



SCIENCE
JOURNAL

MODERN

ENGINEERING AND
INNOVATIVE
TECHNOLOGIES

'2024

ISSUE №36

Part №3



International periodic scientific journal

—*ONLINE*

www.moderntechno.de



Indexed in
INDEXCOPERNICUS
(ICV: 84.86)

MODERN ENGINEERING AND INNOVATIVE TECHNOLOGIES

Issue №36
Part 3
December 2024

Published by:
Sergeieva&Co
Karlsruhe, Germany

Editor: Shibaev Alexander Grigoryevich, *Doctor of Technical Sciences, Professor, Academician*

Scientific Secretary: Kuprienko Sergey, *PhD in technical sciences*

Editorial board: More than 350 doctors of science. Full list on page:

<https://www.moderntechno.de/index.php/swj/about/editorialTeam>

Expert Board of the journal: Full list on page:

<https://www.moderntechno.de/index.php/swj/expertteam>

The International Scientific Periodical Journal "**Modern engineering and innovative technologies**" has been published since 2017 and has gained considerable recognition among domestic and foreign researchers and scholars.

Periodicity of publication: 6 times a year

The journal activity is driven by the following objectives:

- Broadcasting young researchers and scholars outcomes to wide scientific audience
- Fostering knowledge exchange in scientific community
- Promotion of the unification in scientific approach
- Creation of basis for innovation and new scientific approaches as well as discoveries in unknown domains

The journal purposefully acquaints the reader with the original research of authors in various fields of science, the best examples of scientific journalism.

Publications of the journal are intended for a wide readership - all those who love science. The materials published in the journal reflect current problems and affect the interests of the entire public.

Each article in the journal includes general information in English.

The journal is registered in IndexCopernicus, GoogleScholar.

DOI: 10.30890/2567-5273.2024-36-03

Published by:

Sergeieva&Co

Lußstr. 13

76227 Karlsruhe, Germany

e-mail: editor@moderntechno.de

site: www.moderntechno.de

Copyright

© Authors, scientific texts 2024



<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-018>

DOI: 10.30890/2567-5273.2024-36-00-018

MODERN CANCER PREVENTION STRATEGY IN THE CITY OF ODESA: NEW CONCEPTION AND PERSONIFICATED APPROACH

Rybin A.I.,

Kuznetsova O.V.

Odesa National Medical University

Summary. *The authors analyse the state of cancer care in Ukraine and its future trends, taking into account the impact of the war. The paper highlights and analyses the current aspects of the problem of early diagnosis of cancer against the background of reforming medicine in general and the oncological service in particular. The main problems of the oncological service in the region and the state of the organisation of diagnosis of malignant pathology by family doctors are shown. The experience of solving the main problems of the lack of high-quality oncological diagnostics, oncological prevention and interaction between primary and other levels of oncological care at the level of Odesa is presented, and a modern approach to improving the state of the oncological service in the region is proposed. The main vectors of development of the oncological service in the framework of healthcare reform in Ukraine are described.*

Key words: *oncological service; oncological diagnostics; oncological prevention; family doctor; oncological awareness; vaccine prevention.*

Today, especially during the full-scale invasion of our country by the enemy, the preservation and promotion of the health of Ukrainian citizens is one of the most important and urgent conditions for the country's progressive socio-economic development. The high level of morbidity, disability and mortality, difficulties in diagnosis, the need for mass screening activities, and complex and expensive treatment make malignant tumours one of the most socially significant problems in modern society.

