

CRYOTHERAPY FOR BASAL CELL SKIN CANCER

D. TULEUOVA¹

¹"Kazakh Institute of Oncology and Radiology" JSC, Almaty, the Republic of Kazakhstan

ABSTRACT

Relevance: Basal cell skin cancer is the most common type of skin cancer, accounting for about 80% of all cases. Given its benign course, early treatment of basal cell skin cancer (at stages I and II) is an important point. These stages typically have a high cure rate, and one of the key goals of treatment is to minimize exposure with good cosmetic results.

The study aimed to provide an overview and analysis of cryotherapy as a treatment option for basal cell skin cancer (BCSC), including assessing its effectiveness and safety.

Methods: The study included patients of 18 years and older, both sexes, with BCSC stage I and II, who underwent cryotherapy as the main treatment.

Results: Between 2017 and 2023, the Kazakh Institute of Oncology and Radiology (Almaty, Kazakhstan) performed cryotherapy on 983 patients with BCSC stages I and II.

Conclusion: Cryotherapy is an effective method for treating BCSC in the early stages of the disease, providing a good cosmetic result and minimal complications.

Our 983 patients who received cryotherapy had a local response to treatment, manifested by partial or complete disappearance of the tumor.

Cryotherapy has been successfully used in patients aged 18 years and older, regardless of gender and the presence of concomitant diseases.

Absolute standardized morbidity and mortality rates were calculated using the world standard (World).

Keywords: basal cell skin cancer, cryotherapy, treatment outcome.

Introduction: Basal cell carcinoma of the skin (BCSC) is one of the most common malignant skin tumors, representing a significant medical and social problem. According to the World Health Organization, BCSC cases are constantly increasing, especially in countries with high ultraviolet radiation levels. In 2022, 3221 new cases of basal cell cancer were registered in the Republic of Kazakhstan, which is 83% of all skin tumors [1]. In 2023, the number of cases increased to 3998, i.e., an increase of 19% compared to the previous year.

Given the increasing epidemiological status of skin cancer and the importance of developing effective treatments, cryotherapy, a procedure based on the use of low temperatures to destroy tumor cells, is gaining more attention as an alternative treatment for BCSC.

Several methods used currently to treat basal cell carcinoma include cryosurgery, classical open surgery, radiotherapy, photodynamic therapy, and therapy with such topical medicines as 5-fluorouracil and imiquimod (imidazoquinolinone amine, a synthetic immunomodulator that stimulates the elimination of such cytokines as IFN-alpha, IL-6, and TNF-alpha). Each therapeutic or surgical option has specific indications, side effects, advantages, and disadvantages [2, 3, 4, 5, 6].

We studied data collected between 2017 and 2023 at the Kazakh Institute of Oncology and Radiology (KazIOR, Almaty, Kazakhstan), where cryotherapy was performed on 983 patients with BCSC stages I and II. This paper pres-

ents the results of a cryotherapy efficacy and safety analysis and its implications for cancer treatment. The collected data emphasize the possibility of using this method in oncological institutions of the Republic of Kazakhstan and its potential to improve the quality of life of patients.

The study aimed to provide an overview and analysis of cryotherapy as a treatment option for basal cell skin cancer (BCSC), including assessing its effectiveness and safety.

Materials and methods: In 2017-2023, cryotherapy was performed at KazIOR for 983 patients with a preliminarily cytologically confirmed diagnosis of BCSC, of which 612 (62%) were women and 371 (38%) were men.

Cryotherapy was conducted using a Cryo-S Electric II device (Metrum Cryoflex, Poland) and a probe with a diameter of 5 and 20 mm, depending on the size of the skin tumor (Figures 1-3). The refrigerant was carbon dioxide (CO₂) at -74 degrees and above. Usually, one cryotherapy session included 6-12 applications and lasted 15 seconds to 3 minutes.

Results: From 2017 to 2023, 983 patients underwent cryotherapy at KazIOR. 934 (95%) of the total number of patients had basal cell carcinoma of the skin, and 49 (5%) had metatypical cancer. In the first four years, 43 procedures were performed per year. However, since 2021, there has been a sharp increase in the number of procedures performed. It amounted to an increase of up to 83% compared to previous years (Figure 4).



