERIALS AND METHODS

Twenty-four long-term electrocardiographic recordings using one channel Fukuda SM-24 recorder were obtained from 10 patients without clinical

TABLE I. *Clinical Data on Subjects without Cardio-pulmonary Diseases*

No.	Patient	Sex	Age	Clinical diagnosis	Frequency of premature beats (24 hours)
1.	K.Y.	M	62	Chronic hepatitis	13
2.	F.K.	M	67	Ventral hernia	49
3.	T.I.	M	73	Rheumatoid arthritis	35
4.	F.K.	M	64	Diabetes mellitus	10
5.	S.H.	M	73	Diabetes mellitus	79
6.	S.Y.	M	66	Chronic hepatitis	49
7.	H.I.	M	73	Diabetes mellitus	306
8.	T.H.	M	62	Cerebral arteriosclerosis	190
9.	F.A.	M	67	Liver cirrhosis	266
10.	T.I.	M	63	Gastric ulcer	96

evidence of cardio-pulmonary disease. The clinical diagnoses are listed in Table I. Ages of these male patients ranged from 62–73 yr with a mean of 67.

They had been admitted in Shimane Medical University Hospital or Izumo Shimin Hospital and various diagnoses were made (Table I).

One lead was positioned on the manubrium sterni and other on the fifth left intercostal space at the left anterior axillary line.

An hourly event card was provided for checking of activities such as eating, smoking, exercise, bowel movements, the occurrence and type of symptoms and drug ingestion.

Analysis of the 24-hr continuous electrocardiography records was accomplished with a high speed play back analyzer running at 60 times real time, and a low speed paper recorder using a Fukuda SCM-240 Electrocardioscanner.

The technician recorded cumulatively the frequency of premature beats per 30 minutes on a trend record which simultaneously charted the heart rate.

Visual techniques included using a R wave triggered oscilloscopic display and enabled detection of premature beats. The patterns of premature beats were classified into atrial or ventricular premature beats.

A slow speed display and print-out permitted clarification of questionable high speed observations.

The sampling interval consisted of a one minute print-out every 30 minutes.

The printed record of all the arrhythmias was checked by two physicians. These data were plotted in a graphic design such as is shown in Fig. 1.

In addition, arrhythmias and heart rate during the diurnal period (a. m. 6:00–p. m. 6:00) and during the nocturnal (p. m. 6:00–a. m. 6:00) were also observed.

## RESULTS

In 10 patients there were premature beats during at least one 24-hr monitoring session and the frequency ranged from 10 to 306 beats per 24 hours.

No.9 F.A. 63,M.

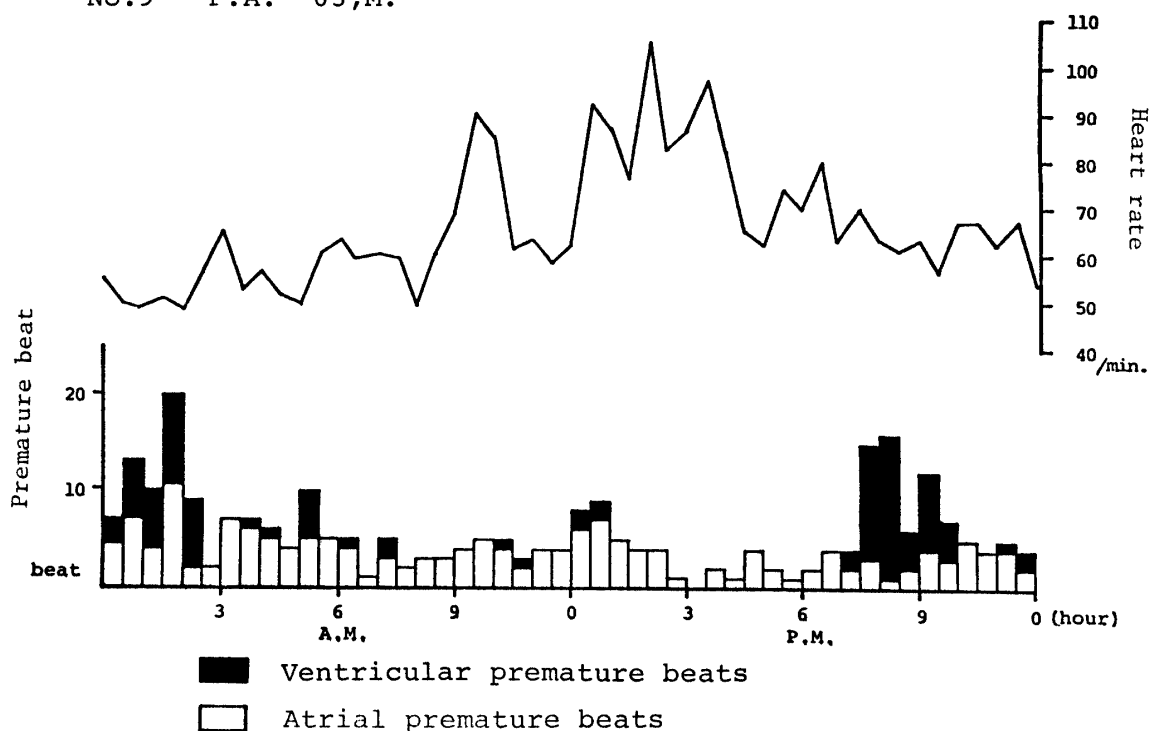


Fig. 1. The extent of variability in the mean 30 min atrial and ventricular premature beats and heart rate frequency on 24-hr monitoring in one typical patient (No. 9. F. A. with liver cirrhosis).