Despite the development of strategic programmes to improve the effectiveness of cancer care, increased funding for the healthcare system in general and oncology in particular, mortality (as well as morbidity) has increased significantly, especially over the past two years of the war, taking into account stress as one of the main triggers of the oncological process. A modern oncology development strategy should be an integral part of a comprehensive national healthcare strategy. It should be noted that strategic planning and implementation of the cancer control programme should be based on monitoring, evaluation and review of the development process and its effectiveness as a basis for obtaining information, results and, of course, reporting. Since independence, Ukraine has implemented three state targeted programmes aimed at combating cancer in children and adults: the State Programme Oncology for 2002-2006, the State Programme Paediatric Oncology for 2006-2010, and the National Programme for the Control of Cancer for the period up to 2016. In addition, in 2008, the National Cancer Institute developed the programme '50 Steps to Fight Cancer in Ukraine'. However, all of these measures, or rather the funds allocated for the implementation of these programmes, concerned only the procurement of medicines, expensive equipment and consumables. A significant number of tasks related to the primary and secondary prevention of malignant tumours, screening, early diagnosis, development of scientific research, social, labour and psychological rehabilitation, and control of the cancer epidemiological situation were left behind.



As a result, despite the rather large amounts of funding, the indicators characterising the effectiveness of the cancer fight have remained unsatisfactory for more than 30 years.

The incidence of cancer in Ukraine in 2022 was even higher compared to 2021, with Ukraine ranking among the top ten countries in the world by this indicator (388.2 cases per 100,000 people; in 2019 alone, 138,509 men and women contracted cancer). The highest incidence is in Kyiv, Kirovohrad, Sumy, Kherson and Zaporizhzhia regions (446.2-433.4). In 2020, every fifth case of malignancy in Ukraine was detected at an advanced stage. The mortality rate is 171.8 cases per 100 thousand people, which is 61,289 deaths in just one year [3].

Insufficient public awareness of the risks of developing cancer, low participation in screening programmes; insufficient vigilance of primary care physicians and the lack of effective retraining programmes; imperfect psychological, social and legal components of a healthy lifestyle require intensified educational and preventive measures.

Today, cancer is one of the most pressing and unresolved medical problems of humanity. People from all continents and countries, rich and poor, men and women, develop malignant tumours. Unfortunately, the prospects are still bleak. If the incidence rate continues to grow, by 2030, according to WHO forecasts, the number of people who will be newly diagnosed with cancer will reach 27 million, 17 million people will die of cancer, and 75 million people will be carriers of this pathology.

In 2017, WHO Director-General M. Chan expressed the opinion that neither money, nor equipment, nor the best intentions can ensure sufficient progress in healthcare if there are no systems capable of providing timely and adequate medical care to those who need it most. These words fully apply to oncology. Unfortunately, today in Ukraine there is no scientifically based state document created by the programme-target method that would define the national policy and strategy in this area and reflect national needs and priorities. In essence, this programme should contain a realistic assessment of available resources and define a vision of the future of our medicine in general and oncology in particular.

This state of the problem leads to the fact that the effectiveness of medical care for patients with malignant tumours leaves much to be desired. Ultimately, this affects the life expectancy of the country's population and is a consequence of economic development, scientific progress in medicine, an increase in the educational level and general culture, the elimination of class and other a priori, non-economic inequalities, and effective and successful public policy. However, today it is necessary to clearly define the ways and methods of development of the healthcare system of Ukraine, not just medical care. Without this, it is impossible to achieve the goal of increasing the life expectancy and quality of life of the Ukrainian people and enhancing human potential.

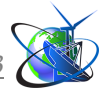
It has long been known that cancer morbidity and mortality depend on geography and vary significantly from continent to continent and country to country. This is primarily due to the availability of anti-cancer treatment methods. 90% of cancer deaths occur in developing countries [2]. Depending on the level of economic development, experts from the World Health Organization (WHO) distinguish



between countries with low, medium and high levels of healthcare resources. Naturally, cancer priorities in these countries are different. In Ukraine, resources are limited in quantity, quality and accessibility, there are problems with their distribution, problems with the organisation of cancer care and problems with the correct choice of directions for the development of the oncology service [8]. It is important to understand that the cost of cancer treatment is constantly growing and is likely to continue to rise. For example, the cost of treating one cancer patient per month with modern drugs already reaches USD 10,000. The total cost of treatment in complex cases can exceed hundreds of thousands. According to WHO experts, the more limited the available healthcare resources, the more emphasis should be placed on early diagnosis, outpatient treatment and short-term therapy. The development of high-tech cancer treatments in such countries should go hand in hand with government incentive programmes for prevention and early preclinical diagnosis. This is called cancer screening [1, 9].