Figure 1 – Cryo-S Electric II device (Metrum Cryoflex, Poland)



Figure 2 – Probes with a diameter of 5 and 20 mm

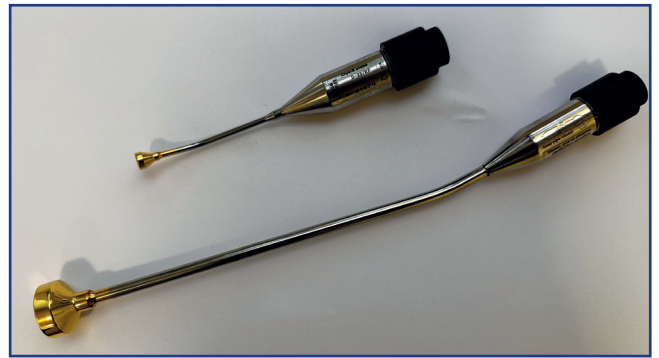


Figure 3 – Probes with a diameter of 5 and 20 mm

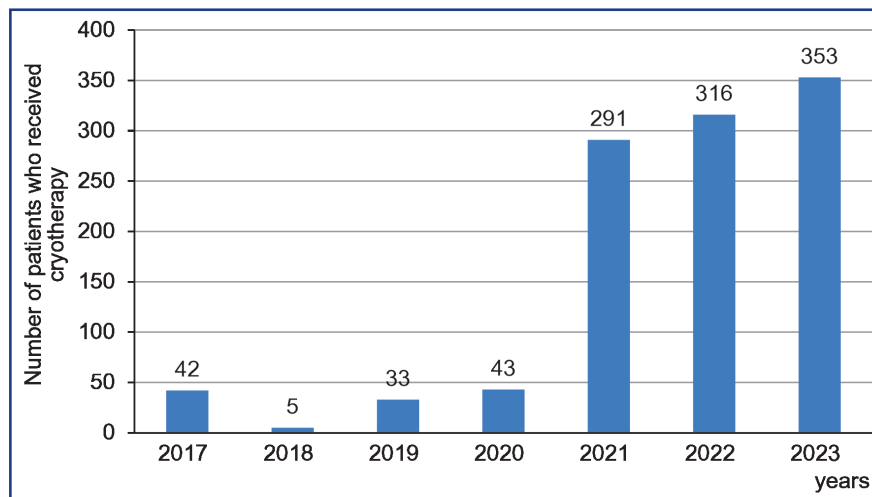


Figure 4 – Distribution of patients who received cryotherapy by years (absolute number)

From 2017 to 2023, the number of women who received cryotherapy exceeded the number of men by 25-

51% in all age groups, except for the 50-59 age group, where there were 4% more men (Figure 5).

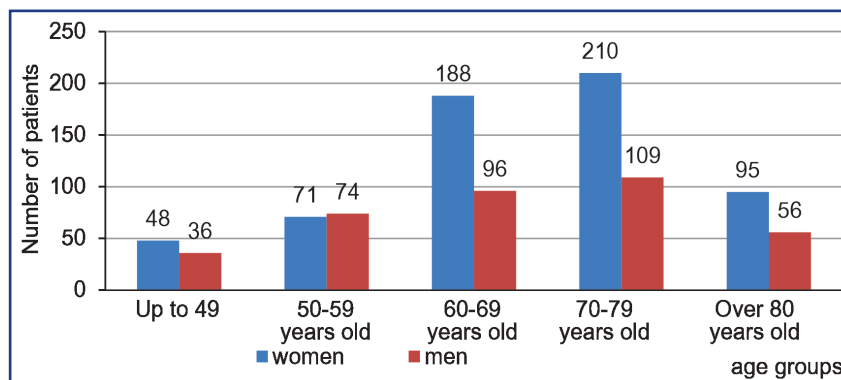


Figure 5 – Total number of patients who received cryotherapy in 2017-2023 by gender and age groups (absolute number)

97% of the patients who received cryotherapy for BCSC were stage I patients, while 3% were stage II patients (Figure 6).

In terms of localization, cryotherapy was performed for facial skin cancer in 72% of patients, for the scalp in 10.0%, for the trunk in 7.2%, for the ear in 5.0%, and the rest of locations in 5.3% of patients (Figure 7). The therapy was per-

formed for the first time in 836 (85%) patients, of whom 43 (4.3%) relapsed after previous surgical interventions and radiation therapy. Repeated cryotherapy was performed in 147 (15%) patients. Of these, 30 patients were prescribed repeated sessions of cryotherapy for relapses after cryotherapy, 6 patients were prescribed a course of radiation therapy, and 5 patients were prescribed surgery.

