**Lactoferrin, *a*-lactalbumin and spontaneous remission of cancer**

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***Abstract***

*Spontaneous remission of cancer is a process of spontaneous suppression of cancer cells by the human body. The phenomenon of "miraculous" treatment has been noted by physicians since the beginning of the XIX century. Hitherto, scientists have not come to a common opinion about the sources of this phenomenon, but a significant number of them believes that the spontaneous activation of the human immune system is the cause of spontaneous remission of cancer.*

The basis for this hypothesis is the fact that in a large number of the cases of spontaneous remission of cancer known to science, it was preceded by an acute bacterial, viral, or fungal infection. [1-7, 9-16]. As a result of such an infection, the human body mobilizes its immune system to suppress the external pathogenic effect of bacteria and destroys the cells of cancerat the same time. This hypothesis was advanced quite a long time ago, but to date, it exists in a general form, without any concretization. We believe that such an immune manifestation of the human body has a specific reason - cancer cells are suppressed by proteins such as lactoferrin and *a*-lactalbumin. These polyfunctional proteins are found in the human body in saliva, tears, secretions of the nasal glands, as well as in the blood and breast milk. Next, let us consider the question of whether the presence of lactoferrin and*a*-lactalbumin in the human body is quantitatively stable or their number increases sharply when diseases caused by bacteria, fungi, viruses, etc. occur. At the same time, it is obviously important how the sources of the disease “plan” to get into the body through the mouth, nose, skin lesions, etc. If the human body is able to synthesize lactoferrin and a-lactalbumin moleculesindependently, which undergo proteolysis to form hydrolysatesin the gastrointestinal tract under the action of proteolytic enzymes (pepsin, trypsin, chymotrypsin), and then peptides that exhibit the most pronounced effects on the above indicators and will be concentrated in the corresponding secretory fluids [8-14].

The hypothesis is that in the human body, not subjected to bacterial, viral or fungal infections, lactoferrin and *a* - lactalbumin are contained in a very limited amount which explains their passive role in the fight against oncological manifestations in such a body. In this case, it is understandable why the effect of lactoferrin and*a*-lactalbumin on cancer cells appears more often after an infectious disease. To combat bacterial, viral and fungal invasion, the body produces protective proteins lactoferrin and *a*-lactalbumin, which can begin to participate in the suppression of cancer cellsin addition to their primary purpose.

What gives us the basis for suggesting that lactoferrin and *a*-lactalbumin are the motivating components of spontaneous remission of cancer?

Firstly, the possibility of treating cancer with lactoferrin and *a*-lactalbumin is described in a number of studies [1-7]. However, it should be noted that some natural proteins included in the same products that contain lactoferrin and *a*-lactalbumin, promote the development of oncological manifestations, for example, casein contained in milk [3].

Secondly, it is noted that not all types of cancer are equally prone to spontaneous remission. In general, the ratio of reported cases of spontaneous remission of cancer to the total number of oncological diseases varies from 1:60000 to 1:100000 [1]. It is possible that a significant number of cases of spontaneous remission of cancer occurring in the early stages of the disease are not recorded, both by specialists and by the patients themselves. However, the statistics show that such types of cancer as blood cancer, melanoma, lymphoma, neuroblastoma are more often cured by spontaneous remission of tumor cells [4]. A possible cause of this phenomenon is that these diseases are associated with the circulatory system, and the blood contains lactoferrin and *a*-lactalbumin.

Breast cancer in women has the highest probability of spontaneous remission - 22%. There was even an opinion that for this type of oncology, the occurrence of spontaneous remission is a general pattern [5], as it is human milk that contains significant amounts of human lactoferrin and*a* - lactalbumin, and the amount of these proteins in breast milk increases significantly during the infant feeding period.

 Thus, the occurrence of spontaneous remission of cancer is most likely for those types of cancer, where there is the greatest presence of substances containing lactoferrin and *a*-lactalbumin(blood, breast milk).

Thirdly, as already noted, the amount of lactoferrin and *a*-lactalbumin in the human body is not constant. It increases when there is a danger of external bacterial, viral and fungal effects, as a response of the body to this danger.

           If the hypothesis stated in [2, 6] is correct, lactoferrin and *a*-lactalbumin are not permanently contained in the human body or are contained in very limited quantities, since these proteins are biologically very active and, if they are always present in the human body with other biological components, that would lead to the loss of their biological activity.

The presence of lactoferrin and *a*-lactalbumin in limited quantities in the human body on an ongoing basis can be explained by the fact that the molecules of these proteins are constantly involved in the suppression of single or extremely limited number of cancer cells, which are also constantly present in the human body. This equilibrium process of suppression of cancer cells by molecules of lactoferrin and*a*- lactalbumin will be one of the characteristics of a healthy human body. In this case, it may be presumed that the assumption made in [5] is of a general nature, i.e. spontaneous remission of cancer cells in a healthy person’s body is a constant equilibrium process of suppression of cancer cells by molecules of lactoferrin and*a*- lactalbumin. The origin of cancerous tumors is the result of a violation of this equilibrium process. It is logical to assume that lactoferrin and *a*-lactalbumin are actively synthesized by the human body when manifestations of bacterial, viral and fungal effects occur, for example, when the temperature rises. This is indirectly confirmed by the results given in [2, 6]. Modeling the conditions of human disease can significantly increase the secretion of lactoferrin and*a*-lactalbumin from cow's milk. The product obtained in this case, lactogel (the carrier of these proteins), has antibacterial, antifungal, antiviral properties, whereas the initial product, cow's milk, does not possess such properties.

In this case, another question arises: if lactoferrin and*a*-lactalbumin are the basis of spontaneous remission of cancer, then why is this phenomenon so rare in practice?

        Firstly, it is possible that the suppression of cancer cells by lactoferrin and *a*-lactalbumin is not uncommon, just in the majority of cases, it is simply not observed by either patients or doctorsat the primary stage of the disease (spontaneous remission of cancer as a permanent phenomenon in the human body was described earlier).

Secondly, the pathogenic effect of bacteria as a sign of external infection leads to an increase in the content of lactoferrin and*a*-lactalbumin in saliva, tears, secretions of the nasal glands, blood and its main purpose initially is to prevent external infection from entering the body.

        Unlike pathogenic bacteria, cancer cells do not enter the human body from outside. The initial accumulations of cancer cells in one of the human organs are not accompanied by characteristic signs of the disease, e.g. an increase in temperature. Figuratively speaking, the organism “does not see” the danger of such a disease and does not synthesize the necessary additional quantity of molecules of anti-killers, such as lactoferrin and a-lactalbumin. When the oncological disease enters the next stages, the required amount of these proteins can no longer be produced by the body.

Thirdly, there may simply be a lack of “building materials” to produce the required amount of lactoferrin(iron in particular) and a-lactalbuminin the human body.

        Fourthly, it is possible that the suppression of cancer cells requires a special nonidentical to these proteins type of lactoferrin and *a*-lactalbumin, which fights bacteria, fungi, or viruses.

 We see confirmation of the stated hypotheses in experiments of double orientation:

- the effects of substances containing lactoferrin and *a* -lactalbumin, e.g. lactogel[6], on the organs of experimental animals, where cancer is present;

- introduction of lactogel into the body of an animal, e.g. while feeding, in order to determine their preventive effect in relation to the possibility of cancer.