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## RESEARCH COMMUNICATION

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# Epidemiology of Esophagus, Lung and Breast Cancer in Mountainous Regions of Kyrgyz Republic

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### Abstract

Relative incidences of esophagus, lung and breast cancers differ in the various populations in Kyrgyzstan. Esophagus cancer is the most commonly observed among the Turkic groups, especially in Kazakhs, while lung and breast cancer are frequently encountered among the European representatives of the population – Russians in particular. Fluctuation in rates for these cancer forms in the Kyrgyzstan mountain regions is highly dependable on the height above sea level. One potential major factor, which may account for the low cancer frequency in general and influence esophagus, lung and breast cancer forms in particular – is mountain hypoxia. Since, among the native citizens (Kyrgyzes), which are adapted to mountain hypoxia conditions (population adaptation), the indicated cancer forms are not so often than the same forms appearance among the other ethnical groups (long adaptation), especially newcomers.

Thus, the incidence rates of esophageal cancer in the Kazakh population is about 32,3 (per 100,000), the same sickness in Kyrgyz is about 11,3, the figure for lung cancer among the Russian population is 34,8, while among Kyrgyzes it is 11,2, breast cancer incidence in Russian citizens is 34,8 but only 15,1 among Kyrgyz residents. It could be established that the studied forms of cancer are less common in high mountain regions than in the regions with low mountains. To a certain extent, mountain hypoxia may function like a brake for the development of cancer tumors. However, the situation is complex, because of the presence of the other factors entailed by the demographic, social-economic and other variation.

**Key Words:** esophagus cancer - lung cancer - breast cancer - mountain regions - hypoxia - ethnic groups.

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### Introduction

Study of cancer origin and its clinical course by epidemiological methods makes it possible to consider different aspects of these processes in different natural regions.

Mountain settlements occupy a special place among the main global environmental and geographic systems. They provide great opportunities to study how outward environmental conditions influence the population morbidity. Living conditions in the high mountain areas substantially differ from region to region. Though, all mountain masses are characterized by low atmospheric

pressure, other factors like the type of landscape, the geographic location and the climate, jointly create individual conditions for each natural zone. Therefore, comparative estimation of the frequency and prevalence of cancerous growths among ethnic groups, which differ in their anthropogenetic characteristics, customs, traditions and dietary habits, but living in the same environment provides an opportunity to assess the role of certain factors determining neoplastic development and to recognize means for prevention.

Mountains occupy 40% of the former Soviet Union territory. Some 12% of the 40% are more than 1500 m above the sea level, which are typically classified as middle height

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as high mountains. More than 20% of the population reside in such conditions. Kyrgyzstan is a region with 75% of its territory covered by mountains with the various climatic and geographical peculiarities in separate individual zones. From this viewpoint, Kyrgyzstan can undoubtedly be taken as a geographical model for investigation of the mountain environment influence on different cancer types.

Mountain hypoxia is a factor which would be expected to influence the frequency of cancers, taking account the physiological background. It substantially affects the adaptive organism's abilities and stimulates the cancer tumor formation process. Hypoxia intensity degree is in strong correlation with the landscape type, geographic location, climatic factors, etc. in different Republic regions. However, the presence of hypoxia does not eliminate the influence of other exogenous and endogenous factors on the frequency of cancer. Currently recognition of the cause-effect relations between different environmental factors (contamination with predecessors of nitro compounds, microelements contained in soils and water sources), which have an effect in hypoxic conditions, and frequency of cancer outbreak in different Republic regions is of the great theoretical and practical interest.

Studying the cancer problem, it's impossible to bypass the question of how customs and habits influence prevalence in different ethnic groups, taking into account the special features of reproductive systems of women, who live in high mountain conditions. Data have allowed the influence on cancer to be estimated to some extent and provide evidence for the hypoxia hypothesis (Iginov, 1992; Soodonbekov, 1999; Iginov, 1999).

The main purpose of this work is to provide pointers to how some exogenic and endogenic factors might affect cancer frequency and the presence of definite cancer forms among the population, living in different mountain regions of Kyrgyzstan, and to estimate the possible hypoxia role in combination with the ethnic distinguishing features, customs, traditions, dietary habits and reproductive change among women population.

For the realization of the purpose we have the following two tasks: to study the morbidity level, especially the prevalence of definite cancer forms depending on the age, and determine the sexual and ethnic structure of population, living in separate geographic Republic regions.

## Materials and Methods

We performed the full analysis of natural, demographic, ethnic and climatic-geographical conditions of Kyrgyzstan. The total material collection of the primary cancer cases, which were registered over a long period, was the basic information source to study the epidemiology of major cancers. So, we have the following data at our disposal: 5474 patients were affected by esophagus cancer during the 25 years period (1959-1983), 3270 cases of lung cancer were registered in 1986-1990 period and 1622 women were affected by breast cancer within the 1989-1994 period in the Kyrgyzstan

separate mountain regions. Main incidence rates of the indicated cancer forms were calculated by means of the generally accepted methods of sanitary statistics.