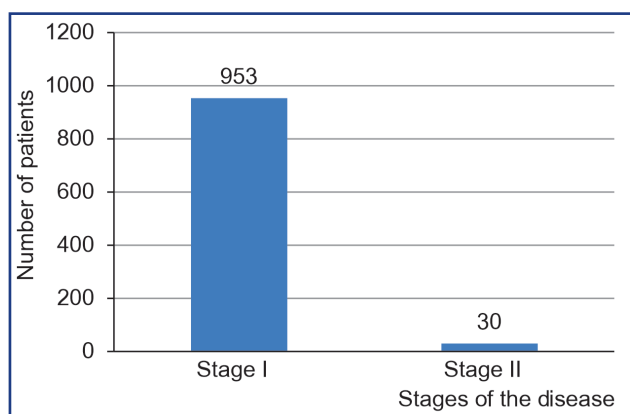


Figure 6 – Distribution of patients who received cryotherapy in 2017-2023, depending on the disease stage (absolute number).

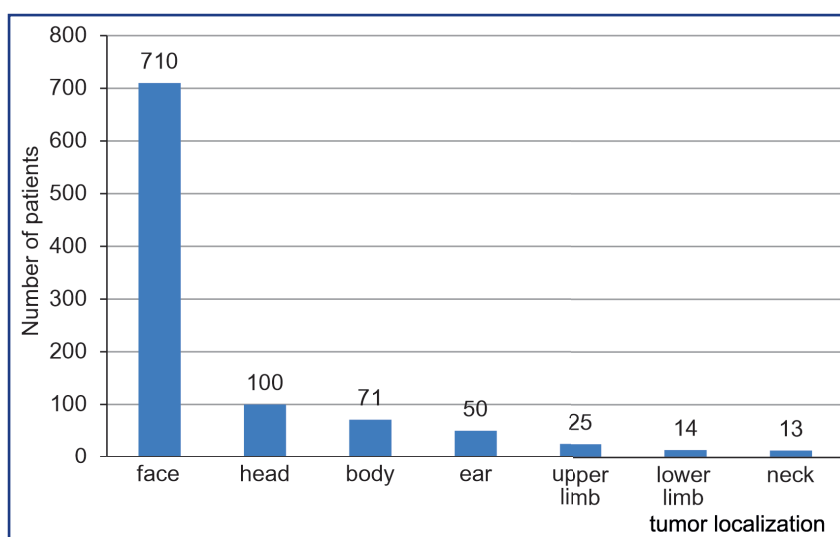


Figure 7 – Distribution of patients depending on the skin tumor location (absolute number)

As a result of treatment, 69 (7%) patients had a relapse successfully treated with radiation therapy in 6 patients, excision of the skin tumor in 4 patients, and repeated sessions of cryotherapy in 30 patients.

After cryotherapy, hyperpigmentation was observed mainly in dark-skinned patients, while skin hypopigmentation was recorded in light-skinned patients. In 30% of cases, a hypertrophic scar in the form of a convex stripe occurred. It resolves on its own in 6-8 months.

Data from other studies also confirm that cryotherapy is efficient at stage I of the disease and delivers high cure rates and minimal recurrence [7, 8]. Cryosurgical procedures showed good results in a study in-

volving 91 patients with T2 and T3 tumors: 82 (94.4%) out of 86 patients with T2 stage BCSC achieved a cure. Relapses in 4 patients were also successfully treated. As for T3 tumors, cryosurgery has only been used in selected cases for strict indications. One of the five patients in this group experienced a surgically resolved recurrence. These findings highlight the need for an individualized approach to treating more complex forms of this disease [2].

Below, there are cases of treatment using cryotherapy performed in our clinic.

Case 1: Patient K, born in 1939, diagnosis: Skin cancer in the infraorbital region on the right StII (T2NoMo),

cytological conclusion - basal cell carcinoma of the skin in the infraorbital region on the right. She underwent 2 sessions of cryotherapy with the Cryo-S Electric II device at an interval of a month at KazIOR in October-November 2021 (Figures 8-11).

