

# NEURAL MODEL OF CELLS EQUISURVIVAL LINES UNDER HYPERTHERMIA

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The absence of biophysical model of hyperthermia effect on the tumor cells forces the researchers to develop the mathematical models based on the experimental data. The different approaches to these models development were considered in [1-3]. The main idea of models construction consists in adjusting of their parameters to obtain an admissible difference between modeling results and experimental data. In this connection the considering models belong to the class of adaptive models. The adaptive neural model named *CRNN* allowing representation the dependencies of tumor cell surviving fraction  $Z$  (%) via duration of hyperthermia  $t$  at the fixed temperature  $T$  was proposed by authors earlier [2]. The feature of this model consists in its ability to produce the dependencies dynamically contrary to usual (static) neural approach.

The representation of survival curves as the collection of lines  $t(T)$  each of them corresponds to the fixed value of parameter  $Z$  is more convenient for analysis of experimental data by specialists and in biomedical practice. The neural model developed in this paper was used for constructing of such collection. We used the multilayer perceptron (*MLP*, [4]) that has universal abilities for approximation of continuous functions with several arguments. The *MLP* with two hidden layers including 8 and 5 neurons respectively was trained for approximation of function  $t(T, Z)$ . We used the experimental data of Chinese hamster V79 cells survival [5] for the computational experiment. The experimental sample was artificially enlarged by modeled points because of insufficient data for carrying out necessary researches (Fig. 1). The collection of equisurvival curves  $t(T)$  corresponding to the different values of parameter  $Z$  in logarithmic scale of variable  $t$  is presented in Fig. 2.

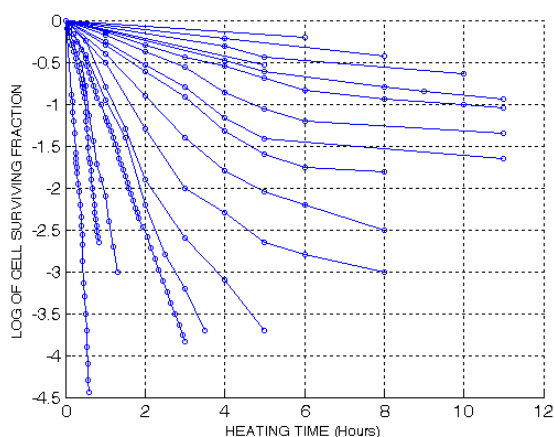


Fig. 1. Survival curves of Chinese hamster V79 cells enlarged by model points

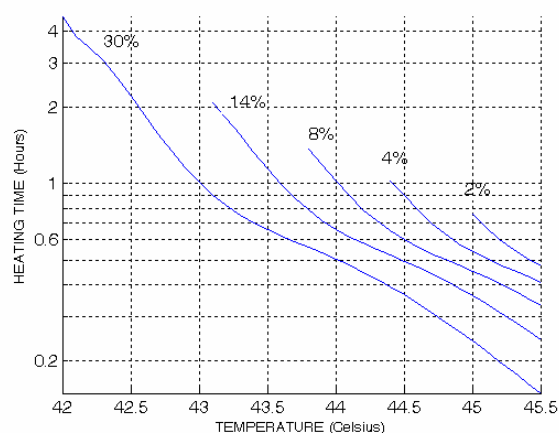


Fig. 2. Equisurvival curves produced by neural model

The character of curve  $\ln [t(T)]$  depicted in Fig. 2 can be useful for specialists in biophysics of hyperthermia effect on tumor cells.

## References

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