## Results and Discussion

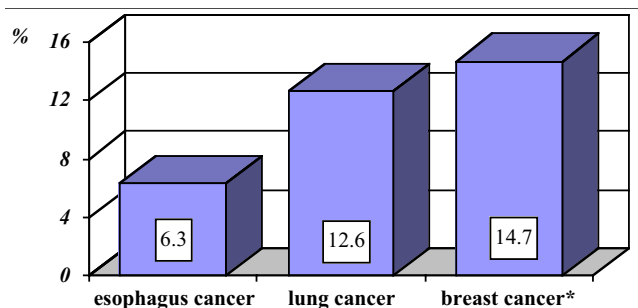
On the basis of conducted research it was determined that lung cancer occupies the third place (12.6%) in the list of different cancerous growths after skin and ventricle cancer, esophagus cancer, the sixth (6.3%), and breast cancer, the second (14.7%), in the female population (Figure 1).

There were also revealed uneven specific weight ranking of these tumors (Figure 2), with a high share of esophagus cancer in Osh region, lung cancers in Talas and Naryn, and breast lesions in Bishkek and Chuy regions. Patients affected by the investigated forms of cancer (Figure 3) are not of the same average age. Breast cancer appears in rather younger age. Breast and lung cancers are most frequently encountered among the 60-69 population age groups, and esophagus cancer develops at the age of 70 and older (Figure 4).

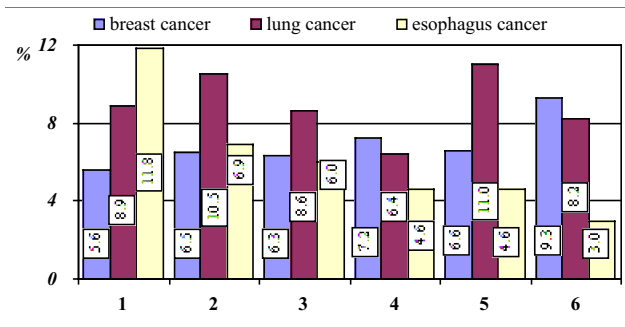
Crude incidence rate characteristics of the analyzed cancer forms (Figure 5) vary in their values in Kyrgyzstan, and standardized incidence rates of esophagus, lung and breast cancer increase with the decrease in the settlement location height above sea level (Figure 6). Standardized incidence rates of the esophagus cancer are high among the rural population of the Republic, while lung and breast cancers are more widespread among the City's residents (Figure 7).

Sickness rate of rural population in districts, which are located at the height of 1000 meters above the sea level increases the same rate of the population, living in the 2500 meters above the sea level regions. (Figure 8).

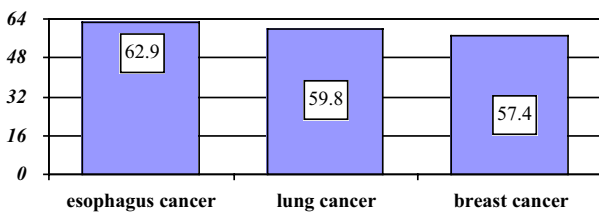
We also studied ethnic distinctions. The standardized (World) incidence rates of esophagus cancer are rather high among the Kazakhs, while lung and breast cancers are predominantly found among the Russian population, and to lesser extents in natives of Kyrgyz nationality (Figure 9).



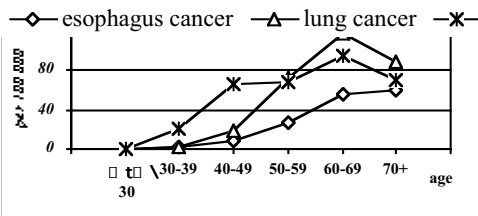
**Figure 1. Proportional Incidences of Esophagus, Lung and Breast Cancer in Kyrgyzstan. In this and in all following diagrams, the indices for breast cancer are calculated for the female population only.**



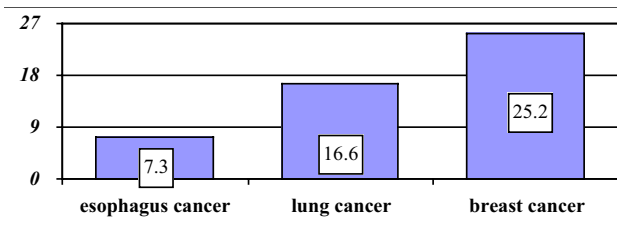
**Figure 2. Incidence Rates per 100,000 (for both sexes) of Esophagus, Lung and Breast Cancers in Separate Regions of Kyrgyzstan. 1 - Osh, 2 – Talas, 3 – Issyk-Kul, 4 – Chuy, 5 – Naryn, 6 – Bishkek**