No.7 H.I. 73,M. May 2 '80

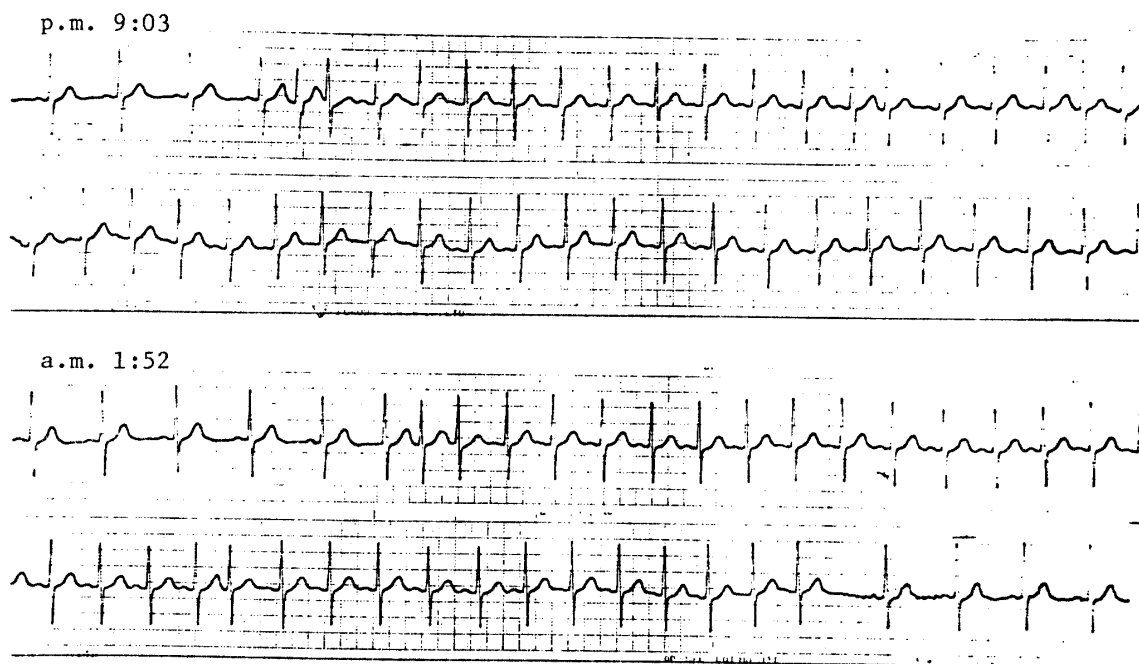
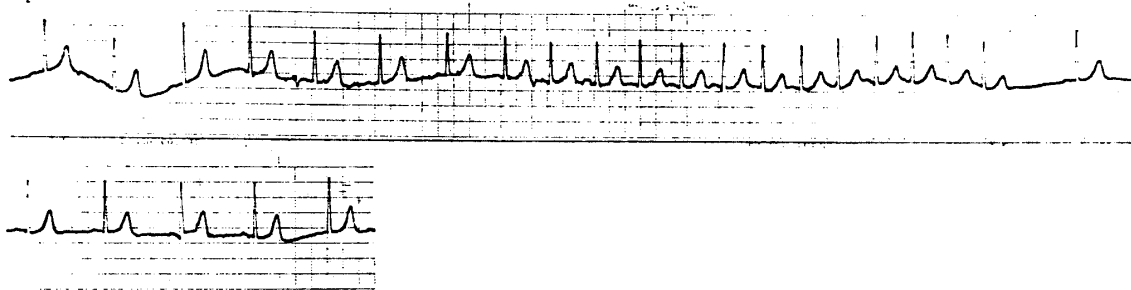


Fig. 2. Transient sinus tachycardia. This transient sinus tachycardia occurred in a 73-yr-old man with diabetes mellitus but who was asymptomatic at the time of this recording.

