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Original scientific paper

Neoplasms (C00-D48) in Osijek-Baranja County from 2001 to 2006, Croatia

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A B S T R A C T

The Institute of Public Health of the Osijek-Baranja County has processed the data on cancer patients that were collected from mandatory county hospitals data reports, county bureaus of statistics and the County Register of Deaths. The cancers were defined according the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), codes of malignant neoplasms (C00-C97), in situ neoplasms (D00-D09) and neoplasms of uncertain or unknown behaviour (D37-D48). The aim of this article was to show the size of the cancer problem in Osijek-Baranja County (OBC) according to the all ICD-10 cancer groups. The cancer incidence and mortality estimated in period 2001–2006 were prepared for all cancers based on gender and for age groups 0–19, 20–44, 45–64, 65+ by the year of the first diagnosis of cancer. The median age at cancer diagnosis was 62.7 years, 61.2 years for females and 64.1 years for males. Applying the EU age-standardized rate, the average annual incidence and mortality rates in the OBC were 411.6/100,000 and 240.7/100,000, respectively. The incidence rates in both genders were highest for neoplasms of digestive organs (C15-C26), respiratory and intrathoracic organs (C30-C39) and for breast (C50) (101.1, 63.6 and 44.3/100,000, respectively). The first two groups of cancer in both genders were also the leading groups of cancer in males (141.6 and 124.9/100,000). The third position in males belonged to neoplasms of male's genital organs (C60-C63, 58/100,000). The leading group in females was C50 (79.3/100,000), followed by groups C15-C26 (73.2/100,000) and in situ neoplasms (D00-D09) (51.4/100,000). The course and shape of mortality rate in the whole corresponded to the incidence rate, but at the lower level. The only exception referred to group C15-C26 (56.8/100,000) as leading mortality cancer group in females. The overall 5-year relative survival was 40.1%. Considering females, this rate amounted to 48.8% while this figure was much lower in men – 32.4%. In age group 65+, 52.6% of cancer patients developed a cancer and 65.4% of patients died at the same age. These basic parameters indicate that the OBC must put great efforts in creating a long-term strategy for cancer prevention and early diagnostics in order to prolong life and improve the quality of life of cancer patients and raise the proportion of 5-year survival.

Key words: *cancer, age-standardized mortality rate, age-standardized incidence rate, 5-year relative survival, age distribution, median age, C00-D48, Croatia, Osijek-Baranja County*

Introduction

The Europe Against Cancer programme was established in the 1980s due to concerns of increasing cancer incidence and death rates. The main areas of its activity focussed on prevention, tobacco control (as one of the most important risks), screening, education and training[1]. The success of such a preventive and basically long-term programme should not be assessed within a short period of time. Although in the period 1985–2000, the results did not meet the expectations, the durability and quality of the program has to demonstrate positive results, despite the aging population. In 2012, it came to an increase in the mortality from lung in females and from pancreatic cancer in both genders, whiles the mortality rate from all other cancers decreased[2]. The increased in cancer incidence in the EU from 2004 to 2006 indicates that the cancers in the EU remains a major public health problem requiring strong measures, particularly primary prevention[3–5]. Despite the aging popula-

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tion in the EU and an increased incidence of cancers in an older age, it is expected that until the year 2020, the EU will have managed to raise the survival and reduce the mortality[6,7]. The most common cancer sites are lung, breast and colorectal cancer. Given the prognosis, pancreatic cancer and lung cancer, followed by cancer of the stomach and liver, will be the leading diagnoses in cancer's mortality[8,9]. In the last 10 years, total incidence and mortality cancer rates have been falling continuously in the USA[10]. Certainly, better prevention and treatment produce positive financial effects, especially if the future trend of population aging is taken into consideration[11]. Compared with other European countries, Croatia and OBC holds a high and unfavourable position in cancer morbidity and mortality[12]. In the OBC, several studies were conducted (regarding to the some cancer sites or even cancer groups), but there was not a single research that encompasses all cancer groups[13-15].

The aim of this article is to provide general information on cancer in the OBC using the ICD-10. General information about cancer in Croatia has so far existed only at the state level whereas at the county level, such information was mostly unavailable.

Materials and Methods

Data source

Although the representativeness of their data might be challenged, mandatory county hospitals data reports, county bureaus of statistics and the County Register of Deaths still represent the only available source of information on the profile of cancer in the OBC. All data from the 2001–2006 period originate from these institutions. The cohort studied in this article included all people with cancer who were registered as the patients in one of two hospitals in OBC in the time period from 2001 to 2006 (follow up period from 1996 to 2010). Based on these sources, a database of people who were hospitalized in the area of the OBC for any reason whatsoever (including cancer) has been generated[16,17]. The data on each of the hospitalized patients have been supplemented with data obtained from the Register of Deaths.