According to the updated data of the National Cancer Registry of Ukraine, in 2022, 135,714 new cases of malignant neoplasms were registered in Ukraine; the overall crude cancer incidence rate was 375.6 per 100,000 people, including 386.2 in men and 366.3 in women [4, 5]. Compared to 2015, the overall incidence of malignant neoplasms did not change significantly and reached 345.2 per 100 thousand people according to the standardised indicator (Ukrainian population standard). In 2016, the highest incidence rates in the male population according to the standardised indicator were observed in Zaporizhzhia, Kirovohrad, Mykolaiv and Kherson regions (463.3-492.8 per 100 thousand men). In the female population, the highest incidence rates were recorded in Zaporizhzhia, Kyiv, Kirovohrad, Sumy regions and the city of Kyiv (325.9-364.5 per 100 thousand women) [3, 4]. There is no doubt that the absence of Odesa Oblast among the leaders in the incidence of malignant tumours is not a success of the cancer service at present, but the result of the work of the cancer service in previous years (2005-2015). However, over the past three years, there have been some rather alarming signals that could lead to a sharp increase in cancer incidence in the future. Mortality from cancer in the Odesa region ranks 2nd in the structure of population mortality. About 7-8 thousand new cases of cancer are registered annually in Odesa region, and about 4 thousand patients die. Among the newly diagnosed patients, 31.7% are people of working age, i.e. socially active and able-bodied people who receive a disability group and cease to contribute to the state's GDP [5]. The incidence rate in the region in 2016 was 293.8 (2014 - 367.0; 2015 - 350.0) per 100 thousand people and in Ukraine in 2015 - 314.0 per 100 thousand. Against the background of a decrease in the incidence of malignant neoplasms in the region, the proportion of patients with cancer in stages III-IV has been steadily increasing over the past five years (from 12.5% in 2012 to 50.1% in 2016 and 53.0% in 2017), which indicates both late treatment of patients for medical care and a decrease in oncological alertness among doctors in the region due to the lack of on-site consultations in the districts by specialists of the oncological dispensary [4-6].

Over the past 3 years (since 2020), a number of indicators characterising the state of diagnosis of malignant tumours in the region have deteriorated. In cervical



cancer, 29 patients, or 10.7% (2020: 10.3%), died before 1 year, including 11 patients from Odesa. About 20% of patients die within the first year after cancer diagnosis.

In the structure of morbidity, the following are ranked: 1st place - skin cancer (13.6%); 2nd place - breast cancer (11.5%); 3rd place - lung cancer (9.3%); 4th place - colon cancer (7.7%); 5th place - rectal cancer (5.6%). The frequency of detection of cancer during preventive examinations of the population has been increasing every year, over the past years it has increased from 24.9% (2008) to 32.7% (2014), but since 2015 it has sharply decreased and amounted to 21.1%, and in 2016 - 9.9% and significantly lower than the figure for Ukraine in 2014 - 29.8%, which indicates poor quality of preventive examinations [6].

The reasons for the deterioration in the quality of cancer care include

- Lack of control over the implementation of organisational and methodological support in level I and II institutions;
- insufficient accessibility of the route for patients with suspected or diagnosed malignancy;
- Lack of interconnection between primary, secondary and tertiary (oncological dispensary) levels of medical care for patients with suspected or diagnosed malignancy;
- lack of clear interaction between district and city oncologists and specialists of the regional oncological dispensary;
- lack of control over the route of a patient with a suspected or diagnosed malignancy;
- Lack of regular monitoring, evaluation, analysis of indicators aimed at preventing early diagnosis, treatment, rehabilitation and reducing disability.

In Ukraine, resources are limited in quantity, quality and accessibility, there are problems with their distribution, problems with the organisation of cancer care and problems with the correct choice of directions for the development of the oncology service [8].

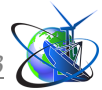
It is important to understand that the cost of cancer treatment is constantly growing and is likely to continue to rise.

