Moreover, the grades for modular testing reveal the same dependence: students' progress is rising during the ovulation period, i.e. during the peak period of estrogens concentration and, on the contrary, is decreasing with lowering concentration of these hormones.

Thus, it can be recommended for students to intensify their educational activity in respect of mastering of the new information and passing of control procedures in the middle of a menstrual cycle – during the period of the maximum estrogens concentration, and so more productive work of hippocampus, and to minimize the educational activity in the premesrtual period as well as during the period of menstruation.

It is clear, that such tactics of educational process is unlikely in conditions of the traditional form of education with the regulated schedule of learning process, but it can be realized in its innovative forms, for example distant education [2] while the subject of pedagogical process forms the individual trajectory of studying. It is also necessary to note that the received results are preliminary, considering multivariate character of researched phenomena and the necessity of their further complex studying.

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THE EFFECT OF *ESCHERICHIA COLI* TOXINS ON BLOOD MICROCIRCULATION IN VENTRAL MESENTERY OF WHITE RATS

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1. Introduction

Bacteria *Escherichia* is the basis of human and animal intestinal microflora. The group of entheropathogenic

E. coli causative colibacillosis has biomedical implication. The virulence of these bacteria associated, at first, by toxins production. The affect of *E. coli* toxins on physiological processes of microorganism particularly investigated.[1] At the same time response of intestine blood vessels on the action of toxins ex tempore in vivo is not describe practically. Changes in blood microcirculation system can be important diagnostic sign, reflecting the interaction of microorganism with surrounding internals' and tissues' cells. One of the perspective methods of evaluation of these changes in biomedical researches is speckle-microscopy[2-5]. Thereby, we carried on an investigation with this method to study the effect of *E. coli* toxins on blood microcirculation in the course of short intervals of time.

2. Methods and materials

2.1 Cultures

We studied exotoxin producing by strain *Escherichia coli* A5 and endotoxin producing by strain *Escherichia coli* B6. Each strain cultured in meat infusion bouillon at 37^{o} C separately. Daily strain cultures centrifuged at 600 g to get supernatants, which used for experiments.

2.2 Laboratory animals

An experimental animals (white rats) sedated by intramuscular injection of 5-Ethyl-5-(1-methylbutyl)-

2,4,6-pyrimidinetrione (*Nembutal*). Then we abducted the abdominal cavity and eviscerated the ventral mesentery. After the abduction we placed rat on the thermostabilizing stage of speckle-microscope. So, the loop of ventral mesentery was placed directly under the microobjective.

2.3 Speckle-microscope and its optical schemes

Optical scheme of speckle-microscope for investigations of random bioflow is shown in Fig. 1[2]. Beam of He-Ne laser (λ=633 nm) is focused into the spot of small radius (W_o =1.5 μm) on the investigated microvessel. Conventional optical microscope supplied by monochrome Mutech 1280-USB digital CMOS camera enables observation of blood flow in a vessel visually. Computer image analyzer processes consequence of the video images (frame-by-frame analysis).

As blood or lymph flows through the vessel or probing beam scans the investigated surface, the strongly focused laser beam is modulated in the waist plane. This leads to the formation of dynamic speckle pattern in the far zone of diffraction. Speckles of large size are formed in the case of small number of scatterers, so diameter of aperture of photodetector is essentially smaller then average speckle size. The temporal fluctuations of scattered intensity are detected by photoreceiver. Time-varying signal is amplified, recorded on the tape and processed further by computer[6].

