METHOD OF INVESTIGATION OF DEVIATIONS FROM THE NORMAL DURATION OF THE CARDIAC CYCLE

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An electronic system for determining the frequency of deviations from the normal duration of the cardiac cycle is described.

KEY WORDS: cardiac cycle; method of investigation of changes; mental fatigue; automatic analysis of time intervals.

During the investigation of autonomic indices during mental fatigue [1] sharp changes are found in the duration of the intervals between cardiac contractions. It is accordingly useful to be able to determine the frequency of deviations from the normal duration of the cardiac cycle.

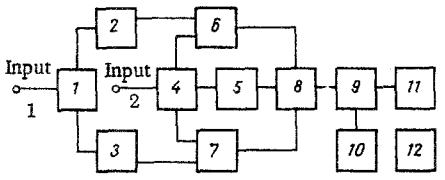

Fig. 1. Diagram of electronic system for prolonged continuous automatic analysis of time intervals between cardiac contractions (description in text).

For this purpose the writer has developed a special electronic system whose circuit is shown in Fig. 1. The system consists of the following main components: 1) a dc voltage amplifier; 2) an electronic relay of the maximal dc voltage; 3) an electronic relay of the minimal dc voltage; 4) a trigger pulse shaper and power amplifier for electric pulse counters; 5) an electric pulse counter of the total number of cardiac contractions; 6) an electric pulse counter of the number of intervals with longer than the assigned duration; 7) an electric pulse counter of the number of intervals with shorter than assigned duration; 8) a control relay of the operative counter; 9) the operative counter; 10) a time relay with 4 fixed delays of 15, 30, 60, and 120 sec; 11) a signal relay; 12) the power unit. The system is intended for working in conjunction with a pulsotachometer controlled by the electrocardiograph. The cardiac rhythm is investigated during mental fatigue as follows. Before the beginning of the investigation the delay of the time relay 10 is set at maximal (120 sec), the operation of the signal relay 11 is set at the minimal number of deviations of the cardiac rhythm, while the voltage relays 2 and 3 are set so that the number of intervals lying outside the limits of dispersion of the cardiac rhythm is 2-3 in 1 min. During the development of mental fatigue the number of operations of the signal relay is increased, so that the sensitivity of the system must be reduced. The reduction in sensitivity of the system is brought about by reducing the delay of the time relay 10 (to 60, 30, and 15 sec) and by increasing the number of deviations (to 10, 15, 20, and 25) in the cardiac rhythm. During investigation of the sinus rhythm of the heart, changes in the sensitivity of the system and the number of operations of the signal time relay within intervals of 5 or 10 min were analyzed. The frequency of deviations from the normal duration of the cardiac cycle was calculated from these data.

LITERATURE CITED

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