For example, the cost of treating one cancer patient per month with modern drugs already reaches USD 10,000.

The total cost of treatment in complex cases can exceed hundreds of thousands.

According to WHO experts, the more limited the available healthcare resources, the more emphasis should be placed on early diagnosis, outpatient treatment and short-term therapy.

The development of high-tech cancer treatments in such countries should go hand in hand with government incentive programmes for prevention and early preclinical diagnosis. This is called cancer screening [1, 9]. According to the updated data of the National Cancer Registry of Ukraine, in 2022, 135,714 new cases of malignant neoplasms were registered in Ukraine; the overall crude cancer incidence rate was 375.6 per 100,000 people, including 386.2 in men and 366.3 in women [4, 5]. Compared to 2015, the overall incidence of malignant neoplasms did not change significantly and reached 345.2 per 100 thousand people according to the standardised indicator (Ukrainian population standard). In 2016, the highest incidence



rates in the male population according to the standardised indicator were observed in Zaporizhzhia, Kirovohrad, Mykolaiv and Kherson regions (463.3-492.8 per 100 thousand men).

In the female population, the highest incidence rates were recorded in Zaporizhzhia, Kyiv, Kirovohrad, Sumy regions and the city of Kyiv (325.9-364.5 per 100 thousand women) [3, 4]. There is no doubt that the absence of Odesa Oblast among the leaders in the incidence of malignant tumours is not a success of the cancer service at present, but the result of the work of the cancer service in previous years (2005-2015).

However, over the past three years, there have been some rather alarming signals that could lead to a sharp increase in cancer incidence in the future.

Mortality from cancer in the Odesa region ranks 2nd in the structure of population mortality.

About 7-8 thousand new cases of cancer are registered annually in Odesa region, and about 4 thousand patients die. Among the newly diagnosed patients, 31.7% are people of working age, i.e. socially active and able-bodied people who receive a disability group and cease to contribute to the state's GDP [5].

The incidence rate in the region in 2016 was 293.8 (2014 - 367.0; 2015 - 350.0) per 100 thousand people and in Ukraine in 2015 - 314.0 per 100 thousand. Against the background of a decrease in the incidence of malignant neoplasms in the region, the proportion of patients with cancer in stages III-IV has been steadily increasing over the past five years (from 12.5% in 2012 to 50.1% in 2016 and 53.0% in 2017), which indicates both late treatment of patients for medical care and a decrease in oncological alertness among doctors in the region due to the lack of on-site consultations in the districts by specialists of the oncological dispensary [4-6]. Over the past 3 years (since 2020), a number of indicators characterising the state of diagnosis of malignant tumours in the region have deteriorated.

After all, the situation with cancer morbidity is not improving... Critical times require tough anti-crisis solutions!

In 2023, the city of Odesa, under the auspices of the Department of Health, for the first time started vaccinating children against HPV using city budget funds as part of the municipal programme 'Health'. This vaccination is recommended, but not included in the National Vaccination Schedule in Ukraine, so the HPV vaccine, which is expensive, is not purchased from the state budget. Currently, only two cities in Ukraine vaccinate children against HPV free of charge - Odesa and Kyiv. In Odesa, the quadrivalent Gardasil vaccine was purchased for vaccination, which provides effective protection against the four most common types of HPV that most often cause cervical cancer in women, as well as other diseases of the reproductive system in women and men. More than 1600 children have already received HPV vaccinations at the expense of the Odesa city budget. It is planned to continue the programme of free HPV vaccination.

In addition, in 2024, the city of Odesa plans to establish a centre for oncological diagnostics and prevention, whose main tasks will be to improve the route for patients with suspected or diagnosed cancer, improve interaction between family doctors and secondary and tertiary care physicians, eliminate monopoly influence on



the formation of patient flows, objectively verify the diagnosis, more efficiently use available resources and fully work on primary and secondary prevention of cancer in the region.

Thus, given the above, it should be recognised that the fight against cancer at the national level does not begin in operating theatres or chemotherapy wards, but rather in the offices of those who make decisions on planning, financing and development of the entire healthcare system in our country.