Case 2: Patient G., born in 1946, diagnosis: Skin cancer in the wing of the nose and the bridge of the nose on the right StII (T2NoMo), cytological conclusion - basal cell carcinoma of the skin on the nose on the right. He underwent 4 cryotherapy sessions with the Cryo-S Electric II device with a month interval at KazIOR in 2022 (Figures 12, 13).



Figure 8 – Skin tumor in the infraorbital region on the right, condition before treatment



Figure 9 – Condition in 4 weeks after 1 cryotherapy session



Figure 10 – Condition in 8 weeks after cryotherapy

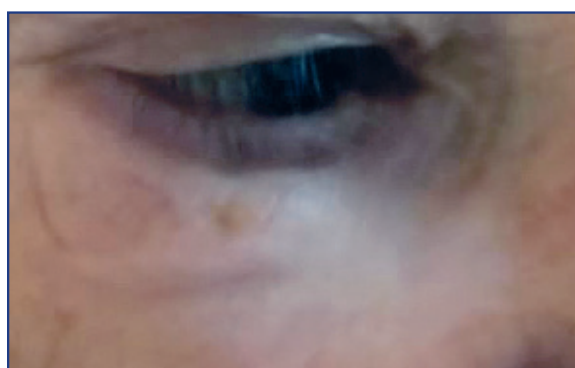


Figure 11 – Condition in 3 years after cryotherapy



Figure 12 – Skin tumor of the wing and bridge of the nose on the right, condition before treatment

Discussion:

Main characteristics of the patients

97% were at stage I of the disease, and only 3% were at stage II. The peak of the age group was observed in

the range of 60-79 years; 40% were women, and 21% were men in this group. Besides, 72% of tumors were localized on the skin of the face.

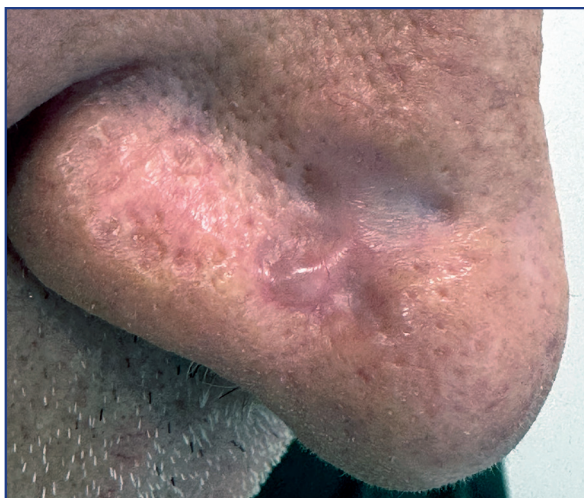


Figure 13 – Condition in 2 years after cryotherapy

Safety and complications

After cryotherapy, 80% of patients experienced localized edema with lymphatic discharge during the first week. It varied depending on the location of the tumor. The most common manifestations were blisters on the neck, limbs, and trunk skin and swelling of half of the face, eyelids, and auricle. A crust formed in 20% of patients immediately after the procedure.

A dry crust was formed in the second week after treatment. It was rejected on its own in 2-3 weeks, leaving an atrophic scar. It is important to note that the healing process proceeded without the need for ointments and solutions, indicating good tolerability and efficiency of the method. This natural recovery process highlights the benefits of cryotherapy as a less invasive approach to treating basal cell carcinoma of the skin.

Clinical and practical aspects

Cryotherapy is an effective treatment for patients with stage I and II BCSC, especially those with comorbidities. This method is characterized by accessibility, low cost, rapid implementation, and good tolerability, making it the treatment of choice for many patients. In addition, cryotherapy provides good cosmetic results, and it is especially important for patients whose tumors are localized on visible areas of the skin.

Advantages and limitations

Cryotherapy shows good cure results, especially in Stages I and II of BCSC, making it a reliable choice for treatment.

The method is low in trauma, and it reduces the risk of complications. It allows patients to recover faster and does not impair the quality of life.

Cryotherapy is a safe procedure, especially for patients with concomitant diseases, as it avoids serious surgical interventions and associated risks.

Conclusion As a result of the study of cryotherapy as a method intended to treat basal cell carcinoma of the skin in patients with Stages I and II of the disease, we came to the following conclusions:

Cryotherapy has shown its high efficiency in the early stages of BCSC, providing a good cosmetic result and minimal complications.

