Biological activity of the mummy. Publication 10: Effects on tumor cell growth and some blood counts

L.N. Frolova, T.L. Kiseleva

(Institute of Homeopathy and Naturotherapy of the Federal Scientific Clinical experimental center of traditional methods of diagnostics and treatment of the Ministry of Health of the SR RF, Moscow)

SUMMARY

The results of numerous experimental studies on the study of the effect of mummy on the growth of tumor cells and some blood parameters are presented and analyzed.

Key words: mummy, tumor, white blood, red blood, erythrocytes, leukocytes, lymphocytes, hemoglobin.

I. Results of studying the effect of mummy on the growth of tumor cells

Since ancient times, for the treatment of malignant neoplasms, mankind has used empirically selected agents of natural origin that contain a complex of biologically active substances with high bioavailability and are easily included in various metabolic processes [9, 14, 15]. There is evidence that natural remedies in the complex therapy of oncological diseases not only increase the effectiveness of cytostatic therapy, enhancing its antitumor activity, but also contribute to the correction of homeostasis disorders that occur during the development of neoplasia and are aggravated by chemotherapy [5, 9, 13-15].

The organo-mineral complex of mummy has long been used in folk medicine for the treatment of patients with some forms of neoplasms of internal organs. The effectiveness of mummy for some types of tumors is described by Avicenna in the "Canon of Medicine" in the section "Tumors and acne": "It helps from mucous tumors" [1]. The results of experimental studies in the second half of the 20th century confirm the feasibility of the traditional use of mummy in oncology in connection with the established ability to inhibit the growth of experimental tumors [11, 12, 26].

Yu.N. Nuraliev (1977) for modeling the process of metastasis in white ratswas implanted with Walker's carcinosarcoma [11, 12]: shredded tumor tissue, diluted in a ratio of 1: 4 with sterile saline with 2000 units. penicillin in 1 ml of suspension was inoculated under the skin of the right lateral surface of the animal's body using a thick needle. Experimental rats were injected with mummy on the 3rd day after vaccination and in the next 7 days against the background of growing Walker's carcinosarcoma.

Animals Experimental group I mummy was administered in a dose 100 mg / kg, II - in a dose 670 mg / kg (1/6 of the LD50 for mice), control group - daily oral saline. On the 11th day after transplantation, the animals were sacrificed. The results were judged by the change in the average weight of the animals as a percentage in relation to the initial weight, as well as on the basis of the calculated percentage of tumor growth inhibition [11, 12].

In the course of research, it was shown that mummy caused a noticeable inhibition of the growth of subcutaneous grafts of Walker's carcinoma. According to the author, this is due to the ability of mummy to enhance some adaptive properties and increase the body's resistance to endogenous and exogenous negative influences [11, 12].

A. Shvetskiy (1990) Ehrlich ascites carcinoma was transplanted into 120 male CBA mice by intraperitoneal injection of a 7-day culture of tumor cells [26]. Shilajit was injected intramuscularly at 150 mg / kg in 0.25 ml of saline; control animals received saline [26]. On the 3rd and 7th day of the experiment, the amount of ascitic fluid in the animals was measured and the content of cells in it was calculated [26]. Three days after

infection, the volume of ascitic exudate in mice treated with mummy was half that in control animals (0.59 ± 0.17 ml and 0.29 ± 0.04 ml); the number of tumor cells was 2.6 times less (0.70 ± 0.11 and 0.27 ± 0.04 billion / ml) [26]. After 7 days, the ratio of the volumes of ascitic fluid was 6.00 ± 0.63 and 3.90 ± 0.44 ml; the number of cells was reduced by 3.5 times: 13.60 ± 1.51 and 3.90 ± 0.42 billion / ml [26].

Thus, the results of studies indicate inhibition of the growth of subcutaneous grafts of Walker's carcinoma and Ehrlich's ascites carcinoma under the influence of mummy [11, 12, 26].

When carrying out this information and analytical research, we found publications containing speculative conclusions that were not experimentally confirmed. Some authors believe that since mummy stimulates cell growth and reproduction, it should also enhance malignant growth, since the main property of a tumor is pathological cell proliferation, characterized by their uncontrolled division [5, 6, 13]. However, statistically reliable results of experimental studies by Yu.N. Nuraliev [11, 12] and A. Shvetskiy [26] testify that mummy inhibits tumor growth. This is explained by the ability of the mummy to increase the general resistance of the body to various adverse effects [11] and to exert a stimulating effect on the immune system [11, 26], which, in turn,

This mechanism is used by some plant adaptogens, nonspecifically increasing the general resistance of the organism to the damaging effects of chemical, physical and biological nature, maintaining a high level of immunity [9].

II. The effect of mummy on some blood parameters

Due to the fact that changes in hematological parameters occur in tumor diseases, it seemed to us expedient in this publication to present the results of an information and analytical study of the effect of mummy on some blood parameters.

2.1. Effect on the composition of peripheral white blood

The change in the number of leukocytes is an indicator of the reaction of the hematopoietic system to the corresponding stimulus. Leukopenia and leukocytosis are a functional state of peripheral white blood caused by imbalance between the sympathetic and parasympathetic nervous systems.

Research N.A. Shelkovsky et al. (1965) were carried out on adult dogs [34]. It was found that the extract of mummy, regardless of the concentration and method of administration, after 5 minutes caused a sharp decrease in the number of neutrophils and pronounced lymphocytosis. Subsequently, there was an increase in the number of neutrophils and a decrease in lymphocytes [34].

In other works of this author, the number of leukocytes in male rabbits of the chinchilla breed was determined [32]. VI series (daily with food was injected at 50 mg of the drug), initialleukocyte count ranged from 5823 to 10000 thousand. On the first day of the experiment, leukocytosis increased sharply and remained at this level for 21 days. From the 24th to the 36th day, an even sharper increase in the number of leukocytes was noted - by about 50% of the initial level. By the end of the experiment, the average leukocyte count was 33% higher than the initial values [32].

