

In the period 2006–2010, the National Cancer Registry indicated a gradual increase in the incidence of malignant tumours among men, from 64,092 thousand in 2006 to 70,024 thousand in 2010. In the reference period, the number of deaths due to malignant tumours among men oscillated around 52 thousand.

The aim of this study was to analyse the incidence of malignant tumours in the male population of Poland in the period 2006–2010.

The study material comprised data obtained from the National Cancer Registry and from the Central Statistical Office, available on the websites of these institutions.

The malignant-tumour incidence rate among the male population in 2006–2010 showed a slow but steady growth, while the death rate dropped slightly at the end of 2010. The hypothesis that the cancer-incidence risk grows with age has been proven, and a substantial increase in this risk is observed from the fourth decade of life. The most common malignant tumours in Poland in the analysed period included lung cancer, followed by prostate cancer and colorectal cancer.

Future prophylactic and educational programmes should be addressed to men prior to reaching the age of increased cancer risk.

Key words: malignant tumours, incidence, male population.

Contemp Oncol (Pozn) 2015; 19 (6): 474–479
DOI: 10.5114/wo.2015.56655

An analysis of malignant tumour incidence in the male population of Poland in the period 2006–2010

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Introduction

The average man in Poland lives 8 years less than the average woman, and displays a lower health awareness [1]. In the age group 45–49, 107 women occur for each 100 men, and this trend indicates an increase in the subsequent age groups [2].

The major causes of death in Poland include cardiovascular diseases, carcinomas (in particular tobacco-related) [3–6] and deaths due to external causes, such as accidents, injuries or poisoning [2].

In global terms, cancer constitutes the third major cause of death, and the second major cause in Poland, also posing one of the most challenging health, economic and social problems of the 21st century [2, 7]. The analysis of the epidemiological situation in the field of carcinomas requires, among other things, conducting an incidence analysis of this group of diseases.

Morbidity, also referred to as incidence, reflects the number of newly registered cases of a given disease in a specified period (a year) when converted (usually) to per 10 thousand or 100 thousand individuals in the population examined [8]. Incidence is a very valuable measure of health-related needs. The monitoring of incidence trends allows the identification of changes over time and prompt reaction to the growing needs in certain medical specialisations (e.g. oncology) or treatment methods, and to the needs related to prophylaxis and health promotion.

In 2008, Poland was a European country characterised by an averagely low incidence and generally high mortality due to malignant tumours. The incidence was lower as compared to most EU-15 countries, but the mortality was much higher [7], which appears alarming.

This situation results, among other things, from the relatively low level of the demographic old-age of the Polish society as compared to the European Union. However, the vital-statistics trend which has prevailed since the end of the 20th century, manifested through the dropping birth rate, is likely to lead to the gradual ageing of the society. This may, in consequence, contribute to an increased incidence of malignant tumours in the future [9].

In 2006–2010, the National Cancer Registry indicated a gradual increase in the incidence of malignant tumours among men, from 64,092 thousand in 2006 to 70,024 thousand in 2010. In the same period, the number of deaths due to malignant tumours among men oscillated around 52 thousand [2, 6, 7].

The aim of this study was to analyse the malignant-tumour incidence in the male population of Poland in the period 2006–2010.

Material and methods

The study material comprised data obtained from the National Cancer Registry and the Central Statistical Office, available on their websites. The Register covers the incidence of carcinomas in the Polish population, which are coded in accordance with the International Statistical Classification of Diseases and Re-

lated Health Problems (ICD Revision 10, C00-D09). This data is presented chronologically in annual reporting periods, and is broken down by gender, age and voivodeship. This kind of information is collected in the Register on the basis of cancer-notification forms (MZ/N-1a). Their analysis makes use of basic statistical indicators such as absolute numbers, percentages, crude rates and standardised rates [10].