Data on every person with cancer are accompanied with their chronological order of illness and hospitalization. The database involved all hospitalizations and all data on ONKO or BSL forms (mandatory statistical patterns for all hospitalized patients in Croatia). The ONKO form is mandatory statistical reports on every hospitalized cancer patients in Croatia. The BSL form is a mandatory statistical report on every hospitalized person, regardless of the causes of hospitalization. All cancer patients coming from this area are hospitalized in state-owned (public) hospitals since there are still the only hospitals here.

Statistical analysis

The cancers were classified according to the ICD-10 group of malignant neoplasms codes C00-D48. The cancer incidence and mortality estimates in the period from 2001 to 2006 were prepared for all cancers based on gender and for age groups 0–19, 20–44, 45–64, 65+ by the year at cancer diagnosis. Based on the 2001 census, the analysis covered a total population of 330.506 people in the OBC. The Croatian National Health Insurance is a universal health insurance that covers all or almost all costs treatment (depending on a personal choice of the type of insurance) of Croatia citizens and provides them with the same chances of recovery. Therefore, this article can be said to comprise the entire population of cancer patients treated in the OBC.

Descriptive statistics were used for both age and gender. The survival rates reflect the outcome up to 5 years after diagnosis for cancer patients who were diagnosed during the period 2001–2005 and who have been followed up for ≥5 years, to the end of 2010. All survival estimates were age-adjusted on the basis of four age groups. The

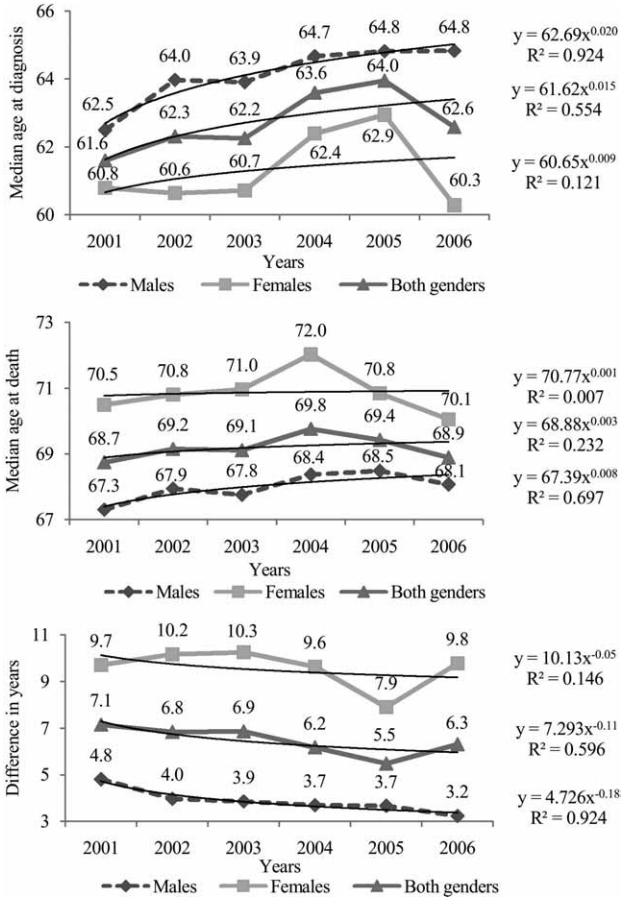

Fig. 1. The median age of cancer patients at diagnosis and at death by primary cancer site (C00-D48) and difference in years between median age at death and at diagnosis in the OBC, periods 2001-2006. The rising trendlines in males suggests that a very strong and extremely dependable relationship exist between the median age at diagnosis and years, R^2=0.924 (R^2>0.80) and strong relationship between median age at death and years, R^2= 0.697 (R^2>0.48<0.81). The rising trendlines in females suggests that a weak relationship (if a relationship even exists) exists between the median age at diagnosis and years, R^2=0.121 (R^2> 0.04<0.16) and no relationship between median age at death and years, R^2=0.007 (R^2>0.00<0.03).

analyses were conducted using age-specific rates, the age-standardization-direct method and 95% confidence intervals (95% CI). The standardized incidence and mortality ratios as well as the 95% confidence intervals were computed for C00-D48 pursuant to the year at cancer diagnosis. Also, both ratios were stratified according to the year at cancer diagnosis, age and gender and adjusted to fit into two 3-years time periods (2001–2003 and 2004–2006). The median age is the observation ranked in the middle; that is 50% of patients are diagnosed at an older age and 50% are diagnosed at a younger age compared to the median. The EU standard population was used in the analysis[18]. The length of stay was determined according to the date of admission and to the date of discharge with regard to the index admission. The SAS statistical package (version 9.1, SAS Institute INC., Cary, NC, SAD) was used for the statistical analysis[19] and Microsoft® Office Excel® 2007.