A significant response was expressed regarding the partial or complete disappearance of tumors in patients who underwent cryotherapy.

Cryotherapy has been successfully used as the primary treatment for our cohort of patients with BCSC, confirming its safety and efficacy.

Our results also show that cryotherapy can be successfully used in patients aged 18 years and older, regardless of gender and the presence of comorbidities.

References:

1. Tuleuova D.A., Serikbaev G.A., Elekbaev A.M., Pysanova Zh.U., Kurmanaliev A.K. Epidemiological status of skin cancer and melanoma in the Republic of Kazakhstan for 2012-2022 // *Oncology and radiology of Kazakhstan*. - 2024. - No. 1(71). - S. 12-21. <https://ojs.oncojournal.kz/index.php/oncol-and-radiol-of-kazakhstan/article/view/253>
2. Pustynskij I., Dvornikov A., Kiva E., Chulkova S., Egorova A., Gladilina I., Peterson S., Lepkova N., Grishchenko N., Galaeva Z., Baisova A., Kalinin S. Krioxirurgiya bazal'nokletochnogo raka kozhi golovy: 15 let opyta // *Zhizn'*. - 2023. - T. 13, № 11. - S. 22-31 [Pustynskij I., Dvornikov A., Kiva E., Chulkova S., Egorova A., Gladilina I., Peterson S., Lepkova N., Grishchenko N., Galaeva Z., Baisova A., Kalinin S. Cryosurgery of basal cell cancer of the scalp: 15 years of experience // *Zhizn'*. - 2023. - Vol. 13, No. 11. % S. 22-31 (in Russ.)]. <https://doi.org/10.3390/life13112231>
3. Tongdee E., Psomadakis C.E., Paka P., Marghoob N., Markowitz O. Emerging Noninvasive Treatments of Nonmelanoma Skin Cancers // *Cutis*. - 2020. - Vol. 105(3). - P. 138-142. <https://pubmed.ncbi.nlm.nih.gov/32352432/>
4. Neville J.A., Welch E., Leffell D.J. Management of nonmelanoma skin cancer in 2007 // *Nat. Clin. Pract. Oncol*. - 2007. - Vol. 4(8). - P. 462-469. <https://pubmed.ncbi.nlm.nih.gov/17657251/>
5. Cheraghi N., Cagnetta A., Goldberg D. Radiation Therapy in Dermatology: Non-Melanoma Skin Cancer // *J. Drugs Dermatol*. - 2017. - Vol. 16(5). - P. 464-469. <https://europepmc.org/article/med/28628682>
6. Finskas O., Zaar O., Svedberg K. Cryosurgery of Periocular Moderately Aggressive Basal Cell Carcinoma // *Acta Derm. Venereol*. - 2020. - Vol. 100(18). - Art. no. adv00336. <https://pubmed.ncbi.nlm.nih.gov/33170299/>
7. Shental', V.V., Goldobenko, G.V., Pustynskij, I.N., Tkachev, S.I. Pervyj opyt primeneniya gipotermii pri luchevoj terapii mestnorasprostranennogo raka kozhi lica // *Vopr. Onkol*. - 2000. - V. 46. - S. 209-211 [Shental', V.V., Goldobenko, G.V., Pustynskij, I.N., Tkachev, S.I. The first experience of using hypothermia in radiation therapy of localized skin cancer of the face // *Vopr. Oncol*. - 2000. - Vol. 46. - P. 209-211 (in Russ.)]. <https://europepmc.org/article/med/10853423>

АНДАТПА

БАЗАЛЬДІ ЖАСУШАЛЫҚ ТЕРІ РАГИНА КРИОТЕРАПИЯ

Д.А. Тулеуова¹¹«Қазақ онкология және радиология ғылыми-зерттеу институты» АҚ, Алматы, Қазақстан Республикасы

Анықтама: Базальды жасушалық тері қатерлі ісігі тері қатерлі ісігінің ең таралған түрі болып табылады, барлық жағдайлардың шамамен 80% құрайды. Терінің базальды жасушалық қатерлі ісігін ерте кезеңде емдеу (I және II), оның жақсы ағымын ескере отырып, маңызды сәт болып табылады. Бұл кезеңдер әдетте жоғары емдеу жылдамдығына ие және емдеудің негізгі мақсаттарының бірі жақсы косметикалық нәтижелермен әсер етуді азайту болып табылады.