In II series (introduced by 100 mg of the drug) - the average number of leukocytes averaged 12400. On the first day, the number of leukocytes decreased and by the 6th day reached 9080 thousand. Approximately at the same level (9500), their content was kept until the end of the experiment [32].

V III series (introduced by 200 mg of the drug for 30 days) - there was an even more distinct decrease in the number of leukocytes, which persisted until the end of the experiment [32].

2.2. Effect of mummy on the composition of peripheral red blood

A series of studies to study the effect of mummy on indicators of peripheral red blood was carried out by N.A. Shelkovsky et al. [27–35].

In experiments on adult dogs weighing from 10 to 25 kg, changes in the picture were studied

red blood with intravascular administration of mummy extract. Blood for analysis was taken from the femoral vein before the experiment and 5, 30, 60 and 90 minutes after the administration of the mummy extract, which was administered intraarterially and intravenously in the form of 1-5-10-20-40% solutions of 1 ml / kg body weight animal [35].

It was found that intra-arterial and intravenous administration of a 1% solution of mummy extract led to a slight decrease in the number of erythrocytes. These changes began in the first five minutes after the introduction of the extract and remained at the same level throughout the entire experiment [35]. With intra-arterial administration of 5, 20, 40% solutions of mummy extract, the increase in the number of erythrocytes occurred more intensively, reaching a maximum increase in 30 minutes from the start of administration [35].

The introduction of a 5% solution caused an increase in the number of erythrocytes by 13%; 20% - by 19%; 40% - by 23% in relation to the initial values. With the introduction of a 10% solution of mummy extract, the greatest increase in the number of erythrocytes was observed 60 minutes (by 10.7%) after the drug was administered [35].

In a number of experiments, by the end of observations, the number of erythrocytes reached the initial value, in particular, with the introduction of 5 and 10% solutions. With the introduction of 20 and 40% solutions, the number of erythrocytes remained high [35].

In all studied animals, the initial amount of hemoglobin ranged from 10 to 18 g%. 5 minutes after intravenous administration of a 1% solution of mummy extract and intra-arterial administration of 1020% solutions, no noticeable changes in the hemoglobin content were observed [35].

5 minutes after intra-arterial injection of a 5% solution, the amount of hemoglobin increased sharply - by 21.4%. Subsequently, a decrease in the level of hemoglobin was noted, but by the end of the experiment its value remained 4.5% higher than the initial level. With the introduction of 1% and 40% solutions, the amount of hemoglobin increased and at the end of the experiment, with the introduction of a 1% solution, it increased by 12.4%, and with the introduction of a 40% solution, by 18% [35].

The reticulocyte count in healthy dogs ranged from 0.2 to 3.1%. Immediately after intra-arterial injection of a 1% solution of mummy extract, their number increased by 47%. After 30 minutes, there was a slight decrease, which did not reach the original value. By the end of the experiment, the number of reticulocytes increased again [35]. With the introduction of a 20% solution in the first 30 minutes, there was no change in the number of reticulocytes. Then there was an increase: after 60 minutes - by 50%, and by the end of the experiment - by 66% [35].

With intravenous administration of 1% solution of mummy extract and intra-arterial 5–10 and 40% solutions, insignificant wavelike fluctuations in the number of reticulocytes were observed both upward and downward [35].

The erythrocyte sedimentation rate in healthy dogs ranged from 1 to 25 mm / h. With intra-arterial administration of 5, 10 and 20% solutions, ESR fluctuations were observed towards acceleration. By the end of the experiment, the acceleration decreased, but did not reach the initial level. Intra-arterial administration of 1 and 40% solutions and intravenous 1% solution did not cause changes in ESR [35]. Thus, in the course of the studies carried out, it was found that the intravascular administration of various doses of mummy extract was accompanied by significant changes in red blood counts, expressed by an increase in the number of erythrocytes, hemoglobin, reticulocytes. The most pronounced changes were after intravenous administration. The authors believe that changes in red blood are associated with changes in the tone of the autonomic nervous system [35].

In another work of N.A. Shelkovsky and V.A. Savenko (1965) studies were carried outon male rabbits of the chinchilla breed [29]. VSeries I initial erythrocyte count on averageamounted to 5920 thousand (5310-6650 thousand). Against the background of daily intake of the drug with food (50 mg each), there was a slight decrease in the average number of erythrocytes up to the 30th day, and by the 39th day their number reached the initial level [29].

In Series II of animals treated with 100 mg of the drug daily with food (the initial number of erythrocytes was 5912 thousand), a decrease in the number of erythrocytes was also observed,

but more intense (on average, less by 758 thousand), which lasts until the 30th day. Then there was an increase, but by the 39th day the initial level was not reached [29]. VIII series of animals treated with 200 mg of the drug for 30 days (initial level - 5762 thousand), on the 1st day there was a decrease in the number of erythrocytes (by 438 thousand). On the third day of the experiment, the decrease was 780 thousand. This level remained with slight fluctuations until the end of the experiment [29].

The dynamics of changes in the number of erythrocytes and hemoglobin in circulating blood under the influence of mummy in chronic experiments on the survival of animals in sealed chambers and under conditions of a reduced partial pressure of oxygen in the inhaled air is presented in sufficient detail in the works of N.A. Shelkovsky and V.A. Savenko [29, 30] and L.N. Frolova andT.L. Kiseleva [25]. It has been shown that mummy increases the body's resistance to oxygen starvation and reduced partial pressure of oxygen in the inhaled air. This is a consequence of a more pronounced reactivity of the hematopoietic system and a decreased sensitivity of the central nervous system to a lack of oxygen in the blood [25].

V.V. Karpova et al. (1972) on18 rabbits weighing 2.5-3.5 kg (3 groups) studied the effect of the Caucasian mummy on some hematological parameters in animals with experimental leukopenia [7].