Results

According to the 2001 census, the analysis covered a total population of 330.506 people in the OBC. From 2001 to 2006, a total of 9,532 people were registered with cancer and treated at the two hospitals in the OBC. The observation period was divided into two three-year periods, the first one comprises the 2001–2003 period and the second one the 2004–2006.

The mean incidence of new cancers over the 6-year study period (2001–2006) amounted to 1,589 cases/year, equating to the OBC population age-standardized incidence rate of 411.6/100,000 (SD±10.4, CI 391.2–432). The incidence rate observed in the two periods decreased in females (from 391.9/100,000, SD±14, CI 364.5–419.4 to 348.3/100,000, SD±13.2, CI 322.5–374), in both genders (from 420.6/100,000, SD±10.5, CI 340–441.3 to 402.6/100,000, SD±10.3, CI 382.5–422), while it went up in males (from 484.6/100,000, SD±17.2, CI 451–518.3 to 503.8/100,000, SD±17.5, CI 469.5–538.1) (Table 1 and 3, Figure 2). In the 2001–2006 period, the incidence rates in males and females were 494.2/100,000 (SD±17.2, CI 451–518.3), and 370.1/100,000 (SD±17.5, CI 469.5–538.1), respectively, which reveals the fact that the chances of males to be diagnosed with cancer were higher by one third than the chances of females to go down with the same illness in the same period.

In the 2001–2006 period, 968 patients died of cancer on a yearly basis on average, which implies the mortality rate of 240.7/100,000 (SD±7.8, CI 225.4–256). Regarding both genders, the mortality rate fell from 256.1/100,000 (SD±8, CI 240.3–271.8) in the 2001–2003 period to 225.3/100,000 (SD±7.5, CI 210.5–240.1) in the 2004–2006 period. In the same time periods the mortality rate in males descended from 362.3/100,000 (SD±14.9, CI 333.2–391.4) to 341.6/100,000 (SD±14.4, CI 313.4–361). Like the incidence rate, the mortality rate in females continuously and uniformly decreased from 184/100,000 (SD±9, CI 166.3–201.6) to 147.4/100,000 (SD±8.1, CI 131.6–163.3).

The median age of patients at diagnosis of cancer was 62.7 years in period 2001–2006 (Table 2, Figure 1). The difference in the median age at diagnosis of cancer between the two time periods was 1.32 years. The diagnosis of cancer in a group of malignant neoplasms of bone and articular cartilage (C40-C41) and malignant neoplasms of thyroid and other endocrine glands (C73-C75) in the second period shifted to the younger age by 9.57 and 1.78 years, respectively. Conversely, neoplasms of lip, oral cavity and pharynx (C00-C14), malignant neoplasm of breast (C50) and neoplasms of mesothelial and soft tissue (C45-C49) shifted to an older age by 3.41, 4.41 and 4.98 years, respectively.

The median age at diagnosis of cancer in females was 61.2 years in both periods with a shift to an older age at diagnosis of cancer for 1.13 years in the second period. The median age of malignant neoplasms of respiratory and intrathoracic organs (C30-C39) and cancer groups C15-C26 increased by 0.3 and 0.91 years in the second period, while cancer groups C00-C14 and malignant neoplasm of eye, brain and other parts of central nervous system (C69-C72) increased by 3.51 and 3.58, respectively.

The median age at diagnosis of cancer in males was 64.1 years in both period with a shift to an older age at diagnosis of cancer for 1.29 years in the second period. The biggest difference in the median age referred to *in situ* neoplasms (D00-D09), with a shift to an older age in the second period by 23.06 years.

The median age at death of cancer was 69.2 years. More precisely, this figure was 67.7 years for men and 70.6 years for women. The difference in the median age at death of cancer between the two periods was 0.34

TABLE 1
HISTORICAL DATA ON THE OVERALL AGE-STANDARDIZED INCIDENCE AND MORTALITY RATE FROM ALL CANCERS PER 100,000 INHABITANTS IN THE OBC (USING THE EU STANDARD POPULATION), COVERING THE PERIOD FROM 2001 TO 2006

Year of data collection	Incidence						Mortality					
	Males		Females		Both genders		Males		Females		Both genders	
	N	ASR	N	ASR	N	ASR	N	ASR	N	ASR	N	ASR
2001–2003	784	484.6	833	391.9	1,617	420.6	587	362.3	442	184.0	1,029	256.1
2004–2005	816	503.8	745	348.3	1,561	402.6	553	341.6	354	147.4	907	225.3
2001–2006	800	494.2	789	370.1	1,589	411.6	570	352.0	398	165.7	968	240.7

N – average number of cases per year, ASR – age-standardized rate (EU)

TABLE 2
THE MEDIAN AGE OF CANCER PATIENTS AT DIAGNOSIS AND AT DEATH BY PRIMARY CANCER SITE IN THE OBC, PERIODS 2001–2006, 2001–2003 AND 2004–2006