The epidemiological analysis employed absolute numbers, percentages, and also standardised and crude incidence rates, along with the cumulative risk of cancer by age, domicile and cancer type. The crude incidence (death) rate reflects the risk of contracting (dying of) a malignant tumour, and determines the number of registered incidence (death) cases due to a given cancer (cancer group) per 100 thousand people in a given year. The standardised incidence (death) rate (by age) reflects the risk of contracting (dying of) a malignant tumour, and determines the number of incidence (death) cases that would occur in a given population if its age structure were the same as in the standardised population, when converted per 100 thousand people. "The standard global population" was assumed as the population for the purpose of standardised rates. The population structure by gender and by 5-year age group was presented using data provided by the Central Statistical Office (CSO), based on the results of the 2011 National Census [11].

The resulting data was analysed using Microsoft Excel 2010 and Statistica 10.0 software.

Results

A gradual increase in the crude and standardised incidence rates was recorded in the reporting period, together

with a visible percentage increase in the male population aged 45 and more (society ageing) and a relatively constant number of men in the entire population (Table 1, Fig. 1).

The incidence of carcinomas is strongly age-dependent. The incidence rate displays an exponential dependence on age between the fourth and seventh decade of life (Fig. 1) [7].

The number of deaths due to malignant tumours in Poland for the last five decades has increased by nearly 2.4 times [7]. In the analysed period, it amounted to 463,521 thousand, including 260,531 thousand deaths among men, which accounted for 56.2% of all deaths due to malignant carcinomas in the discussed period (Table 2).

Lung cancer is the most-common type of cancer among men, in terms of frequency, accounting for around one-fifth of all incidence cases (22.1%). It is followed by prostate cancer (12.5%), colorectal cancer (12.2%) and bladder cancer (6.7%). Malignant skin cancer, stomach cancer, kidney cancer, laryngeal cancer, pancreatic cancer and leukaemia are also among the ten most frequent carcinomas contracted by men. Lung cancer constitutes the most frequent cancerous cause of death among men (over one-third, i.e. 31.7%, of all deaths). Colorectal cancer constitutes 10.8% of all deaths due to cancer, and prostate cancer 7.5%. Stomach cancer, bladder cancer, pancreatic cancer, kidney cancer, leukaemia and brain cancer are also among the major cancerous causes of death (Table 3).

The five-year relative survival rate of male patients with malignant tumours, diagnosed in 2000–2002 and 2003–2005, is shown in Table 4 [12, 13]. The highest increase is observed in the five-year survival rates of men suffering with prostate cancer, followed by bladder cancer and colorectal cancer, while a slight downward trend involves male patients with brain cancer and pancreatic cancer.

Table 1. Incidence of malignant tumours, number as a total in the population and percentage in the group of 45 years and above amongst men in Poland in 2006–2010 – own study [basing on 7]

Year	Absolute number	Crude rate	Standardized rate	Number of men in population in total (in thousand)	Number of men in population in total (%)	Number of men in population above 45 year of life	Number of men in population above 45 year of life (%)
2006	64 093	347.6	249.8	18 427	48.3	6 777 345	36.8
2007	64 292	349.1	245.6	18 412	48.3	6 842 383	37.2
2008	65 483	355.7	245.8	18 415	48.3	6 903 398	37.5
2009	68 854	373.7	254.2	18 429	48.3	69 57 117	37.7
2010	70 024	375.5	251	18 653	48.4	7 117 429	38.2
Total	332 746						

Table 2. Mortality due to malignant tumours amongst men in Poland in years 2006–2010 [basing on 7]

Year	Number of cases	Crude rate	Standardized rate	Number of cases in all population
2006	51 777	280.8	195.7	463 521
2007	52 324	284.1	193.3	
2008	52 219	283.7	188.6	
2009	52 394	284.4	185.6	
2010	51 817	277.9	178.3	
Total	260 531			

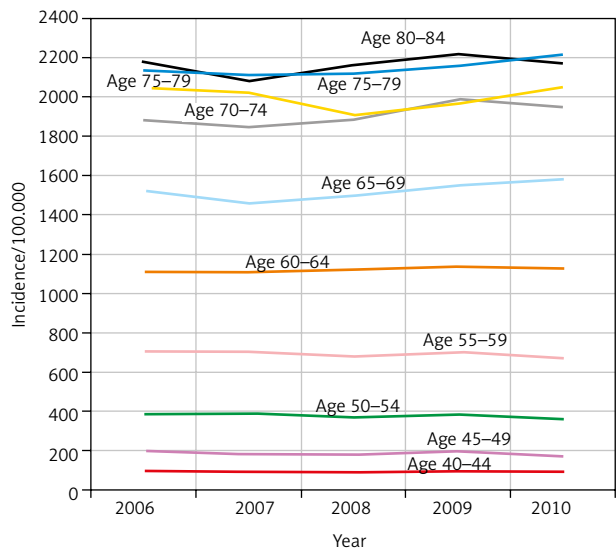


Fig. 1. Incidence of malignant cancers in Poland in 2006–2010 depending on the age [7]

