# INVESTIGATION OF EFFERENT IMPULSES IN POSTGANGLIONIC SYMPATHETIC FIBERS DURING EXPOSURE TO SUPERHIGH-FREQUENCY ELECTROMAGNETIC FIELDS

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Spontaneous electrical activity recorded in efferent fibers of the renal, splenic, and inferior mesenteric nerves in cats during a single exposure to the action of a superhigh-frequency (SHF) field with a power flux density of 30 mW/cm$^2$ is increased in 50% of cases, while during exposure to SHF fields of higher intensity it is increased in all cases.

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Superhigh-frequency (SHF) electromagnetic fields produce changes in activity of systems and organs controlled by the autonomic nervous system [1, 3, 5-7, etc.]. However, the state of the efferent component of the sympathetic nervous system during exposure to SHF fields remains incompletely studied.

In the present investigation, efferent impulses were studied in the postganglionic sympathetic fibers of the splenic, renal, and inferior mesenteric nerves.

## EXPERIMENTAL METHOD AND RESULTS

Experiments were carried out on 35 cats anesthetized with urethane. Spikes were recorded in the central segments of the divided nerves by means of silver electrodes, with interoelectro distance 4-5 mm. A four-beam CRO was used for recording. The SHF field generator (wavelength 12.6 cm) was a "Luch-58" physiotherapeutic apparatus.

Exposure for 30 min to the action of an SHF field with PFD* of 12 mW/cm$^2$ did not produce significant changes in spike activity recorded in the central segments of the divided sympathetic nerves. With a PFD of 30 mW/cm$^2$, changes in efferent impulse activity were observed in half of the experiments, with an increase in amplitude of spikes recorded in the renal and mesenteric nerves (the potential in the fibers of these nerves was increased by 150-200%). An increase in amplitude was observed in most experiments for 1-1.5 h after exposure to the SHF field had ended. In individual cases large numbers of spikes appeared outside the groups (Fig. 1). During exposure of cats to SHF fields of high power (PFD 230 mW/cm$^2$), intensification of electrical activity was observed in the branches of the renal and mesenteric nerves and, less frequently, in the splenic nerves.

Repeated exposure to SHF fields during the same experiment stimulated impulse activity recorded in efferent fibers of the sympathetic nervous system, or left it unchanged (PFD 30-50 mW/cm$^2$). In cases of repeated exposures to SHF fields of high power (more than 100 mW/cm$^2$), weakening of bioelectrical activity was observed for 1-2 h.

Very often an increase in amplitude of the biopotentials after irradiation took place only in some efferent sympathetic fibers, the spikes in other fibers remaining unchanged. In addition, a decrease in spike activity, following an increase immediately after irradiation, was observed in some fibers 1-2 h after exposure to the SHF field. It must be assumed that this variation in responses of different sym-

*PFD denotes power flux density, measured in W, mW, or $\mu$W/cm$^2$.

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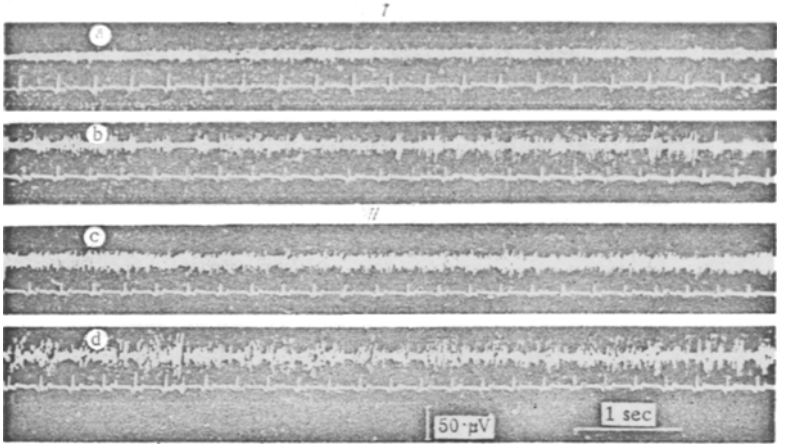


Fig. 1. Effect of single exposure to SHF field on bioelectrical activity in efferent nerve fibers of a cat. I) background electrical activity in branch of mesenteric nerve (a) and in branch of renal nerve (b); II) bioelectrical activity in branch of mesenteric nerve (c) and in branch of renal nerve (d) after irradiation. Conditions of irradiation: PFD 30 mW/cm$^2$, exposure 30 min. From top to bottom in each frame: bioelectrical activity of corresponding nerve, ECG.

pathetic nerves supplying the abdominal viscera reflects the functional heterogeneity of central portions of the sympathetic nervous system. Other authors [4] have described the same peculiarity in the response of the sympathetic nervous system to various external influences.

Changes in bioelectrical activity in the postganglionic sympathetic fibers and changes in the structure and function of the adrenal medulla produced by exposure to SHF fields [2-8] suggest that this factor acts on the sympatho-adrenal system as a whole.

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