	Median age (in years) at diagnosis											
	Females – age (number)				Males – age (number)				Both genders – age (number)			
ICD-10	2001–2006	2001–2003	2004–2006	Difference (years)*	2001–2006	2001–2003	2004–2006	Difference (years)*	2001–2006	2001–2003	2004–2006	Difference (years)*
C00-C14	67.2 (38)	65.6 (21)	69.1 (17)	3.51	59.8 (252)	58.2 (132)	61.7 (120)	3.51	60.8 (290)	59.2 (153)	62.6 (137)	3.41
C15-C26	69.7 (1068)	69.2 (563)	70.2 (505)	0.91	66.3 (1376)	65.8 (703)	66.8 (673)	1.00	67.8 (2444)	67.3 (1266)	68.2 (1178)	0.91
C30-C39	65.7 (264)	65.6 (146)	65.9 (118)	0.30	64 (1211)	63.3 (618)	64.7 (593)	1.34	64.3 (1475)	63.8 (764)	64.9 (711)	1.11
C40-C41	50.0 (17)	50.1 (11)	49.8 (6)	–0.30	53.9 (24)	62.3 (12)	45.4 (12)	–16.86	52.3 (41)	56.5 (23)	46.9 (18)	–9.57
C43-C44	69.5 (274)	69.1 (126)	69.9 (148)	0.80	66.1 (307)	65.3 (127)	66.6 (180)	1.24	67.7 (581)	67.2 (253)	68.1 (328)	0.87
C45-C49	63.9 (32)	61.9 (15)	65.7 (17)	3.74	59.5 (32)	57.4 (19)	62.6 (13)	5.27	61.7 (64)	59.4 (34)	64.4 (30)	4.98
C50	61.5 (990)	61.3 (518)	61.8 (472)	0.51	68.2 (9)	71.6 (4)	65.5 (5)	–6.06	42.9 (999)	40.8 (522)	45.2 (477)	4.41
C51-C58	60.6 (643)	60.5 (344)	60.8 (299)	0.39	–	–	–	–	60.6 (643)	60.5 (344)	60.8 (299)	0.39
C60-C63	–	–	–	–	67.8 (566)	67.6 (224)	68 (342)	0.37	67.8 (566)	67.6 (224)	68.0 (342)	0.37
C64-C68	67.1 (176)	67.4 (86)	66.9 (90)	–0.47	65.2 (418)	64.8 (203)	65.6 (215)	0.83	65.8 (594)	65.5 (289)	66.0 (305)	0.44
C69-C72	51.6 (103)	50.0 (56)	53.6 (47)	3.58	54.4 (99)	54.1 (52)	54.7 (47)	0.62	53.0 (202)	52.0 (108)	54.2 (94)	2.18
C73-C75	50.3 (123)	51.1 (58)	49.5 (65)	–1.64	47.8 (29)	49.2 (17)	45.8 (12)	–3.43	49.8 (152)	50.7 (75)	48.9 (77)	–1.78
C76-C80	67.7 (82)	68.4 (47)	66.9 (35)	–1.49	62.1 (90)	60.6 (53)	64.4 (37)	3.77	64.8 (172)	64.2 (100)	65.6 (72)	1.34
C81-C96	64.4 (208)	63.8 (101)	65 (107)	1.20	58.8 (239)	59.4 (118)	58.2 (121)	–1.11	61.4 (447)	61.4 (219)	61.4 (228)	0.01
D00-D09	40.6 (527)	40.6 (298)	40.6 (229)	0.04	56.7 (17)	41.8 (6)	64.8 (11)	23.06	41.1 (544)	40.6 (304)	41.7 (240)	1.13
D37-D48	53.5 (188)	52.7 (108)	54.6 (80)	1.95	53.0 (130)	53.0 (64)	53.0 (66)	0.05	53.3 (318)	52.8 (172)	53.9 (146)	1.12
C00-D48	61.2 (4733)	60.7 (2498)	61.8 (2235)	1.13	64.1 (4799)	63.5 (2352)	64.8 (2447)	1.29	62.7 (9532)	62.1 (4850)	63.4 (4682)	1.32

* Difference (in years) = period II (2004–2006) – period I (2001–2003)

TABLE 2 (continued)