Cancer detectability among men differs in particular voivodeships of Poland. However, the types of most frequently recorded types of malignant tumours correspond to the national trends. The voivodeships with the largest numbers of registered carcinomas (over 34% of all notifications) in the analysed period included the Śląskie, Mazowieckie and Wielkopolskie Voivodeships. These voivodeships are inhabited by around 34% of the entire Polish population. The highest standardised incidence rates and the highest cumulative risk of cancer were recorded in

the Wielkopolskie, Dolnośląskie and Pomorskie Voivodeships, while the highest mortality rates involved the Kujawsko-Pomorskie, Warmińsko-Mazurskie and Pomorskie Voivodeships (Table 5).

Discussion

Within the last thirty years, the incidence of malignant tumours in Poland has soared. Since the beginning of the 21st century, we have noted a gradual ceasing of this trend, and in the recent decade the incidence curve has plateaued. In the analysed period, from 2006 to 2010, the malignant-tumour incidence among the male population indicated a slow but steady growth, while the death rate dropped slightly at the end of 2010 [2, 7]. The incidence of malignant tumours in Poland is lower than the EU average, but mortality is around 20% higher among men [7]. The five-year survival rate of patients with malignant tumours within the first decade of the 21st century grew from 32.9% to 37.3% among men, and from 51.2% to 53.5% among women. This growth might reflect an increased efficiency of cancer treatment in Poland, but there is no specific evidence to prove this hypothesis [12].

The difference in the 5-year survival rate among men and women stems, among other things, from the fact that organic carcinomas with poor prognosis, i.e. lung cancer, laryngeal cancer and oesophageal cancer, constitute over one-third of all cancer-incidence cases among men [13]. These trends require further thorough monitoring and an increased efficiency of oncologic care in our country.

The incidence risk grows with age, with peak values between the age of 55 and 79. Most incidence cases, i.e. 70%, among men occur after the age of 60. The risk of contracting cancer grows with age, and a considerable increase is

Table 3. Incidences of falling ill and deaths at men, as concerns 10 major malignant tumours in 2006–2010 [basing on 7]

New cancer cases					The type of malignant cancer	Deaths				
Number of cases	Crude rate	Standardized rate	Cases in %	95% CI		Number of cases	Crude rate	Standardized rate	Cases in %	95% CI
73 443	79.5	54.3	22.1	21.9–22.2	lung C34	82 575	89.4	60.2	31.7	31.5–31.9
41 476	44.9	30.1	12.5	12.3–12.6	prostate C61	19 486	21.1	12.9	7.5	7.4–7.6
40 703	44.1	29.71	12.2	12.1–12.3	large intestine C18-C21	28 073	30.4	19.7	10.8	10.7–10.9
22 404	24.3	16.1	6.7	6.6–6.8	urinary bladder C67	11 917	12.9	8.2	4.6	4.5–4.7
21 283	23.1	15.1	6.4	6.3–6.5	skin C44	3945	4.3	2.9	1.5	1.5–1.6
16 930	18.3	12.4	5.1	5.0–5.2	stomach C16	17 610	19.1	12.6	6.6	6.7–6.9
12 526	13.6	9.6	3.8	3.7–3.8	kidney C64	7780	8.4	5.7	3.0	2.9–3.1
10 338	11.2	7.8	3.1	3.0–3.2	larynx C32	7342	7.9	5.5	2.9	2.8–2.9
8141	8.8	6.0	2.4	2.4–2.5	pancreas C25	11 136	12.1	8.1	4.3	4.2–4.4
7470	11	6.6	2.2	2.2–2.3	leukaemia C91-C95	7229	7.8	5.4	2.8	2.7–2.8
7048	7.6	6.0	2.1	2.1–2.2	brain C71	7042	7.6	5.6	2.7	2.6–2.8
332 746	360.4	249.3	100	–	Cancers in total	260 531	282.2	188.1	100	–

