NORMALIZED ENTROPY AS NEW SIGN OF FUNCTIONAL AND ORGANIC DAMAGES IN CARDIOVASCULAR SYSTEM

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The aim of this study was to investigate the sensitivity of new measure of complexity of blood pressure (BP) signal – normalized entropy (E/H, the Shannon entropy related to the system energy) in the evaluation of short-lasting functional cardiovascular damages caused by acetylcholine (ACh) and adrenaline (A) and of organic damages induced by severe stress (SS).

The female rats (n=60) were instrumented with catheters for recording of BP, heart rate (HR) and for ACh (3μg/1000g) and A (10μg/1000g) injection. The E/H computation algorithm was used. The some rats were subjected to moderate stress (MS, 60-min immobilization) and the others – to SS (120 min immobilization+intermittent sound 120 dB). During MS, the HR and BP increase was accompanied by two types of E/H responses. In some rats, E/H increased and in others, E/H decreased. ACh caused decrease in HR by 61% and in BP by 74%. The A injection resulted in BP increase by 39% and compensatory HR decrease by 74%. These short-lasting dramatical bradicardic and hypotensive effects of ACh and bradicardic effect of A were accompanied by dramatical E/H decrease in all rats (by 90% and 65%, respectively). During BP and HR recovery, E/H increased in one part of rats and decreased in another part of ones. During SS that resulted in organic cardiovascular damages, the HR and BP increase didn't differ significantly from that observed during MS. But the degree of E/H increase and decrease was much more greater during SS compared with MS.

So, our data suggest that such complexity measure as E/H may be used successfully for determining and predictability of short-lasting functional and organic pathological changes in cardiovascular system.

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