	Median age (in years) at death											
	Females – age (number)				Males – age (number)				Both genders – age (number)			
ICD-10	2001–2006	2001–2003	2004–2006	Difference (years)*	2001–2006	2001–2003	2004–2006	Difference (years)*	2001–2006	2001–2003	2004–2006	Difference (years)*
C00-C14	73.0 (22)	74.9 (13)	70.3 (9)	–4.58	63.2 (175)	63.1 (93)	63.3 (82)	0.17	64.3 (197)	64.5 (106)	64.0 (91)	–0.58
C15-C26	72.5 (856)	72.2 (451)	72.8 (405)	0.58	68.5 (1109)	68.3 (573)	68.7 (536)	0.40	70.2 (1965)	70.0 (1024)	70.4 (941)	0.44
C30-C39	68.0 (223)	68.1 (122)	67.9 (101)	–0.23	65.5 (1090)	65.1 (543)	66 (547)	0.89	65.9 (1313)	65.6 (665)	66.3 (648)	0.64
C40-C41	65.1 (8)	60.6 (5)	72.6 (3)	12.06	61.8 (16)	65.5 (9)	56.9 (7)	–8.59	62.9 (24)	63.8 (14)	61.6 (10)	–2.11
C43-C44	75.4 (93)	76.3 (55)	74.1 (38)	–2.23	71.5 (135)	72.3 (67)	70.8 (68)	–1.54	73.1 (228)	74.1 (122)	71.9 (106)	–2.16
C45-C49	72.7 (23)	69.4 (11)	75.8 (12)	6.40	68.6 (19)	69.3 (13)	67.1 (6)	–2.19	70.9 (42)	69.3 (24)	72.9 (18)	3.56
C50	69.1 (422)	68.4 (251)	70.0 (171)	1.60	74.1 (6)	77.2 (3)	71.1 (3)	–6.01	69.1 (428)	68.5 (254)	70.0 (174)	1.52
C51-C58	68.1 (342)	68.6 (190)	67.4 (152)	–1.24	–	–	–	–	68.1 (342)	68.6 (190)	67.4 (152)	–1.24
C60-C63	–	–	–	–	75.0 (296)	75.0 (141)	75.0 (155)	0.01	75.0 (296)	75.0 (141)	75.0 (155)	0.01
C64–C68	73.4 (95)	72.9 (54)	73.9 (41)	0.93	70.9 (231)	70.1 (127)	71.9 (104)	1.77	71.6 (326)	71.0 (181)	72.4 (145)	1.49
C69-C72	60.7 (60)	60.9 (33)	60.6 (27)	–0.36	59.0 (75)	59.6 (40)	58.4 (35)	–1.15	59.8 (135)	60.2 (73)	59.3 (62)	–0.83
C73-C75	66.4 (15)	69.7 (8)	62.6 (7)	–7.07	62.4 (10)	60.9 (8)	68.3 (2)	7.48	64.8 (25)	65.3 (16)	63.9 (9)	–1.40
C76-C80	72.4 (66)	73.2 (40)	71.2 (26)	–2.08	64.9 (80)	65.0 (45)	64.8 (35)	–0.24	68.3 (146)	68.9 (85)	67.5 (61)	–1.39
C81-C96	70.9 (135)	70.0 (72)	71.9 (63)	1.85	66.4 (148)	66.6 (81)	66.1 (67)	–0.51	68.6 (283)	68.2 (153)	68.9 (130)	0.68
D37-D48	74.9 (28)	74.0 (22)	78.1 (6)	4.18	73.7 (30)	71.2 (17)	76.9 (13)	5.71	74.3 (58)	72.8 (39)	77.3 (19)	4.55
C00-D48	70.6 (2388)	70.4 (1327)	70.8 (1061)	0.35	67.7 (3420)	67.5 (1760)	68.0 (1660)	0.52	68.9 (5808)	68.7 (3087)	69.1 (2721)	0.34

* Difference (in years) = period II (2004–2006) – period I (2001–2003)

TABLE 2 (continued)

	Difference in years between the median age at death and at diagnosis											
	Females				Males				Both genders			
ICD-10	2001–2006	2001–2003	2004–2006	Difference (years)*	2001–2006	2001–2003	2004–2006	Difference (years)*	2001–2006	2001–2003	2004–2006	Difference (years)*
C00-C14	5.9	9.3	1.2	8,08	3.3	4.9	1.6	3.34	3.5	5.4	1.4	3.99
C15-C26	2.8	3.0	2.6	0,34	2.2	2.5	1.9	0.60	2.4	2.7	2.2	0.47
C30-C39	2.3	2.5	2.0	0,53	1.5	1.7	1.3	0.44	1.6	1.8	1.4	0.47
C40-C41	15.1	10.5	22.9	–12,36	7.9	3.2	11.5	–8.27	10.6	7.3	14.8	–7.46
C43-C44	5.9	7.2	4.2	3,04	5.5	7.0	4.2	2.78	5.4	6.9	3.9	3.03
C45-C49	8.8	7.4	10.1	–2,66	9.1	11.9	4.5	7.46	9.1	9.9	8.5	1.42
C50	7.5	7.1	8.2	–1,10	5.9	5.6	5.6	–0.05	26.3	27.7	24.9	2.89
C51-C58	7.4	8.2	6.5	1,63	–	–	–	–	7.4	8.2	6.5	1.63
C60-C63	–	–	–	–	7.2	7.4	7.0	0.36	7.2	7.4	7.0	0.36
C64-C68	6.2	5.6	7.0	–1,40	5.7	5.3	6.3	–0.94	5.9	5.4	6.5	–1.05
C69-C72	9.1	10.9	7.0	3,94	4.6	5.4	3.7	1.77	6.8	8.2	5.2	3.00
C73-C75	16.1	18.5	13.1	5,43	14.6	11.7	22.6	–10.90	15.0	14.6	15.0	–0.39
C76-C80	4.7	4.9	4.3	0,60	2.8	4.5	0.4	4.02	3.5	4.7	1.9	2.73
C81-C96	6.5	6.3	6.9	–0,65	7.6	7.3	7.9	–0.60	7.2	6.8	7.5	–0.67
D37-D48	21.4	21.3	23.5	–2,22	20.7	18.3	23.9	–5.66	21.0	20.0	23.4	–3.43
C00-D48	9.3	9.7	8.9	0,78	3.6	4.0	3.2	0.77	6.2	6.7	5.7	0.98