Group I received every other day a solution of thiophosphamide (intravenously) in a dose 0.4 mg / kg and daily once a day mummy pills at a dose of 100 mg / kg; II - mummy in the form 2.5% solution intravenously at a dose of 50 mg / kg and a solution of thiophosphamide (in doses of group I); III (control) - only thiophosphamide. The blood picture was examined before the start of the experiment and 6 times during the experiment [7]. It was found that the introduction of mummy orally or intravenously with developing leukopenia leads to the normalization of blood counts. In animals of the control group, the number of leukocytes sharply decreased; some of the animals died. With simultaneous oral (pills) and intravenous administration of solutions of thiophosphamide and mummy, blood counts did not change significantly throughout the experiment compared with normal blood counts. The study of the leukocyte composition showed that an increase in the number of leukocytes occurs mainly due to an increase in lymphocytes in the peripheral blood [7].

The study of the influence of the Caucasian mummy and its humic acids on the content of leukocytes was carried out on 12 rabbits weighing 2.3-3.1 kg. All rabbits received a thiophosphamide solution at a dose of 0.4 mg / kg for 3 days. ThenGroup I rabbits were injected daily, once a dayoral mummy at a dose of 100 mg / kg. II - oral humic acid mummy in a dose 50 mg / kg per 1% sodium bicarbonate solution [7].

The measurements were carried out before the start of the experiment, after 3-day administration of thiophosphamide, then on the 3rd, 6th and 12th days after the administration of the test substances. After a three-day administration of thiophosphamide, there was a sharp decrease in the number of leukocytes - 4.5 ± 1.25 and a decrease in the amount of hemoglobin. In the leukocyte composition of the blood, only the number of lymphocytes significantly decreased [7].

Thus, the introduction of mummy and its humic acids promoted the restoration of the composition of the peripheral blood of animals with experimental leukopenia. The total number of leukocytes, lymphocytes and hemoglobin increased already on the 3rd day after the introduction of mummy, and on the 12th day it reached the norm [7].

Studies of the composition of peripheral blood (erythrocytes, hemoglobin, leukocytes) V.I. Kozlovskaya et al. (1972) were carried out on12 rabbits. AnimalsI (experimental) group througha day for 20 days, a 2.5% solution of the Caucasian mummy was injected up to 100 mg / ml (at the rate of 50 mg / kg of body weight per day). AnimalsII (control) group received saline [eight].

The measurements were carried out on the 6th, 10th, 14th, 21st, and 30th days. It was shown that the introduction of the mummy solution contributed to an increase in the number of erythrocytes (from 5326 ± 485 thousand to 6900 ± 223.1 thousand) and blood leukocytes. The average hemoglobin content increased from 11.3 to 13.4 g%. The number of leukocytes increased already on the 6th day after the administration of the mummy solution; by the end of the experiment, it was 8233 ± 299 relative to 6508 ± 480 in the initial state. In the control group, on the contrary, there was a slight decrease in the number of erythrocytes [8].

Thus, long-term oral administration of a 2.5% solution of mummy at a dose of 50 mg / kg stimulates hematopoiesis in rabbits (promotes an increase in the number of erythrocytes, leukocytes, platelets and an increase in hemoglobin content) [8].

Research by R.M. Muminova et al. (1978) are devoted to the study of the composition peripheral blood of healthy rats, as well as the determination of the erythrocyte sedimentation rate and weight of rats with arsenic-caffeine ulcers [10].

It was found that in rats with ulcerogenesis treated with mummy, along with an improvement in the general condition (increased activity, improved appetite), there is an increase in weight (by an average of 61 g), an increase in the amount of hemoglobin (by an average of 3.3 g%) and erythrocytes (by 3,130,000); a decrease in the number of leukocytes (by 400) and the erythrocyte sedimentation rate (by 7 mm / h) [10]. It has been shown that mummy at a dose of 300 mg / kg improves the general condition of rats, stimulates the composition of peripheral blood, and decreases the activity of the inflammatory process; has an adaptogenic and antitoxic effect [10].

I. Aminzhonov (1981) studied the effect of mummy on indicatorsperipheral blood and bone marrow in experimental animals (30 mongrel dogs weighing 13–27 kg) with acute posthemorrhagic anemia, which was caused by a single bloodletting at the rate of 3.0% of the animal's body weight. The morphological composition of peripheral blood was examined before bloodletting and on the 3rd, 7th, 12th, 14th, 20, 30, 50, 60, 70, 80 and 90th days after bloodletting [3].

The experimental animals were divided into two groups: I (18) - received the mummy inside at the rate of 5 mg / kg weight for 14-21 days, II (12) - 5.0 saline solution at the same time [3].

As a result of bloodletting, all experimental animals showed a sharp drop in the number of erythrocytes, hemoglobin content, and all hematocrit values. Peripheral blood smears revealed single normoblasts, anisocytosis, hypo- and dysproteinemia, hypoferrimia, hypocobaltomy, hypercupremia; an increase in the number of reticulocytes was noted [3].

During the recovery period in dogs of both groups, blood counts gradually returned to their initial values, but at different rates. In dogs of group I, the restoration of the number of erythrocytes occurred on the 40th day, hemoglobin - on the 50th day. In the control group, the number of erythrocytes returned to normal on the 60th day, and the hemoglobin content did not return to the initial value even on the 70th day after phlebotomy. The hematocrit recovered in the dogs of the experimental group on the 20th day, and in the control ones on the 30th [3].

In experimental dogs, the increase in the number of reticulocytes was more pronounced than in control (on the 14th day - 2.4 times, on the 30th day - 2.7 times more). This indicates a higher regenerative capacity of the bone marrow of animals that received mummy [3]. The dynamics of the peripheral blood picture (hemogram) was in accordance with the myelogram, which reflects the functional state of the bone marrow. During the period of reticulocytic crisis (7-14th day) in dogs of the experimental group and the control group, an increase in the number of reticulocytes in the peripheral blood was accompanied by an increase in the number of erythronormoblasts in the bone marrow. in dogs of the experimental group up to 43.4 ± 1.7% or 6.2% more than in the control group [3]. By the end of treatment (26th day) in dogs treated with mummy,

Erythrocytometric measurements showed that the dogs of the experimental group had a better saturation of erythrocytes with hemoglobin, an earlier recovery of the mean volume of erythrocytes and a predominance of red cells with a normal diameter compared with control animals [3].