Based on the above, the following **conclusions** can be drawn.

1. In order to effectively implement measures for early diagnosis and prevention of malignant tumours, as well as to improve the performance of oncological services in the context of healthcare reform, coordination of actions between various practical healthcare services, primarily oncological and primary care (family doctors), is necessary.

2. In order to solve the problems of secondary prevention of malignant tumours, it is necessary to clearly organise early detection of diseases by the medical staff of the primary health care centres with the introduction of common standards of diagnostic and dispensary work on malignant tumours.

3. Monitoring the health status of the population should become an important task of healthcare authorities. In order to consolidate efforts, it is necessary to ensure monitoring of the health status of the population on the basis of the department of oncological diagnostics and oncological prevention, which should become a coordinating centre for preventive measures.

4. The identified indicators of the prevalence and structure of malignant neoplasms in Odesa Oblast should be taken into account by the heads of health care facilities and health care authorities when planning and organising cancer care.

5. Further development of the targeted oncology programme is needed to implement the following tasks: strengthening the role of primary health care, intensifying the work of family doctors in oncological diagnostics and increasing the cancer awareness of primary health care doctors; development of inter-territorial specialised oncological centres, reconstruction and construction of radiology departments of oncological institutions in the region; advanced training of medical workers of the oncological service; development of early diagnostic methods, new approaches to the treatment of malignant tumours.

References

1. Bondar O.V., Rybin A.I., Busel S.V. Experience of improving specialised oncological care in the Odesa region: a new platform in oncological services / XIV Congress of Oncologists and Radiologists of Ukraine, 30 September - 2 October, Kyiv. 2021.

2. Bondar O.V., Rybin A.I., Muzyka V.V. Cervical cancer screening programme with HPV testing / Bulletin of Marine Medicine. - 2022. - №1 (94). - C. 58-64. DOI <http://dx.doi.org/10.5281/zenodo.6414037>.

3. Dumansky Y.V., Chekhun V.F. Oncology in Ukraine: the state of the problem and ways of development / Oncology. - 2022. - Vol. 24, No. 3. C. 1-6. DOI: [10.32471/oncology.2663-7928.t-24-3-2022-g.10652](https://doi.org/10.32471/oncology.2663-7928.t-24-3-2022-g.10652).



4. Cancer incidence on five continents. Electronic resource: <http://ci5.iarc.fr/CI5I-X/Default.aspx>.

5. Cancer in Ukraine, 2021-2022. Incidence, mortality, performance indicators of the oncological service. Bulletin. National Cancer Registry of Ukraine, 24 / Edited by. Fedorenko Z.P.: 145 p.

6. Rybin A.I. Modern aspects of quality management of specialised oncological care: a new platform in oncological service / Clinical Oncology. - 2018. - Vol. 8, No. 4 (32). - P. 251-253.

7. Stepula V.V., Lukianchuk O.V., Rybin A.I. Cervical cancer in Ukraine: problems and solutions / Odesa Medical Journal. - 2006. - No. 3(95). - P. 83-86.

8. Stepula V.V., Lukyanchuk O.V., Rybin A.I. Prevention of ovarian-menstrual cycle disorders in patients of reproductive age after fractional curettage of the uterus / Oncology. - 2006. - Vol. 8, No. 3. - P. 264-266.

9. Mouli S., Baker J.C., Brown D.B. (2017) Interventional Oncology Service Development. Semin. Intervent. Radiol. 34(2): 182-186

10. Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2019 global survey. Geneva: World Health Organization; 2020.

11. Centers for Disease Control and Prevention (2020) Cancers associated with human papillomavirus, United States, 2012-2016. August, Accessed September 23, 2019.

12. Gardasil. European Medicines Agency Web site. www.ema.europa.eu/en/medicines/human/EPAR/gardasil. Accessed March 2, 2021.

13. Atun R., Knaul F.M. (2012) Innovative financing: local and global opportunities. In: Closing the Cancer Divide: An Equity Imperative. F.M. Knaul, J. Galow, R. Atun, A. Bhadelia (ed.). Boston: Harvard Global Equity Initiative: 353 p.