Difference (in years) = period II (2004–2006) – period I (2001–2003)

years and it resulted from the higher median age in the second one. The highest median age at death of cancer in males was detected in the groups of malignant neoplasms of male genital organs (C60-C63, 75 years) and neoplasms of uncertain or unknown behaviour (D37-D48, 73.7 years). With respect to females, the highest median ages at death were found with cancer groups of melanoma and other malignant neoplasms of skin (D43-D44, 75.4 years), D37-D48 (74.9 years), malignant neoplasms of urinary tract (C64-C68, 73.4 years) and C00-C14 (73 years).

In the period from 2001 to 2006, the OBC population was felled by cancer at a rate of 411.6/100,000 (SD±12.6, CI 539.6–589.1) with indications of a downward trend in the second reference period. In the first period (2001–2003), the incidence rate was higher than that in the subsequent three-year period (420/100,000 and 408/100,000) (Table 3, Figure 2). The patients were commonly diagnosed with malignant neoplasms of digestive organs (C15-C26, 101.1/100,000, SD±6.23, CI 120.6–145) with indications of a downward trend from 104.9/100,000 to 97.2/100,000 in the second period. Then came malignant neoplasms of respiratory and intrathoracic organs (C30-C39, 63.6/100,000, SD±5.31, CI 87.8–108.6) followed by malignant neoplasm of breast (C50, 44.3/100.000), malignant neoplasms of female genital organs (C51-C58, 28.3/100.000) and *in situ* neoplasms (D00-D09, 26.9/100.000). The referring incidence rates fell between the two three--year periods. Comparing the data in the two periods, malignant neoplasms of urinary tract (C64-C68, 25/100,000), melanoma and other malignant neoplasms of skin (C43-C44, 24/100,000), C60-C63 (23/100,000) and malignant neoplasms, stated or presumed to be primary, of lymphoid, haematopoietic and related tissue (C81-C96, 19.3/100,000) reflected an upward trend. Other groups of cancer disclosed a decline in the cancer incidence rates. Due to the age of onset, all groups aged 65+ had the highest incidence rate, except the *in situ* neoplasm group (D00-D09, 49.7/100,000) which had the highest incidence rate at the age between 20 and 44 years.

Females had a cancer incidence rate of 370/100,000 in the period from 2001 to 2006. The incidence rate showed a downward trend from 391.9/100,000 in the 2001–2003 period to 348.3/100,000 in the 2004–2006 period. The highest incidence rate among females was found with cancer site C50 (79.3/100,000). Group C15-C26 (73.2/100,000) was characterized by the second highest incidence rate. Next, groups D00-D09 and C51-C58 with incidence rates of 51.4 and 51/100,000, respectively. Out of all 15 reference cancer groups, just four cancer groups showed a slight increase in the incidence rates. These were groups C43-C44 (from 17.7 to 20/100,000), C81-C96 (from 14.8 to 15.6/100,000), malignant neoplasms of thyroid and other endocrine glands (C73-C75, from 12 to 13/100,000) and malignant neoplasms of mesothelial and soft tissue (C45-C49, from 2.3 to 2.5/100,000). Female patients from cancer group D00-D09 became sick at the highest incidence rate of 99.9/100,000 at the age 20–44 years.

Concerning males, the cancer incidence rate rose from 484.6/100,000 in the 2001–2003 period to 503.8/100,000 in the 2004–2006 period. Group C15-C26 was featured by the highest incidence rate (141.6/100,000).