The results of the study of the osmotic and acid resistance of erythrocytes showed that after blood loss on the 1st day in dogs of both groups there was a shift of acid erythrograms to the left, and the curves of osmotic erythrograms had a right shift. These changes are explained

a sharp imbalance in the red blood system caused by acute blood loss and associated with increased hemolysis of mainly old and deposited erythrocytes, which are released into the peripheral blood on the 1st day after bloodletting [3].

Starting from 5-7 days after phlebotomy, the points of the end of hemolysis and the maxima of acidic erythrograms shifted to the right, and the curves of the osmotic erythrogram to the left. The whole process of hemolysis became longer than the initial one; changes in the osmotic and acid resistance of erythrocytes in control and experimental animals were significantly different. For example, according to the acid erythrogram, on the 14th day after bloodletting, the duration of hemolysis in dogs of the experimental group reached 9.5 minutes, while in control dogs it was only 7.5 minutes. These shifts indicate an increase in the number of highly resistant, young erythrocytes in the blood. These changes in the erythrogram correlated with a proportional increase in the number of reticulocytes in the peripheral blood [3].

Research by M.Zh. Allaeva et al. (2008) were performed at 12 rabbits of both sexes weighing 2.3–2.4 kg. Mumiyo in the dosage form of capsules and tablets was administered at 150 mg / kg orally daily for a month. Peripheral blood was assessed by the hemoglobin content (with a Sali hemometer) and the number of leukocytes and erythrocytes (in the Goryaev chamber) - before the experiment and every 15 days [2].

It was found that before the start of the experiment the number of erythrocytes was 5.5 ± 0.7 million, leukocytes - 9.2 ± 0.9 thousand, hemoglobin content - 11.0 ± 0.7%; the average weight of animals is 2.45 ± 0.28% kg. On the 15th and 30th days of the introduction of the mummy capsules, the number of erythrocytes increased, respectively, to 6.3 ± 0.3 and 7.4 ± 0.7 million, leukocytes - 10.5 ± 0.7 and 10.9 ± 0.7 thousand, hemoglobin content - 12.6 ± 0.7% and 12.8 ± 0.4%, animal weight - 2.61 ± 0.28% kg [2].

On the 15th and 30th days of administration of mummy tablets, the animals also had an increase in the number of erythrocytes, respectively, to 6.4 ± 0.2 and 6.4 ± 0.7 million, leukocytes - 10.4 ± 0.7 and 10.5 ± 0.7 thousand, hemoglobin content - 12.2 ± 0.6% and 12.2 ± 0.8%, animal weight - 2.75 ± 0.31% and 2.89 ± 0, 21% kg [2].

Thus, on the 15th day of administration of capsules and tablets of mummy, the number of erythrocytes increased by 15.2% and 16.2% of the initial indicator, and on the 30th day by 28.0% and 17.1%, respectively. A similar pattern was also established in the study of blood hemoglobin: on the 15th day, the amount of hemoglobin increased by 14.5% and 11.3% from the initial, and on the 30th day - by 16.1% and 10.9%, respectively. During the observation period, the number of leukocytes did not change significantly. No morphological changes in erythrocytes and leukocytes were observed during the experiment [2].

The results of these studies indicate that oral administration of mummy, regardless of the dosage form, has a beneficial effect on the peripheral blood picture at a dose of 150 mg / kg: it stimulates erythropoiesis and does not have a toxic effect on peripheral blood [2].

A comprehensive study of the state of peripheral white and red blood, hemoglobin and erythrocyte sedimentation rate in animals with fractures of tubular bones was studied by a number of authors (R. Bekiev and E.M. Kran, A.Sh. Shakirova, N.M. Madzhidov et al.) and is presented in detail in [22]. It has been shown that under the influence of mummy, the blood picture improves: the number of erythrocytes increases, the hemoglobin content increases significantly, and the erythrocyte sedimentation rate normalizes [22].

A series of studies devoted to the study of the effect of mummy on blood counts in acute radiation sickness was carried out by T. Tukhtaev et al. (1969-1972) [16-19]. The research results are presented in detail in the publication [23]. On the basis of the experimental studies, the mummy was attributed by the authors to the number of effective stimulants of erythro-, lymph- and leukopoiesis. It has been shown that the stimulating effect of mummy is also manifested at the cellular level: nucleic acid metabolism and cell division are enhanced, which is accompanied by an increase in their number [23].

The results of studies by I. Aminzhonov (1981),devoted to the study of the effect of the Pamir mummy on hematopoiesis in rats with its protective (up to

irradiation) use. Experimental animalsGroup I (50), before irradiation, mummy was administered orally once at a rate of 500 mg / kg body weight for 8 days. AnimalsII group(control (50)) before irradiation, physiological saline was injected in the same volume and at the same time as the experimental. III group of animals (biological (20)) were not irradiated and nothing was injected [3]. The results can be considered promising for the development of antiradiation drugs. Acute radiation sickness in rats of groups I and II was caused by a single general uniform irradiation with X-rays. The total radiation dose is 450 r at a power of 72 r / min. The composition of peripheral blood and bone marrow was studied twice before irradiation and on the 3rd, 7th, 12th, 20th and 30th days after it. To obtain a myelogram, 5 rats from each group were sacrificed for each study period [3].

On the first day after exposure to ionizing radiation, the animals of the experimental and control groups developed pronounced changes in the morphological composition of peripheral blood and bone marrow. At the same time, not only a decrease in the number of blood corpuscles was observed, but also the appearance in a large number of cells with degenerative changes (pycnosis, rexis, chromatinolysis, vacuolization of protoplasm, etc.) [3].