Зерттеудің мақсаты – оның тиімділігі мен қауіпсіздігін бағалауды қоса алғанда, базальды жасушалық тері обырын (BCSC) емдеу нұсқасы ретінде криотерапияны шолу және талдау.

Әдістері: Зерттеуге негізгі емдеу әдісі ретінде криотерапиядан өткен екі жыныстағы 18 жасан асқан, БКК I және II сатылары бар пациенттер қатысты.

Абсолютті стандартталған аурушаңдық пен өлім-жітім көрсеткіштері әлемдік стандартты (Әлемдік) пайдалана отырып есептелді.

Нәтижелері: 2017-2023 жылдар аралығында Қазақ Ұлттық онкология және радиология ғылыми-зерттеу институты (Алматы, Қазақстан) базальды жасушалық карциноманың (БЦК) I және II сатысымен ауыратын 983 науқасқа криотерапия жүргізді.

Қорытынды: Криотерапия - бұл жақсы косметикалық нәтиже және асқынулардың ең аз санын қамтамасыз ететін аурудың ерте кезеңдерінде БКК емдеудің тиімді әдісі.

Криотерапиядан өткен 983 пациентіміз ісіктің ішінара немесе толық жойылуымен көрінетін емдеуге жергілікті жауап берді.

Криотерапия жынысына және қатар жүретін аурулардың болуына қарамастан 18 жасан асқан науқастарда сәтті қолданылды.

Түйінді сөздер: базальды жасушалық тері ісігі, криотерапия, емдеу нәтижесі.

АННОТАЦИЯ

КРИОТЕРАПИЯ БАЗАЛЬНОКЛЕТОЧНОГО РАКА КОЖИ

Д.А. Тулеуова¹¹АО «Казакский научно-исследовательский институт онкологии и радиологии», Алматы, Республика Казахстан

Актуальность: Базальноклеточный рак кожи является наиболее часто встречающимся типом рака кожи, составляя около 80% всех случаев. Лечение базальноклеточного рака кожи на ранних стадиях (I и II), учитывая его доброкачественное течение, является важным моментом. На этих стадиях обычно достигается высокий процент излечиваемости, и одной из ключевых целей лечения является минимизация воздействия с хорошим косметическим результатом.

Цель исследования – предоставление обзора и анализа криотерапии в качестве метода лечения базальноклеточного рака кожи (БКРК), включая оценку ее эффективности и безопасности.

Методы: Для исследования были включены пациенты с I и II стадиями БКРК, возраст от 18 лет и старше, обоих полов, которым проведена криотерапия как основной метод лечения.

Абсолютные стандартизованные показатели заболеваемости и смертности рассчитаны с применением мирового стандарта (World).

Результаты: В период с 2017 по 2023 год в Казахском Национальном Исследовательском Институте Онкологии и Радиологии (Алматы, Казахстан) была проведена криотерапия у 983 пациентов, страдающих базальноклеточным раком (БКРК) I и II стадий.

Заключение: Криотерапия является эффективным методом лечения БКРК на ранних стадиях заболевания, обеспечивая хороший косметический результат и минимальное количество осложнений.

У наших 983 пациентов, получивших криотерапию, наблюдался локальный ответ на лечение, выражающийся в частичном или полном исчезновении опухоли.

Криотерапия успешно применена у пациентов в возрасте от 18 лет и старше, независимо от пола и наличия сопутствующих заболеваний.

Ключевые слова: базальноклеточный рак кожи (БКРК), криотерапия, результат лечения.

Transparency of the study: Author take full responsibility for the content of this manuscript.

Conflict of interest: Author declare no conflict of interest.

Financing: Author declare no financing of the study.

Authors' input: contribution to the concept, study design, execution and interpretation of the study, preparation of the manuscript –

D. Tuleuova.

Authors' data:

D. Tuleuova (corresponding author) – Ph.D. Medicine, Head of the Day Surgical Hospital Department, Kazakh Institute of Oncology and Radiology, Almaty, Kazakhstan, tel. +77019887876, e-mail: tudiabd@mail.ru, ORCID: 0000-0001-9179-3728.

Address for correspondence: D. Tuleuova, Kazakh Institute of Oncology and Radiology JSC, Abay Ave. 91, Almaty 050061, the Republic of Kazakhstan.