Table 4. The indicator of 5-year relative survival of patients with malignant neoplasms in Poland in men diagnosed in 2000–2002 and 2003–2005 [basing on 12 and 13]

The type of malignant cancer	Number of cases 2000–2002	5-year survival 2000–2002 (%)	95% CI	Number of cases 2003–2005	5-year survival 2003–2005 (%)	95% CI
Lung C34	43 470	10.8	64.1–66.2	45 465	11.9	11.5–12.2
Prostate C61	15 845	65.2	64.1–66.2	21 007	76.4	75.5–77.3
Large intestine C18–C21	18 462	43.3	42.4–44.2	21 998	47.6	46.7–48.4
Urinary bladder C67	11 535	57.1	55.8–58.2	12 945	61.4	60.2–62.5
Melanoma C43	2409	54.4	52.0–56.7	2971	56.4	54.3–58.6
Stomach C16	9825	14.9	14.0–15.7	9967	16.4	15.5–17.2
Kidney C64	6572	52.1	50.6–53.5	7177	54.6	53.2–56.0
Larynx C32	6819	50.6	49.1–51.9	6739	50.6	49.2–52.0
Pancreas C25	4896	8.9	8.7–9.2	4969	8.5	8.3–8.7
Leukemia C91–C95	3386	32.9	30.9–34.7	4347	39.4	37.7–41.2
Brain C71	3547	23.4	20.9–23.9	3722	22.5	21.9–24.9
Cancers in total	1 558 834	32.9	32.5–33.1	176 706	37.3	37.0–37.6

Table 5. The incidence of falling ill and deaths according to provinces amongst men in the period of 2006–2010 [basing on 7 and 11]

Province	Number of cases	Standardized rate	Cases in %	95% CI	Population on 31 March 2011	Number of deaths	Standardized rate	Deaths in %	95% CI
Greater Poland	41 248	290.9	12.4	12.3–12.5	3 447 441	22 896	200.4	8.8	8.6–8.9
Pomeranian	40 019	284.0	12.0	11.9–12.1	2 276 176	15 583	203.8	6.0	5.9–6.1
Lower Silesian	32 375	281.8	9.7	9.6–9.8	2 915 238	20 758	198.3	8.0	7.9–8.1
Kuyavian-Pomeranian	28 671	271.1	8.6	8.5–8.7	2 097 634	15 298	213.9	5.9	5.8–6.0
Subcarphation	27 588	265.6	8.3	8.2–8.4	2 127 285	12 332	167.4	4.7	4.6–4.8
Świętokrzyskie	22 276	265.3	6.7	6.6–6.8	1 280 727	8943	176.1	3.4	3.3–3.5
Lublin	21 225	255.3	6.4	6.3–6.5	2 175 700	13 648	168.2	5.2	5.1–5.3
Warmian-Masurian	19 774	250.1	5.9	5.8–6.0	1 452 147	9556	206.2	3.7	3.6–3.8
Lesser Poland	18 908	244.3	5.7	5.6–5.8	3 337 471	20671	175.3	7.9	7.8–8.0
Opole	18 840	243.8	5.6	5.5–5.7	1 016 213	6802	180.1	2.6	2.5–2.6
Silesian	12 817	243.2	3.8	3.7–3.9	4 630 364	33 076	189.8	12.6	12.5–12.7
Lodz	12 334	237.9	3.7	3.6–3.8	2 538 677	18 956	192.6	7.3	7.2–7.4
Lubusz	11 345	235.5	3.4	3.3–3.5	1 022 843	6443	190.6	2.5	2.4–2.6
West Pomeranian	8945	214.5	2.7	2.6–2.8	1 722 883	11 693	198.2	4.5	4.4–4.6
Masovian	8610	212.9	2.6	2.5–2.7	5 268 660	35 686	179.2	13.4	13.3–13.4
Podlachian	7771	199.9	2.3	2.2–2.4	1 202 365	8195	177.5	3.1	3.0–3.1
In total	332 746	249.3	100	8.6–8.7	38 511 824	26 0531	188.1	100	6.7–6.9

observed from the fourth decade of life [2, 6, 7, 14]. Such a trend in the incidence change curve indicates the occurrence of specific cancer-risk factors associated with different stages of life. This data should be taken into account when planning any studies on cancer-risk factors related to human activity in various decades of life, and also when planning and establishing prophylactic programmes.