In the bone marrow, a suppression of the process of transformation, differentiation and maturation of hematopoietic cells was noted, which led to a sharp decrease in blood corpuscles. The bone marrow was emptied mainly due to a decrease in myelo-lymphoid blood cells. A blood test showed that all irradiated rats developed anemia, leukopenia, and thrombocytopenia [3].

In the course of the studies, it was shown that in protected animals, the recovery of peripheral blood and bone marrow parameters proceeded more quickly than in unprotected ones. For example, the number of erythrocytes in experimental rats remained at the initial level until 3 days after irradiation, while in control rats, the content of erythrocytes was significantly lower in relation to the initial ($P < 0.01$) [3].

The maximum decrease in the number of erythrocytes was noted in control rats on the 20th day of the experiment, while in the experimental this indicator was significantly ($P < 0.01$) higher than in the control. On the 30th day after irradiation, the number of erythrocytes in all experimental animals reached the initial value [3]. Some differences between the control and experimental animals were also established in terms of the content of hemoglobin and reticulocytes. The number of reticulocytes in the peripheral blood in experimental rats on days 7, 20 and 30 after irradiation was significantly ($P < 0.01$) higher than in control rats [3].

The number of peripheral blood platelets in all animals dropped sharply immediately after irradiation. However, the decrease in this indicator in the experimental rats was significantly less than in the control ones. The number of platelets in unprotected rats, even at the end of the experiment, did not reach the initial values and was at a low level [3].

The number of leukocytes in all animals dropped sharply after irradiation. However, the decrease in the number of leukocytes in protected rats was less pronounced than in unprotected ones: on the 3rd day after irradiation, the number of leukocytes in experimental rats was 2.4 ± 0.2 thousand, and in control rats - 1.0 ± 0.2 thousand. in 1 μl of blood. The restoration of the number of leukocytes in the animals of the experimental group proceeded more intensively than in the animals of the control group. At the end of the experiment, the number of leukocytes in the animals of the experimental group was 10.6 ± 0.1 thousand, in the control - 7.00 ± 0.03 thousand ($P < 0.01$), with the initial 12.1 ± 0.7 thousand. in 1 μl of blood. Analysis of the leukocyte formula showed that after irradiation the most pronounced drop in the number of neutrophils was in control rats [3].

Thus, mummy in acute radiation sickness has a stimulating effect on hematopoiesis [3].

2.3. Effect on blood counts in subacute and chronic exposure to benzene

Yu.N. Nuraliev (1973) in experiments on rabbits and rats studied the effect of mummy on toxic-dystrophic processes of hematopoietic organs arising from subacute and

chronic exposure to benzene [11, 12]. Chronic poisoning was caused by daily administration of benzene for 8 days at a dose of 0.8 ml / kg (for rabbits) and at a dose of 1.6 ml / kg (for rats). The prophylactic effect of mummy was studied in 20 rabbits and 110 white rats. Experimental animals were injected orally at a dose of 100 mg / kg (for rabbits) and 150 mg / kg (for rats) [12].

In animals of the control series, chronic benzene poisoning was accompanied by a noticeable decrease in the number of erythrocytes and severe leukopenia. There was a sharp decrease in the number of granular leukocytes and lymphocytes. The amount of hemoglobin on the 7th and 14th days of poisoning did not decrease, which is possibly associated with the destruction of erythrocytes and the release of free hemoglobin. ESR at all periods of the study was at a fairly high level - from 4.1 ± 0.12 to 7.4 ± 1.3 mm / h relative to 1.4 ± 0.2 mm / h of the initial series [12].

The animals of the experimental groups were injected with mummy at a dose of 100 mg / kg (for rabbits) and 150 mg / kg (for rats) for 8 days, 40 minutes before the injection of benzene and then for 21 days. The number of erythrocytes, leukocytes, especially lymphocytes, and, in most cases, hemoglobin, on the 7th, 14th, 21st and 28th days of the study in experimental animals was statistically significantly higher than in animals of the control group ($P < 0.01–0.001$) [12].

In animals that received prophylactic mummy, complete normalization of all hematological parameters occurred on days 14–21 from the beginning of the experiments, while in control animals, even on the 35th day of the study, the hematological parameters were lower than in the initial state [12]. The therapeutic effect of mummy was studied in experiments on 10 rabbits and 100 white rats. Control and experimental animals were injected with benzene for 8 days. Starting from the 8th day, mummy was injected at a dose of 150 mg / kg of body weight. In a comparative aspect, the therapeutic effect of the drug pentoxil [12], which has a leuko-stimulating effect, was studied on 10 rabbits.

Hematological parameters were determined before and after the introduction of benzene on the 14th, 21st, 28th days, during which the treatment was carried out, as well as on the 35th day, that is, one week after the termination of the course of treatment [12]. Benzene intoxication caused anemia, leukopenia with a decrease in the number of leukocytes and, mainly, granulocytes, thrombopenia, increased ESR in rabbits [12]. Shilajit, introduced against the background of an already developed toxico-dystrophic process, caused a pronounced relief of the picture of benzene intoxication [12].

In a comparative study of the therapeutic effect of mummy with pentoxil, it was found that mummy, in contrast to pentoxil, starting from the first week of drug administration, had a positive effect not only on leuko-, but also on erythro- and hematopoiesis ($P <0.05-0.01$) [12]. In animals of the experimental group, the ESR in all periods of the study was 1.5–2.0 times lower than in the control [12].

Starting from the 7th day, and in the next 14–21 days of administration of mummy or pentoxil, a pronounced increase in the number of reticulocytes was observed. Moreover, in animals treated with mummy, the percentage of reticulocytes was much higher than in animals treated with pentoxil, which indicates a stimulating effect of the drug on erythropoiesis [12].

Thus, when comparing the therapeutic effect of mummy with the leuko-stimulating drug pentoxil, it was revealed that the therapeutic effect of mummy was 1.5–2.0 times more pronounced during all periods of the study than in animals treated with pentoxil ($P <0.05–0.001$) [12].