No.10 T.I. 63,M. June 13 '80

p.m. 5:24



a.m. 3:27

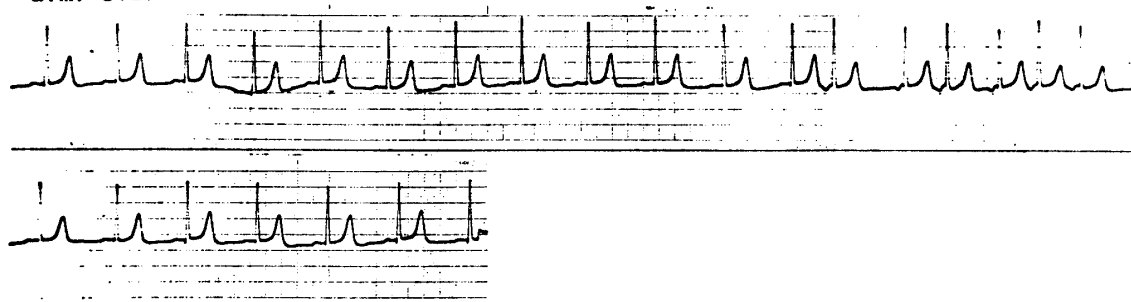


Fig. 3. Transient sinus tachycardia and repetitive upper atrioventricular junctional premature beats. The patient was a 63-yr-old man with gastric ulcer. This case illustrates transient sinus tachycardia at p. m. 5 : 24 and repetitive upper atrio-ventricular junctional premature beats at a. m. 3 : 27 during a 24-hr monitoring session.

TABLE II. *Comparison with Frequency of Premature Beats between Diurnal and Nocturnal Periods*

No.	Patient	Diurnal		Nocturnal	
		Frequency of P. B.	Heart rate	Frequency of P. B.	Heart rate
1.	K.Y.	7(2)	63.720	6(1)	57.000
2.	F.K.	26	52.440	23	49.410
3.	T.I.	21(6)	66.720	14(8)	55.530
4.	F.K.	4	52.260	6	45.480
5.	S.H.	43	62.670	36	57.450
6.	S.Y.	25	51.540	24	44.550
7.	H.I.	149	57.960	157	53.100
8.	T.H.	107	53.220	83	46.380
9.	F.A.	84(12)	52.620	182(86)	42.570
10.	T.I.	51	57.450	45	54.090

P. B. : Premature beats  
 ( ) : Ventricular premature beats

Of these 10 patients, ventricular premature beats (VPBs) were observed in three, and the frequency ranged from 3 to 98 beats per 24 hours. There were no relationships between arrhythmia and subjective symptoms such as precordial oppressive sensation, chest pain and palpitation

One 73-year-old man H. I. (No. 7) with diabetes mellitus proved to have a transient sinus tachycardia, as shown in Fig. 2.

One 63-year-old man T. I. (No. 10) with gastric ulcer had a transient sinus tachycardia and repetitive upper atrioventricular junctional premature beats, as shown in Fig. 3.

Heart rate showed a reduction of 11% in the nocturnal period compared with the diurnal mean of 57.060 beats per 12 hours (Table II). Occurrence, frequency and pattern of premature beats remained unchanged during the diurnal and nocturnal periods.

## DISCUSSION

The effectiveness of continuous ambulatory electrocardiography for detecting arrhythmia has been established and such is preferably used for analyses of various arrhythmia in clinical conditions. We studied the frequency, occurrence and pattern of arrhythmia and changes of cardiac cycle in diurnal and nocturnal period in patients with no evidence of cardio-pulmonary disease.

### *Frequency, Occurrence and Pattern of Premature Beats*

Frequency of per beats every 30 minutes during 24-hr monitoring periods, is illustrated in a graph in Fig. 1.

In all cases, atrial premature beats (APBs) were observed and the frequency was 10–306 beats per 24 hours. VPBs were recognized in three and the frequency was 3–98 beats per 24 hours.

According to previous studies regarding occurrence of premature beats in 122,000 apparently healthy man (range of 16–50 yr. old), APBs were seen in 0.4%, VPBs in 0.8% (5).

The APBs were 2.9%, VPBs 3.5% in 1,847 consecutive electrocardiographies recorded in Shimane Medical University Hospital.

Differences in the detection of occurrence of arrhythmia were attributed to different patients and normal subjects and/or methods of recording.

Kennedy *et al.* emphasized that ventricular ectopy could be effectively determined by increasing the hours of continuous ambulatory electrocardiography (6).

As for occurrences of VPBs using continuous ambulatory electrocardiography in normal subjects, Lown *et al.* (7) and Kennedy *et al.* (6) reported that such were 66% and 35% respectively.

The occurrence of VPBs in this study was 30%, such being close to the findings of Kennedy *et al.* (6).

In two patients, attacks of sinus tachycardia and repetitive upper atrioventricular junctional premature beats were observed. Here the relationship between the occurrence of arrhythmia and subjective symptoms was unclear and the patients had not noticed the attacks.

### *Changes of Cardiac Cycle in Diurnal and Nocturnal Period*

The cardiac cycle in diurnal and nocturnal periods and frequency of premature beats remained unchanged.

Lown *et al.* (7) pointed out that frequency of VPBs was reduced by 25–50% during sleep and suggested that frequency of VPBs may be associated with neurophysiologic factors. Reduction of APBs and VPBs during sleep was not apparent in our subjects.

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