14. Barnett C., Hort K. (2013) Approaches to regulating the quality of hospital services in low- and middleincome countries with mixed health systems: A review of Their Effectiveness, Context of Operation and Feasibility. Working Paper Series 32, The Nossal Institute for Global Health, University of Melbourne, Australia.

15. Ferlay J., Ervik M., Lam F., Colombet M., Mery L., Pineros M. et al. Global Cancer Observatory: Cancer Today. Lyon: International Agency for Research on Cancer; 2020 (<https://gco.iarc.fr/today>, 2021).

16. Mouli S., Baker J.C., Brown D.B. (2017) Interventional Oncology Service Development. Semin. Intervent. Radiol., 34(2): 182–186.

17. World Health Organization Comprehensive Cervical Cancer Control: A Guide to Essential Practice. 2nd ed Geneva, Switzerland: 2018; WHO Press.

Резюме. Авторами проведений аналіз стану онкологічного сервісу в Україні та його майбутніх тенденцій з урахуванням та впливом війни. В роботі висвітлено та проаналізовано сучасні аспекти проблеми ранньої діагностики онкологічних захворювань на тлі реформування медицини в цілому та онкологічної служби зокрема. Показано основні проблеми онкологічного сервісу регіону та стан організації діагностики злоякісної патології сімейними лікарями. Наведено досвід вирішення на рівні міста Одеса основних проблем відсутності якісної онкодіагностики, онкопrevenції та взаємодії між первинною та іншими ланками надання онкологічної допомоги, а також запропонований сучасний підхід до



покращення стану онкологічної служби регіону. Описано основні вектори розвитку онкологічної служби в рамках реформування медицини в Україні.

Ключові слова: онкологічна служба; онкодіагностика; онкопrevenція; сімейний лікар; онконастороженість; вакцинопрофілактика.



<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-004> 57

PROSPECTS FOR THE USE OF EXTRUSION AS A TECHNOLOGICAL METHOD THAT CAN IMPROVE THE BIOAVAILABILITY OF AMINO ACIDS IN FEED

*Obodovych O. M., Tselen B. Ya., Nedbailo A. Ye.,
Gozhenko L. P., Radchenko N. L.*

<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-038> 63

PHOTOSYNTHETIC ACTIVITY OF FORAGE BEET PLANTS DEPENDING ON THE VARIETY IN THE CONDITIONS OF THE RIGHT BANK FOREST STEPPE OF UKRAINE

Ovcharuk V.I., Ovcharuk O.V., Ievstafieva I.M.

<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-058> 72

USE OF IMMUNO-CORRECTIVE AND BIOCIDAL DRUGS IN POULTRY DIETS

Chechet O., Lozhkina O., Prylipko T.M., Kostash A.

<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-075> 77

FEASIBILITY STUDY OF THE BIOTECHNOLOGY PRODUCTION PROJECT

Kovalenko V. M., Bashlai S. V.

Innovations in medicine, pharmaceuticals, chemistry, veterinary medicine

<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-012> 84

ANALYSIS OF THE EFFECTIVENESS OF MULTIMODAL ANESTHESIA IN PATIENTS WITH CANCER OF THE BODY OF THE UTERUS DURING HYSTERECTOMY

Bosenko K.V., Budniuk O.O.

<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-018> 94

MODERN CANCER PREVENTION STRATEGY IN THE CITY OF ODESA: NEW CONCEPTION AND PERSONIFICATED APPROACH

Rybin A.I., Kuznetsova O.V.

<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-052> 102

BIOMECHANICAL APPROACHES TO LONG-TERM SPLINTING OF MOBILE TEETH IN PERIODONTITIS

Belikov O.B., Belikova N.I., Sorokhan M.M

<http://www.moderntechno.de/index.php/meit/article/view/meit36-00-053> 112

HYGIENIC ASSESSMENT OF AEROGENE INFLUENCE OF XENOBIOTICS ON FORM THE HEALTH OF CHILDRENS

Rublevska N.I.