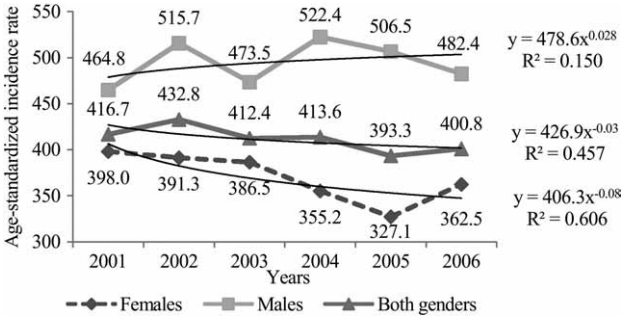

Fig. 2. The cancer age-standardized incidence rate for C00-D48 in the period 2001-2006 in the OBE per 100,000 inhabitants using the EU standard population. The downward trendline in females suggest that a strong relationship exists between age-standardized incidence rate and years, R^2=0.606 (R^2>0.48<0.81) and weak rising trendline relationship in males (R^2 =0.150, (R^2>0.04<0.16)).

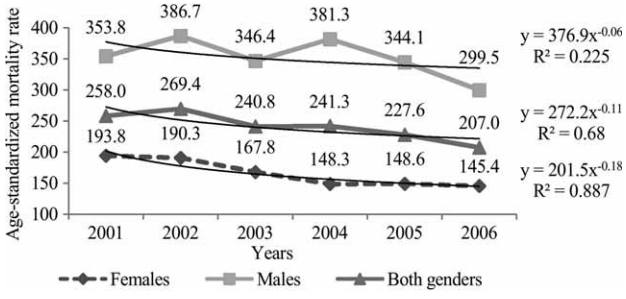

Fig. 3. The cancer age-standardized mortality rate for C00-D48 in the period 2001-2006 in the OBE per 100,000 inhabitants using the EU standard population. The downward trendline in females suggest that a very strong and extremely dependable relationship exists between age-standardized mortality rate and years, R^2=0.887 (R^2>0.80) and moderate downward trendline relationship in males (R^2 =0.225, (R^2>0.16<0.49)).

Group C30-C39 immediately followed group C15-C26 (the incidence rate of 124.9/100,000). Both of these leading cancer groups revealed a slight decline from the first to the second period. Out of 15 cancer groups, the incidence rate increased in seven groups (C60-C63, C64-C68, C81-C96, D37-D48, C40-C41, D00-D09 and C50). A particularly large increase referred to group C60-C63 (from 45.9 to 70.1/100,000). With respect to six cancer groups, the incidence rate decline (C15-C26, C30-C39, C00-C14, C69-C72, C76-C80, C45-C49 and C73-C75) whereas the incidence rate remained the same in group C81-C96.

The total cancer mortality rate in the OBC in the 6-year period was 240.7/100,000 (SD±7.8, CI 225.4–256) (Table 4, Figure 3). It decline from 256.1/100,000 in the 2001–2003 period (SD±8.04, CI 240.3–271.8) to 225.3/100,000 in 2004–2006 period (SD±7.54, CI 210.5–240.1). Group C15-C26 was characterized by the highest mortality rate among both genders (80/100,000). This type of cancer was also the most common cause of death in both genders (in females 56.8/100,000 and in males 114/100,000, respectively). Group C15-C26 followed by groups C30-C39 and C50 (56.2 and 17.9/100,000, respectively).

TABLE 3
THE CANCER AGE-STANDARDIZED INCIDENCE RATE FOR C00-D48 IN TWO PERIODS (BY AGE GROUPS AND GENDERS) IN THE OBC PER 100,000 INHABITANS USING THE EU STANDARD POPULATION

	Age-standardized incidence rate – Females														
	0–19			20–44			45–64			65+			All ages		
ICD-10	I	II	T	I	II	T	I	II	T	I	II	T	I	II	T
C50	–	–	–	28.4	23.2	25.8	183.0	168.1	175.6	249.0	229.9	239.5	83.1	75.4	79.3
C15-C26	0.8	–	0.4	11.6	7.5	9.6	97.8	90.7	94.2	441.9	398.4	420.1	77.3	69.1	73.2
D00-D09	–	0.8	0.4	115.8	84.0	99.9	64.1	50.8	57.5	17.0	19.1	18.0	58.4	44.4	51.4
C51-C58	0.8	1.7	1.3	28.4	24.9	26.6	97.0	88.4	92.7	180.1	149.4	164.8	54.2	47.7	51.0
C30-C39	–	–	–	5.8	2.3	4.1	33.6	34.4	34.0	98.5	74.2	86.4	21.3	17.6	19.4
C43-C44	–	–	–	2.3	1.2	1.7	26.6	25.8	26.2	93.2	119.7	106.5	17.7	20.0	18.9
D37-D48	7.6	4.2	5.9	10.4	9.3	9.8	34.4	25.0	29.7	39.2	28.6	33.9	18.8	13.9	16.3
C81-C96	1.7	1.7	1.7	5.2	3.5	4.3	19.6	23.5	21.5	68.9	73.1	71.0	14.8	15.6	15.2
C64-C68	–	0.8	0.4	2.3	1.7	2.0	16.4	21.1	18.8	64.6	62.5	63.6	12.0	13.0	12.5
C73-C75	–	–	–	9.8	14.5	12.2	22.7	25.0	23.9	12.7	8.5	10.6	10.5	12.3	11.4
C69-C72	6.7	5.0	5.9	5.2	2.9	4.1	14.1	14.1	14.1	22.3	19.1	20.7	9.7	8.1	8.9
C76-C80	0.8	–	0.4	1.2	1.2	1.2	7.0	7.8	7.4	37.1	24.4	30.7	6.5	5.0	5.8
C00-C14	–	–	–	1.7	–	0.9	4.7	4.7	4.7	12.7	11.7	12.2	3.2	2.5	2.8
C45-C49	0.8	0.8	0.8	–	1.2	0.6	4.7	2.3	3.5	8.5	11.7	10.1	2.3	2.5	2.4
C40-C41	1.7	0.8	1.3	1.2	1.2	1.2	3.1	0.8	2.0	3.2	2.1	2.6	2.0	1.1	1.6
C00-D48	21.0	16.0	18.5	229.3	178.3	203.8	628.7	582.6	605.7	1348.9	1232.3	1290.6	391.9	348.3	370.1

