LABELING NATURAL PHYSIOLOGICALLY ACTIVE SUBSTANCES OF NON-STOICHIOMETRIC STRUCTURE AND HETEROGENIC COMPOSITION WITH TRITIUM: PROSPECTS FOR BIOLOGICAL STUDIES

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Before introduction of a new medical product into medical practice the product under consideration must be clinically tested. Clinical trials however are extremely expensive and involve a great body of men varying from 20-80 to 1000-3000 during phase I and phase II respectively. Therefore, pioneering aimed to characterize would-be medical products using physical-chemical methods and computer modeling is of great urgency. Such an approach is suitable very well for the preparations of established mode of action and is used on a large scale for drug preliminary screening. Principles of study and assessment of medical products of natural origin have not been yet well developed. The main peculiarity of medical products of natural origin is their complex chemical composition and simultaneous presence of several biologically active substances determining pharmacological effects.

Humic substances (HS) which are active principle of sapropel, peat, and mumijo are the most complex natural medical raw materials in terms of their chemical composition. HS are organic compounds possessing non-stoichiometric structure, irregular composition, high heterogeneity of structural elements, and polydispersity. At present many humic-based medical products are commercially available such as Torfot, Gumisol, Peloidin, FiBS, epril and others. In spite of confirmed medical efficiency of the mentioned medicines, the mechanism of HS action is still unclear because of absence developed approaches of natural remedies investigation. The main hindrance making difficult study of HS in organisms is a lack of HS determination methods in the presence of the other organic substances presented in biota.

Our study was aimed to estimate possibility of a study of HS behavior in living organisms using tritium labeled preparations obtained according (1).

A quantitative estimation of HS interaction with gram-negative bacteria (on the example of *Escherichia coli*), higher plants (on the example of wheat *Titicum aestivum* L.), and fungi (on the example of *Trametes maxima*) has been performed. Additionally, HS were characterized in terms of their hydrophobicity which is known to be a very important characteristic from biological activity point of view. An applicability of tritium autoradiography to visualize HS distribution has been demonstrated using plants as a target object.

HS have been established to be hydrophilic compounds having octanol-water distribution coefficient varying from –2.98 to –1.95. Amounts of HS accumulated by biological organisms under study were estimated as 45-655, 105-140 и 200-900 mg/kg for bacteria, fungi, and plants respectively. At that major part of HS were adsorbed by cell surface whereas only about 10% of HS were found in the intracellular space. The future prospects of the tritium labeled preparations usage for the studies of biologically active substances of non-stoichiometric structure and heterogenic composition has been demonstrated on the example of humic substances.

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References:

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