To find out the individual results of the therapeutic action of the drugs 7 days after the 21-day course of treatment (on the 35th day from the beginning of the experiments), control blood tests were carried out. It was found that after the cessation of the administration of mummy, the number of erythrocytes did not decrease, while the cessation of the administration of pentoxil was accompanied by a slight decrease in the number of erythrocytes, leukocytes and an acceleration of ESR. This indicates an insufficiently persistent therapeutic effect of pentoxil in comparison with mummy. That is, pentoxil, in contrast to mummy, less protected animals from death and contributed to their depletion (on days 21–28 of the experiments, the weight of rabbits receiving pentoxil was somewhat lower than in the control) [12].

Thus, with chronic intoxication of animals with benzene, mummy at a dose of 100 mg / kg (for rabbits) and 150 mg / kg (for rats) had a good therapeutic and prophylactic effect, which was manifested in the protection of animals from death, lengthening the life expectancy of animals,

an increase in the number of erythrocytes, leukocytes, the normalization of hemoglobin and ESR [12]. The effect of the Pamir mummy on hematopoiesis in benzene cytopenia in rabbits was studied by I. Aminzhonov (1981). Cytopenia was reproduced by subcutaneous injectionbenzene at the rate of 0.8 ml / kg of body weight of the animal for 7 days; a detailed general blood test was performed in the initial state and on the 3rd, 8th, 15th, 22nd, 29th days after the last injection of benzene [3].

Rabbits I (20) groups received the Pamir mummy orally from the first day from the beginning of benzene administration and within 14 days after it at the rate of 50 mg / kg of animal weight. AnimalsII (35) groups - only saline solution of 5.0 ml at the same time as the experimental [3]. During the study, it was shown that on the 3rd day after the last injection of benzene, all animals showed a characteristic pattern of benzene poisoning: the animals dramatically lost weight and began to die, the total number of leukocytes fell 3-4 times compared with the initial data [3]. The use of mummy in benzene leukopenia had a beneficial effect on the indices of hemograms and myelograms. The number of leukocytes and the leukocyte formula in the experimental rabbits recovered on the 15th day of the experiment, in the control ones - incomplete recovery of the number of leukocytes occurred on the 29th day; the leukocyte formula did not return to normal until the end of the experiment [3].

The number of erythrocytes and hemoglobin in animals of the experimental group was restored on the 22nd day (9.5 ± 6.2) x 1012 g / l and 106.0 ± 4.0 g / l. In the control group, the number of erythrocytes returned to normal on the 29th day, and the hemoglobin content did not return to the initial value until the end of the experiment [3]. All myelogram indices were normalized in animals of the experimental group by the 22nd day; the number of mature neutrophils in the bone marrow was 25.2 ± 0.7%. In the control group, the normal leukoerythroblastic ratio and neutrophil maturation index were not achieved by this day; the number of mature neutrophils in the bone marrow was 19.8% instead of 24.4% at baseline [3].

Thus, mummy in post-hemorrhagic anemia and benzene cytopenia had a pronounced therapeutic and prophylactic effect, contributing to a more rapid recovery of peripheral blood and bone marrow parameters [3].

IX. The discussion of the results

The results of the information and analytical study devoted to the study of the effect of mummy on the growth of tumor cells and blood counts were summarized by us in Table 1.

From the data in the table it can be seen that under the influence of mummy there is a noticeable inhibition of the growth of subcutaneous grafts of Walker's carcinoma and Ehrlich's ascites carcinoma. Perhaps this is due to the ability of mummy to enhance some adaptive properties and increase the body's resistance to endogenous and exogenous negative influences.

Shilajit, regardless of the concentration and method of administration, has a stimulating effect on the morphological composition of the blood: it helps to increase the number of erythrocytes, leukocytes, platelets and increase the hemoglobin content; causes a sharp decrease in the number of neutrophils. With developing leukopenia, oral or intravenous administration of mummy leads to the normalization of blood counts.

Intravascular administration of various doses of mummy extract is accompanied by significant changes in red blood counts, expressed by an increase in the number of erythrocytes, hemoglobin, reticulocytes. The most pronounced are changes during intravenous administration, which is explained by a change in the tone of the autonomic nervous system.