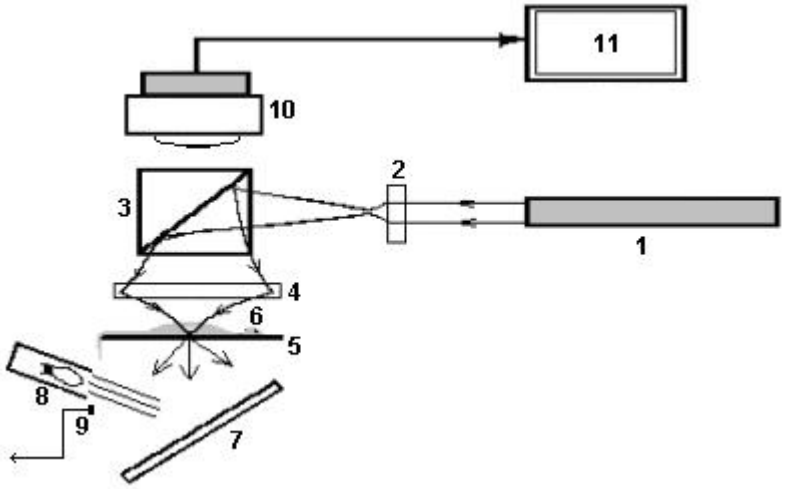

Figure 1. Optical scheme of speckle-microscope
1 - laser, 2 - microobjective with 10^xmagnification, 3 - beamsplitter, 4 - microobjective with 8^x magnification, 5 - stage, 6 - biological object (mesentery of white rat), 7 - mirror, 8 - lamp, 9 - photoreceiver with pinhole, 10 - TV camera, 11 - computer.

2.4 Original research

We brought a quantity one of the daily culture supernatant (~1ml) on the ventral mesentery loop and registered output signal of speckle-microscope for 10 second immediately. Repeated superimposing accomplished after 1, 2, 3, 4 and 5 minutes for dynamic process was studying. Blood flow characteristics before supernatant superimposing were used as control. The speckle-signal is amplified, recorded as avi-file and processed further by the computer with the original algorithm for MathCad 2001 program.

Obtained data are presented as changes of signal spectrum bandwidth (BDW) for each second during the time registration.

3. Results

We compared the effect of *E. coli* exotoxin and endotoxin on blood microcirculation in white rats ventral mesentery. Obtained results are presented in Fig. 2 and Fig. 3.

Fig. 2 shows the affect of *E. coli* A5 on blood microcirculation in capillaries. It is noted immediate increasing of blood flow velocity after superimposing supernatants.

Superimposing of *E. coli* B6 endotoxin shown lower fluctuations of blood flow velocity (Fig. 3).

4. Conclusion

Thereby superimposing of *E. coli* toxins caused immediate change of blood flow velocity in the course of short intervals of time. Thereat superimposing of *E. coli* A5 exotoxin offered the more intensive reaction, than *E. coli* B6 endotoxin. There was nearly twice increase of signal spectrum bandwidth in this case, while superimposing of *E. coli* B6 endotoxin resulted in increase of ~20 Hz maximum.

5. Acknowledgement

This work has been funded by Russian Foundation of Basic Researchers (Grant No. 06-04-39016), National Science Foundation of China (Grant No. 30711120171), and US Civil Research and Development Foundation (AWARD REC~006).

