

PERSPECTIVES OF APPLICATION OF NON-LINEAR DYNAMICS METHOD IN VETERINARY MEDICINE

Oleshkevich A. A., Nosovski A. M.¹, Ippolitova T. V.

K. I. Skryabin Moscow State Academy of Veterinary Medicine and Biotechnology (Moscow SAVMB), Scriabin 23, Moscow, 109 472 Russia

Phone number: (495)377-72-66. E-mail: kaffizmgavmib@mail.ru

¹ – Institute of Medical-Biological Problems, Russian Academy of Science, Khoroshevsky highway 76 a, Moscow, 123 007, Russia. E-mail: nam@imbp.ru

The authors made an express assessment of the physiological state of the blood cells of diseased and healthy domestic animals (cats, dogs, horses), as well as blood cells after physical exposure to tissue *in vitro*. The changes were recorded by light microscopy methods and traditional hematological tests. Physical factors of external influence were high (+40°C) & low (-28°C) temperature, X-ray, ultrasound or combined treatment of blood samples. From the experimental and intact specimens, smears were prepared, stained. The resulting preparations were photographed, the images were interpreted into a numerical series using the *HarFA* program and then regression equations in several color combinations (*BW*, *B+BW*, *W+BW*) were constructed. The values of the amplitude of the discrete and continuous fractal spectrum were taken from the obtained numerical series. Then, the kind of histograms, as well as the values of fractal dimensions before and after the physical factor, were studied in healthy and sick individuals.

The authors analyzed all the data obtained and made possible reference series of normative indicators. We compared the partial numerical values of the fractal dimensions in the *BW* and *B+BW* combinations from healthy animals to the impact with the results obtained for the diseased individuals, and after the action of the factor. Decrease in the index (D_{B+BW}/D_{BW}) in the cells of the smear spoke about the depth of change in the physiological state of the biological object.

Thus, the *HarFA* program was first used for clinical blood analysis. Comparison of changes in fractal analysis of blood cells with hematological tests confirms the accuracy, objectivity and informativeness of the technique developed. The degree of tissue changes recorded in *HarFA* directly depended on the increase in the exposure dose. The *HarFA* package showed changes in the macro- and microstructure of the blood cells. Authentic results of complex cells examination after exposure to any factor allow to determine the degree of response of the organism and to prevent long-term consequences. In our opinion, the *HarFA* software package will allow objectively to identify changes in the cellular structure of biological objects at various stages of the disease and under numerous factors affecting it. Therefore, it is possible to create an express method that will allow to diagnose tissue condition after physio- or radiotherapy, to predict the course of the reparative process, to correct the treatment process and to select the dose of exposure individually.