Table 1

The effect of mummy on the growth of tumor cells and some biochemical parameters

№ п/п	Автор исследования, библиографическая ссылка	Год	Характеристика объекта исследования				Результаты исследований
			Название препарата и его концентрация	Способ введения и дозы	Опытные животные	Место отбора проб мумиё	
I. Результаты изучения влияния мумиё на рост опухолевых клеток							
1.	Ю.Н. Нуралиев [11, 12]	1977	экстракт мумиё	I опытная группа получала перорально в дозе 100 мг/кг, II – 670 мг/кг	белые крысы	Средняя Азия, Забайкалье	Тормозит рост подкожных трансплантатов карциномы Уокера.
2.	А. Швецкий [26]	1990	мумиё	внутримышечно по 150 мг/кг в 0,25 мл физиологического раствора	мыши-самцы линии СВА		Тормозит рост подкожных трансплантатов асцитной карциномы Эрлиха.
II. Влияние мумиё на некоторые показатели крови. 2.1. Влияние на состав периферической белой крови							
3.	Н.А. Шелковский с соавт. [34]	1965	экстракт мумиё	Внутрисосудистое	взрослые собаки	не указано	Вызывает резкое снижение числа нейтрофилов и выраженный лимфоцитоз.
4.	Н.А. Шелковский с соавт. [32]	1965	экстракт мумиё	перорально 50 мг, 100 мг и 200 мг в течение 30 дней	кролики-самцы породы шиншилла	не указано	В дозе 200 мг способствует снижению количества лейкоцитов.
2.2. Влияние мумиё на состав периферической красной крови							
5.	Н.А. Шелковский с соавт. [35]	1965	экстракт мумиё	внутриартериально и внутривенно в виде 1-5-10-20-40 % растворов по 1 мл/кг веса	взрослые собаки весом от 10 до 25 кг	не указано	Способствует увеличению количества эритроцитов, гемоглобина, ретикулоцитов. Наиболее выраженные изменения наблюдаются при внутривенном введении.
6.	Н.А. Шелковского и В.А. Савенко [29]	1965	экстракт мумиё	перорально 50 мг, 100 мг и 200 мг в течение 30 дней	кролики-самцы породы шиншилла	не указано	Способствует уменьшению количества эритроцитов.
7.	В.В. Карпова с соавт. [7]	1972	пилюли мумиё, раствор мумиё	перорально 100 мг/кг; 2,5 % раствор внутривенно в дозе 50 мг/кг	кролики весом 2,5–3,5 кг	Кавказ	При развивающейся лейкопении нормализует показатели крови.
8.	В.И. Козловская с соавт. [8].	1972	раствор мумиё	2,5 % раствор мумиё до 100 мг/мл (из расчета 50 мг/кг веса в день)	кролики	Кавказ	Оказывает стимулирующее влияние на морфологический состав крови кроликов: увеличивает количество эритроцитов, лейкоцитов, тромбоцитов и повышает содержание гемоглобина.
9.	Р.М. Муминова с соавт. [10].	1978	не указано	перорально в дозе 300 мг/кг	крысы	не указано	Способствует стимуляции состава периферической крови, уменьшению воспалительного процесса; обладает адаптогенным и антитоксическим эффектом.
10.	И. Аминжонов [3]	1981	мумиё	перорально из расчета 5 мг/кг массы в течение 14–21 дней перорально в течение 8 дней однократно из расчета 500 мг/кг массы тела	беспородные собаки (массой 13–27 кг)	Памир	Нормализует миело- и эритрограмы. Способствует лучшему насыщению эритроцитов гемоглобином, увеличению количества ретикулоцитов. Оказывает стимулирующее влияние на гемопоэз.

11.	М.Ж. Аллаева с соавт. [2]	2008	капсулы и таблетки мумиё	перорально 150 мг/кг ежедневно в течение месяца	кролики обоего пола массой 2,3–2,4 кг	не указано	Стимулирует эритропоэз и не оказывает токсического влияния на периферическую кровь.
2.3. Влияние на показатели крови при подостром и хроническом воздействии бензола							
12.	Ю.Н. Нуралиев [11, 12]	1973	водный экстракт мумиё	перорально дозе 100 мг/кг (для кроликов) и 150 мг/кг (для крыс)	кролики и крысы	Средняя Азия, Забайкалье	Оказывает хорошее лечебное и профилактическое действие: защищает животных от гибели, увеличивает продолжительность жизни, увеличивает количество эритроцитов, лейкоцитов, нормализует содержанияе гемоглобина и СОЭ.
13.	И. Аминжонов [3]	1981	мумиё	перорально из расчета 50 мг/кг массы животного	кролики	Памир	Оказывает выраженное лечебное и профилактическое действие, способствует ускоренному восстановлению показателей приферической крови и костного мозга.

As a consequence pronounced reactivity hematopoietic systems and reduced sensitivity of the central nervous system to a lack of oxygen in the blood, mummy helps to increase the body's resistance to oxygen starvation and a reduced partial pressure of oxygen in the inhaled air.

In post-hemorrhagic anemia and benzene cytopenia, mummy has a pronounced therapeutic and prophylactic effect, contributing to a more accelerated recovery of peripheral blood and bone marrow parameters.

Thus, according to the results of experimental studies, mummy can be considered a promising drug with a wide spectrum of biological activity.

However, in order to introduce mummy preparations into clinical practice, it is necessary to conduct experimental and clinical studies on standardized samples of dry mummy extract for all of the listed indications. In this case, special attention should be paid to scientifically grounded selection of doses and methods of administration of dry mummy extract in each case.

Literature

1. Abu Ali Ibn Sina. Canon of Medicine. Selected Sections. Part I. / Compiled by: U.I. Karimov, E.U. Khurshut. - M. - Tashkent: Commercial Bulletin, Fan of the Academy of Sciences of the Republic of Uzbekistan, 1994. - pp. 309–310.

2. Allaeva M.Zh., Fayzieva Z.T., Aliev Kh.U. Influence of mummy and glycorazmulin on indicators blood // Practical phytotherapy. - 2008. - No. 4. - P. 12-15.

3. Aminzhonov I. About the effect of mummy on the processes of blood regeneration in cytopenias of different etiology: author. dis. ... Cand. honey. sciences. - Dushanbe, 1981 .-- 18 p.

4. Andreeva O.I. Changes in the activity of alkaline phosphatase during intravascular introduction of the extract of mummy // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - S. 7-10.

5. Bayersdorff D. Treatment and prevention of cancer: an integrated approach / Per. with him. - M .: AO Interexpert, 2000. - 224 p.

6. Dolgikh V.T. Tumor growth. Selected Lectures: A Study Guide for Students medical universities. - M .: Medical book, N. Novgorod: Publishing house of NGMA, 2001. - 81 p.

7. Karpova V.V., Shinkarenko A.L. To the chemical and biological study of the Caucasian mummy // Geographical environment and public health: Abstracts. report Second North. - Kavk. scientific. meeting. by probl. honey. geography, dedicated. To the 100th anniversary of the birth of V.I. Lenin, 21-25 Sept. 1970 -

Nalchik, 1970. - S. 390–391.

8. Kozlovskaya V.I., Krasovskaya A.G., Ardelyan V.N. and others. Toxicity of mummy and effect on morphological composition of blood with prolonged oral administration // Mumiyo and its therapeutic application: Abstracts. report 18 Feb 1972 - Pyatigorsk, 1972. - S. 28-30.