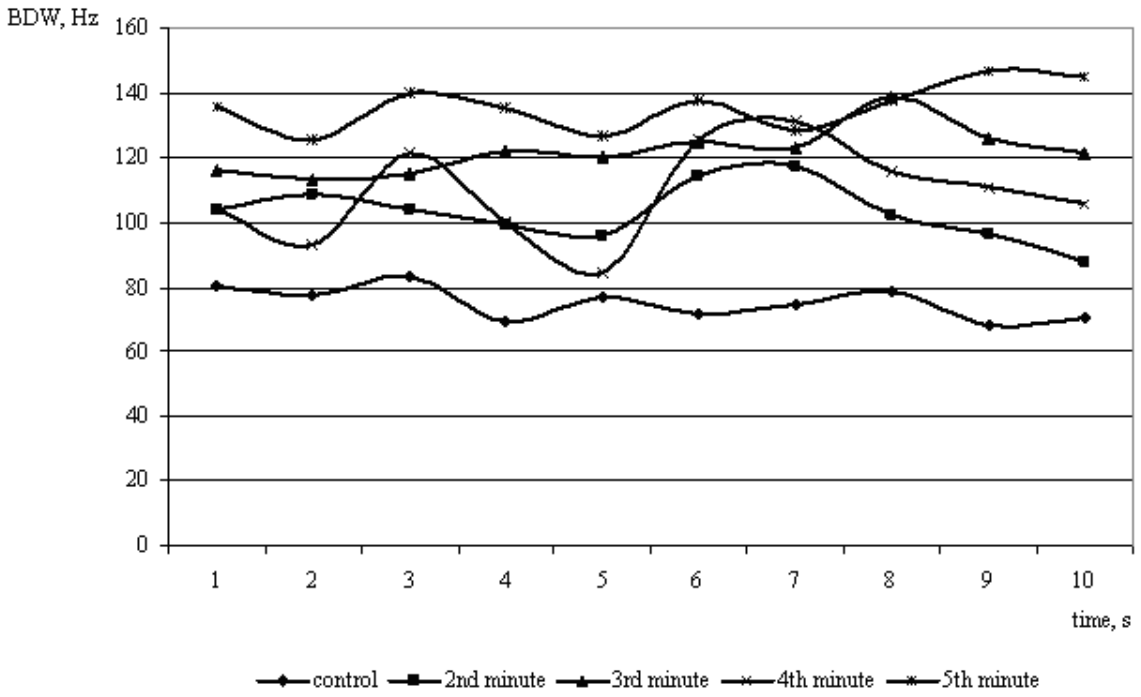

Figure 2. The effect of *Escherichia coli* A5 exotoxin on blood microcirculation in white rats ventral mesentery

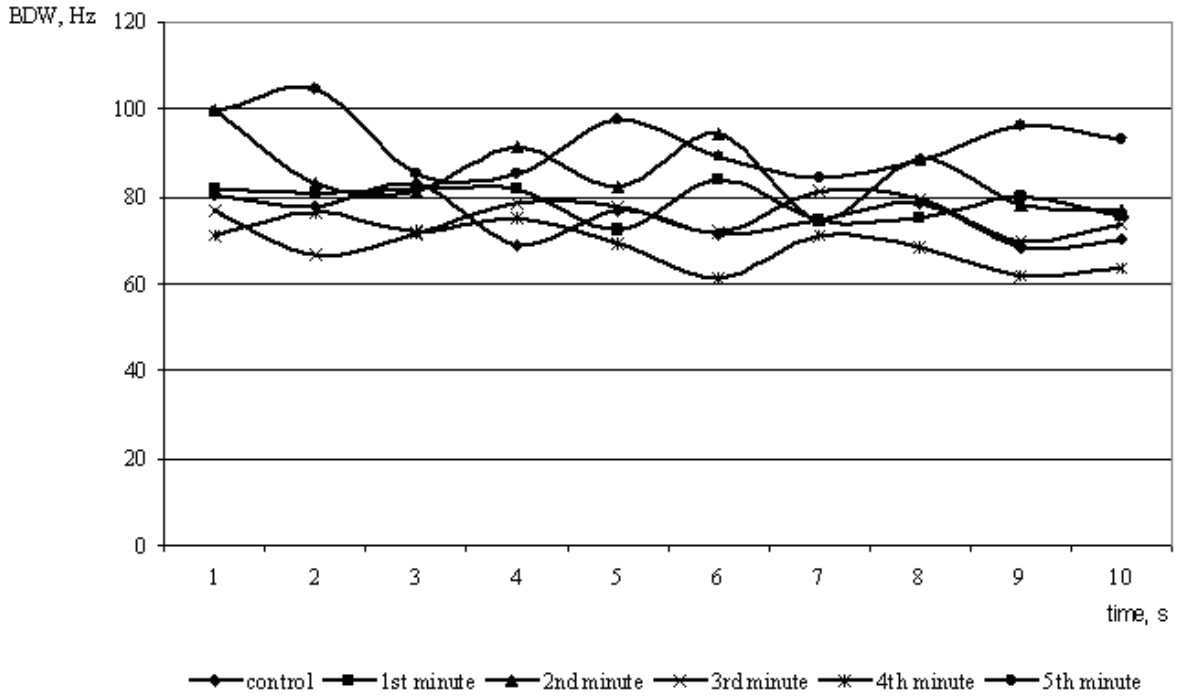

Figure 3. The effect of *Esherichia coli* B6 endotoxin on blood microcirculation in white rats ventral mesentery

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