LITERATURE CITED

1. V. Ya. Brodskii and N. V. Nechaeva, Rhythm of Protein Synthesis [in Russian], Moscow (1988).
2. V. P. Kaznachev, V. A. Trufakin, V. A. Kozloz, et al., Fiziol. Zh. SSSR, No. 4, 584 (1980).
3. S. G. Mamontov and V. V. Sinel'shchikova, Zh. Obshch. Biol., **38**, No. 1, 100 (1977).
4. R. Otnes and L. Erikson, Applied Analysis of Time Series [Russian translation], Moscow (1982).
5. Yu. A. Romanov, S. S. Filippovich, and Yu. I. Druzhinin, Problems in the Temporal Organization of Living Systems [in Russian], Moscow (1979), p. 97.
6. V. V. Sinel'shchikova, Byull. Éksp. Biol. Med., No. 10, 97 (1971).
7. Statistical Methods for Computers [in Russian], Moscow (1986), pp. 77-94.
8. A. V. Shurlygina, M. V. Robinson, and T. P. Noppe, Physiology and Pathology of Mechanisms of Human Adaptation [in Russian], Novosibirsk (1977), pp. 71-77.
9. H. Kirk and Z. Zellforsch, **129**, 188 (1972).
10. G. Sainte-Marie and S. P. Leblond, Blood, **26**, 765 (1965).

ACTION OF REMANTADINE ON FUSION OF THE LIPID ENVELOPE OF INFLUENZA A VIRUS WITH PLASMA AND INTERNAL MEMBRANES IN LYMPHOBLASTOID CELLS

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For transcription of the virus genome to begin in cells infected by enveloped viruses, the nucleocapsid of the virus must be released from external proteins and the lipid envelope. For this purpose, the influenza virus utilizes the path of receptor-mediated endocytosis: it is bound by receptors on the plasma membrane, and penetrates through covered pits and vesicles into the endosomes, where at low pH fusion of the lipid envelopes of the virus and endosomes takes place, leading to release of the nucleocapsid [4, 11]. Fusion of the lipid envelope of the virus with cell membranes was studied until very recently by inducing this process artificially by lowering the pH, and thus observing only fusion of the lipid envelope of the virus and the plasma membranes of the cells [8, 14]. By the fluorescence quenching method [12] the fusion of the lipid envelope of the virus both with plasma membranes of cells and with membranes of endosomes can be evaluated quantitatively. In this method a fluorescent probe with hydrocarbon chain, determining incorporation of the probe molecule into the lipid envelope of the virus, is used. If the virus membrane fuses with the cell membranes, redistribution of the probe on the membrane takes place, its concentration is reduced, quenching is reduced, and accordingly fluorescence increases, and an effect of dequenching of fluorescence (DQF) is observed.

Remantadine is widely used nowadays in the chemotherapy of influenza, but its mechanism of action has not yet been explained [1]. According to one group of investigators remantadine is a substance which, like NH_4Cl and chloroquine, inhibits fusion of the lipid envelope of the virus and endosomes. On the other hand, there is evidence [6, 7] that remantadine blocks the stage of RNP release from the nucleocapsid, interfering with the beginning of transcription. The aim of the present investigation

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