9. Medicinal plants and cancer / Balitskiy K.P., Vorontsova A.L. - Kiev: Nauk. Dumka, 1982. - 376 p.

10. Muminova R.M., Puzankova R.N., Mirzaeva G.A. About the stimulating effect of mummy-asil on the composition of peripheral blood in experimental animals // Experimental and clinical studies of the Central Asian mummy: Mater. symposium. May 30, 1978 - Tashkent: Medicine, 1980. - S. 108-111.

11. Nuraliev Yu.N. Pharmacology of Shilajit: Author's abstract. dis. ... Dr. med. sciences. - Yaroslavl, 1973. - 34 p.

12. Nuraliev Yu.N. Shilajit and its medicinal properties. 2nd ed. - Dushanbe: Irfon, 1977 .-- 112 p.

13. Olkhovsky V.K. Cancer treatment. The newest reference book. - Rostov on-Don: Phoenix, 2007 .-- 224 p.

14. Plants in the complex therapy of tumors / E.D. Goldberg, T.G. Razin, E.P. Zueva, E.N. Amosova, S.G. Krylova, V.E. Goldberg. - Moscow: RAMS Publishing House, 2008 .-- 232 p.

15. Treshchalina E.M. Antitumor activity of substances of natural origin. - M: Practical Medicine, 2005 .-- 272 p.

16. Tukhtaev T.M. About the medicinal properties of the drug mumiyo // Mumiyo and its medicinal properties: Abstracts. report 18 Feb 1972 - Pyatigorsk, 1972. - S. 22-24.

17. Tukhtaev T.M. Stimulation of hematopoiesis with short-term and prolonged irradiation. - Dushanbe: Irfon, 1978 .-- 222 p.

18. Tukhtaev T., Rogozkin V.D. The effect of the drug mummy on hematopoiesis in acute radiation sickness // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - S. 60–63.

19. Tukhtaev T., Rogozkin V.D. Stimulation of lymphopoiesis in acute radiation sickness // Scientific. conf. Tajik honey. in-ta them. Abuali Ibn-Sino: Mater. conf. - Dushanbe, 1966. - S. 122–123.

20. Frolova LN, Kiseleva TL .. Biological activity of mummy. Publication 2. Anti-inflammatory, anti-burn and regenerative action // Traditional medicine. - 2007. - No. 4 (11). - S. 51–55.

21. Frolova L.N., Kiseleva T.L. Biological activity of the mummy. Publication 3: Impact on gastrointestinal tract. Antiulcer, hepatoprotective, choleretic action // Traditional medicine. - 2008. - No. 1 (12). - S. 48–56.

22. Frolova L.N., Kiseleva T.L. Biological activity of the mummy. Post 4: Regenerative action in bone fractures // Traditional medicine. - 2008. - No. 2 (3). - S. 51-60.

23. Frolova L.N., Kiseleva T.L. Biological activity of the mummy. Publication 6. Impact on course of experimental acute radiation sickness // Traditional medicine. - 2008. - No. 4 (15). - S. 54–61.

24. Frolova L.N., Kiseleva T.L. Biological activity of the mummy. Publication 7. Impact on course and outcome of acute myocardial infarction // Traditional medicine. - 2009. - No. 1 (16). - S. 51–62.

25. Frolova L.N., Kiseleva T.L. Biological activity of the mummy. Publication 8. Adaptogenic action. Influence on the immune system // Traditional medicine. - 2009. - No. 2 (17). - S. 65–70.

26. Shvetskiy A.G. Shilajit is a non-specific biogenic stimulant: its properties and history from antiquity to the present day. - Krasnoyarsk, 1991 .-- 111 p.

27. Shelkovsky N.A., Andreeva O.I. The level of the electrolyte composition of the blood at intravascular administration of mummy extract // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - pp. 93–99.

28. Shelkovsky N.A., Andreeva O.I., Shelkovskaya N.K. Influence of intravascular administration

mummy on the change in total protein and residual nitrogen in blood serum // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - pp. 100–101.

29. Shelkovsky N.A., Savenko V.A. To the question of dosage of mummy in experiments on rabbits // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - pp. 103–112.

30. Shelkovsky N.A., Savenko V.A. About survival in sealed animal chambers, who received the mummy // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - pp. 113–119.

31. Shelkovsky N.A., Savenko V.A., Crane E.M. Changes in the body's reactivity to reduced partial pressure of oxygen when taking Shilajit // I Inter-Republican Symposium on the Experimental Study of Shilajit: Mater. symposium. - Dushanbe, 1965. - S. 129-135.

32. Shelkovsky N.A., Shelkovskaya N.K. Changes in the platelet composition of the blood with intravascular administration of various concentrations of mummy extract // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - P. 136-138.

33. Shelkovsky N.A., Shelkovskaya N.K., Andreeva O.I. Sugar content in the peripheral blood with intravascular injection of mummy // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - S. 139-141.

34. Shelkovsky N.A., Shelkovskaya N.K., Crane E.M. Change in the number of leukocytes and leukocyte formula with intravascular administration of various concentrations of mummy extract // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - S. 142-146.

35. Shelkovsky N.A., Shelkovskaya N.K., Crane E.M. A picture of red blood with intravascular administration of mummy extract // I Inter-republican symposium on the experimental study of mummy: Mater. symposium. - Dushanbe, 1965. - pp. 147–151.

36. Shinkarenko A.L., Karpova V.V., Gerashchenko G.I. and others. Study of the chemical composition and biological properties of the Caucasian mummy // Mumiyo and its medicinal use: Abstracts. report 18 Feb 1972 - Pyatigorsk, 1972. - S. 7-9.

Author's address
Ph.D. Frolova L.N.
Institute of Homeopathy and Naturotherapy FNCEC TMDL MH and SR
RF 127206, Moscow, st. Vuchetich, 12a
fln1966@yandex.ru

Frolova, L.N. Biological activity of the mummy. Publication 10: Influence on the growth of tumor cells and some blood parameters / L.N. Frolova, T.L. Kiseleva // Traditional medicine. - 2009. - No. 4 (19). - P.34-45.