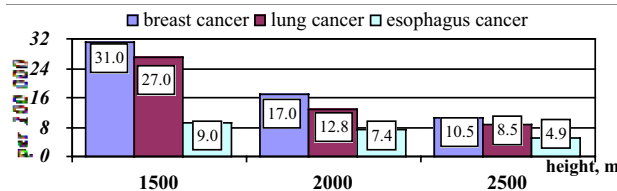
**Figure 3. Average Age of the Patients Affected by Esophagus, Lung and Breast Cancer in Kyrgyzstan.**



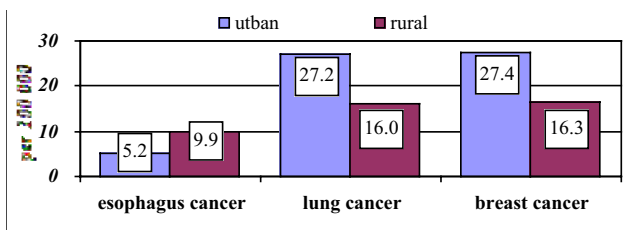
**Figure 4. Age Incidence Rates per 100,000 of Esophagus, Lung and Breast Cancer in Kyrgyzstan.**



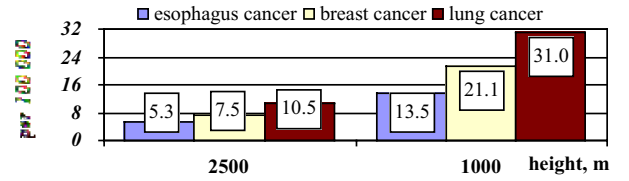
**Figure 5. Crude Incidence Rates per 100,000 Esophagus, Lung and Breast Cancer in Kyrgyzstan.**



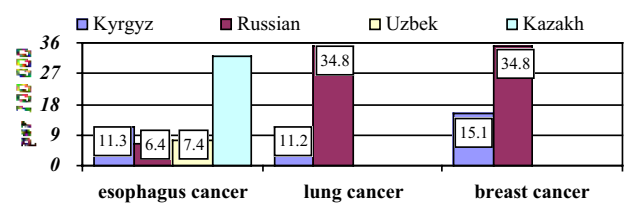
**Figure 6. Standardized Incidence Rates per 100,000 of Esophagus, Lung and Breast Cancer Depending on Height above the Sea Level in Kyrgyzstan.**



**Figure 7. Standardized Incidence Rates per 100,000 of Esophagus, Lung and Breast Cancer Among the Urban and Rural Inhabitants of Kyrgyzstan.**



**Figure 8. Standardized Incidence Rates per 100,000 of Esophagus, Lung and Breast Cancer at the Various Heights above the Sea Level in Kyrgyzstan.**



**Figure 9. Standardized Incidence Rates per 100,000 of Esophagus, Lung and Breast Cancer among the Separate Ethnic Groups of Kyrgyzstan Population.**

**Conclusions**

Thus, there are distinctive features of esophagus, lung and breast cancer morbidity among the separate ethnic population groups, living in different climatic and natural Kyrgyzstan regions. These zones considerably differ from each other in terms of their climatic-geographical, social-economic, environmental and ethnographic conditions and, in addition, by demographic allocation of mentioned ethnical residents’ groups in our Republic. At the same time, it’s impossible to ignore the role of the biological adaptation to the high mountain’s conditions among the separate population groups. Besides, taken the careful examination of the whole complex of factors, which can contribute to esophagus, lung and breast cancer, we selected those of them which most likely affect the frequency of the indicated cancer forms outbreaks among the high mountain regions’ residents. Dietary habits, local traditions, religious rituals and, consumption of alcohol and cigarettes are general factors. The leading role in esophagus cancer may be played by some nitro compounds predecessors – microelements, which are contained in soils and water sources.

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### Personal profile: Saginbek Iginov

Saginbek Imankulovich Iginov was born in Kazakhstan in 1937. In 1961 he graduated from Kyrgyz State Medical Institute. He then entered Clinical Ordinance and participated in further Postgraduate courses in the Kyrgyz Research Institute for Oncology and Radiology. He successfully defended his dissertation and obtained his Ph.D., becoming a candidate of medical sciences in 1966.

He headed the Cancer Epidemiology Laboratory in Kazakh Research Institute of Oncology and Radiology from 1968 to 1974. During the 1974-1978 period he worked as an assistant in the Oncology Department of Karaganda State Medical Institute in Kazakhstan. From 1978 he worked as a senior employee and then moved to the post of leading scientific worker and head of Department of Epidemiology and Cancer Statistics of the National Center of Oncology under the Public Health Ministry of Kyrgyz Republic.

He became Doctor of Medical Sciences (1992), and professor (2000) and is the holder of the Honored Doctor of Kyrgyz Republic Rank (2000). S. Iginov is the author of more than 120 research works. His research interests include: Clinical Oncology, Oncoepidemiology, Ethnical Demography, Medical Geography.