Application of Physical-chemical Approach to the Analysis of Folk-medicine Recipes in Oncology

Tatjana Borisova, Inta Vegnere

Pauls Stradins Museum for History of Medicine Pharmacy Museum, Latvia

Introduction. The attention of the authors was attracted to the investigation of a lot of recipes of folk medicine for treatment of oncological ailing. About 300 recipes were chosen over the last ten years. They were offered by authors of letters to popular magazines, published in collections by pharmacists and healers in Russian and Latvian. About 30 % of those were offered by doctors, including oncologists, as an additional treatment. Ones of the most popular plants among them were aloe, maize, beet, worm wood.

Aim, Materials and Methods. The aim of the study was to create physical-chemical theory in oncology. A wide row of plants and substances act simultaneously on different systems and organs of a human; different problems of one's health allowed us to find a common base of their acting. The latter is expected to be an extracellular matrix (EM) of a cell. The main compound of EM is collagen II, which possesses colloidal-chemical properties [1]. The following hypothesis was put forward: cells of a tissue are big micelles due to their EMs. The crossing of diffusion parts (DPs) of double electrical layers (DELs) of cells takes place.

Results. Experimental part. Gelatin was used as the model of EM. It was swollen in aloe latex and solutions of salts LiCl, NaCl, KCl, NH4Cl. The degree of swelling, electroconductivity and dielectric permeability were measured.

The main attention was paid to the area of existence of cancer cells where concentration of background electrolyte NaCl exceeds 0.9 % (0.15 M) isotonic solution 2–3 times [2]. Oncologist Alifirov A. calls it the area of comfort existing of cancer cells because of facilitated metabolism of them [2]. In our opinion, the reason proves it wrong.

Presence of any surface interface (included between EM and background electrolyte solution) means voluminous deviation of loads and presence of DEL at phase interface. DEL consists of adsorption layer (of dimension of hydrated ion, Å) and DP (of dimension 10–100 nm). The last value depends on the concentration of electrolyte. Solution of 0.15 M NaCl corresponds to thickness of 10 nm. This value can be decreased by introduction of less-hydrated specific adsorbing counter-ions. Less dissotiated or soluted compound is created as a result.

Transition of hyperplasia (H) to dysplasia (D) is presented in Figure 1 [3]. It is obvious that the point of transition is the point of critical micelle concentration 2 (CMC2), where DPs of two or more cells (as large micelles) are crossed and surface potential doubles. The up meant "area" appears. Increasing swelling of gelatin (and EM) by 0.1 μm (100 nm) is dramatical for cells. Cancer is an illness of EMs.

The only way to turn D into H is to introduce less-hydrated ions to DP. These ions are found as micro- and ultra-microelements in plants beet, grapes, wine (Rb); apricot (Ag); bread, worm wood (Au).

Conclusions. A lot of folk medicine recipes guided us to offer physical-chemical approach to treatment of oncological tissues. Chemistry of surface phenomenon, including making mixed stable adsorption layer of counterions at EM/solution phase interface, gives us new opportunities in this field.

References:

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