Malignant tumours constitute the second major cause of death in Poland. The epidemiological projections for the coming years are not optimistic, given the progressing ageing of society. This contributes to premature deaths among both women and men [2, 10, 11, 15], exerting an influence on the socioeconomic situation of Polish families and on the condition of public finances. For decades, such

a situation has been triggered, among other things, by a low level of knowledge of pro-health behaviour, including oncologic prophylaxis in the female and male populations [16–19].

The continuously high incidence and mortality rates due to cancer in Poland require profound changes in the financing, planning, organisation, implementation and monitoring of the efficiency of various activities undertaken by the government administration (and mainly by the Ministry of Health) in the field of public-health improvement. It should be noted that the plans in the multiannual *National Cancer Control Programme* are being realised in 2006–2015. The main goals of the Programme include preventing further growth in the incidence rate of cancer, and achieving average European early-cancer detection and treatment-efficiency rates. Having inspected the implementation of the *National Cancer Control Programme* objectives by the Minister of Health in 2009–2013, the Supreme Audit Office has assessed their efficiency in a negative way. As revealed by the said inspection, the Programme goals determined by the Act have not been achieved, and the early cancer detection and treatment-efficiency rates are still very far from the European average [20, 21].

Other comprehensive programmes must be undertaken in the future, with a view to promoting modern prevention, diagnostic and therapeutic methods. The measures to be taken must provide for raising the social awareness of pro-health behaviour, including oncologic prophylaxis, by making better use of human resources available within the healthcare system. This is both the most essential and the cheapest way to conduct system activities oriented towards improving the state of health of the population [22, 23].

In 2010, 24.5% of all deaths in Poland were caused by malignant tumours. Cancer is the major cause of premature deaths among both women and men. The most-frequent malignant tumours in Poland include tracheal cancer, bronchial cancer and lung cancer, followed by prostate cancer and colorectal cancer [2, 7].

Screening tests constitute an indispensable tool for ensuring the early diagnosis of cancer. They allow cancer to be detected at an early stage. In Poland, there are screening test programmes, financed from public resources, which allow the detecting of colorectal cancer, breast cancer and cervical cancer. However, these measures are obviously insufficient, which often leads to late diagnosis of cancer at an advanced 3rd or 4th stage [24, 25].

The distribution of the incidence of malignant tumours among men by voivodeship also forms an interesting element of the analysis. Over one-third of all cancer-incidence cases are attributable to three out of sixteen voivodeships (i.e. Śląskie, Mazowieckie and Wielkopolskie), which are altogether inhabited by around 34% of the entire Polish population. These findings require further examination, as the regional differences observed may be caused by differences in the infrastructure of healthcare systems, communication, interest on the part of local-government bodies in the protection of citizens' health, such demographic features as age and education, and access to various sources of information.

The analysis of death rates by voivodeship also requires an in-depth analysis in the context of improving the healthcare system efficiency [26].

In conclusion: the incidence rate of malignant tumours in the male population in 2006–2010 indicated a slow but steady growth.

The mortality rate decreased slightly at the end of 2010. This trend requires a separate analysis.

The incidence rate of cancer grows with age, with peak values between the age of 55 and 79. The upward trend starts with the fourth decade of life, and most incidence cases occur after the age of 60 (70% of new incidences).

In the analysed period, the most common types of malignant tumours in Poland have been lung cancer, followed by prostate cancer and colorectal cancer. This trend has not changed for the last decade as regards the first two cancer types mentioned, whereas colorectal cancer has gone up from fifth to third position in the analysed period.

The conditions of reporting and mortality due to malignant tumours by voivodeship should be subject to separate analyses, in the context of shaping the regional and national health policy.

The authors declare no conflict of interest.

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Submitted: 12.12.2014

Accepted: 7.04.2015