Years of data collection: I period – 2001–2003, II period – 2004–2006, T – period 2001–2006

TABLE 3 (continued)

	Males														
	0–19			20–44			45–64			65+			All ages		
ICD-10	I	II	T	I	II	T	I	II	T	I	II	T	I	II	T
C15-C26	–	0.8	0.4	13.1	10.8	12.0	200.3	179.5	189.9	818.3	814.6	816.5	144.7	138.5	141.6
C30-C39	0.8	–	0.4	9.1	8.0	8.6	232.0	208.7	220.4	600.7	611.9	606.3	127.5	122.3	124.9
C60-C63	0.8	0.8	0.8	9.7	13.7	11.7	29.2	44.2	36.7	318.0	491.0	404.5	45.9	70.1	58.0
C64-C68	–	0.8	0.4	2.3	5.1	3.7	65.9	60.1	63.0	223.2	247.4	235.3	41.8	44.3	43.0
C43-C44	1.6	–	0.8	5.7	2.9	4.3	27.5	49.2	38.4	152.5	215.7	184.1	26.1	37.0	31.6
C00-C14	–	–	–	6.3	1.1	3.7	66.8	57.6	62.2	76.3	91.1	83.7	27.3	24.8	26.0
C81-C96	4.8	4.8	4.8	9.1	9.1	9.1	26.7	34.2	30.5	119.0	107.9	113.4	24.3	25.0	24.7
D37-D48	4.0	4.8	4.4	8.0	8.0	8.0	17.5	16.7	17.1	44.6	48.4	46.5	13.2	13.7	13.5
C69-C72	3.2	0.8	2.0	4.6	6.3	5.4	20.0	15.0	17.5	29.8	31.6	30.7	10.8	9.7	10.2
C76-C80	0.8	–	0.4	4.0	0.6	2.3	15.9	9.2	12.5	48.4	46.5	47.4	10.9	7.6	9.3
C45-C49	1.6	–	0.8	1.1	1.1	1.1	4.2	3.3	3.8	18.6	13.0	15.8	3.9	2.7	3.3
C73-C75	0.8	–	0.4	3.4	3.4	3.4	3.3	2.5	2.9	11.2	5.6	8.4	3.5	2.4	3.0
C40-C41	–	1.6	0.8	–	1.7	0.9	5.0	2.5	3.8	11.2	7.4	9.3	2.5	2.5	2.5
D00-D09	1.6	–	0.8	0.6	–	0.3	0.8	4.2	2.5	3.7	11.2	7.4	1.3	2.3	1.8
C50	–	–	–	–	–	–	0.8	1.7	1.3	5.6	5.6	5.6	0.8	1.0	0.9
C00-D48	19.9	14.3	17.1	77.0	71.8	74.4	716.1	688.6	702.4	2481.0	2748.8	2614.9	484.6	503.8	494.2

	Both genders														
	0–19			20–44			45–64			65+			All ages		
ICD-10	I	II	T	I	II	T	I	II	T	I	II	T	I	II	T
C15-C26	0.4	0.4	0.4	12.4	9.2	10.8	147.4	133.6	140.5	578.5	549.5	564.0	104.9	97.2	101.1
C30-C39	0.4	–	0.2	7.5	5.2	6.3	129.6	118.7	124.2	280.8	269.3	275.1	66.0	61.1	63.6
C50	-	–	–	14.1	11.5	12.8	94.9	87.6	91.2	160.7	148.5	154.6	46.3	42.3	44.3
C51-C58	0.4	0.8	0.6	14.1	12.4	13.2	50.1	45.6	47.8	114.8	95.2	105.0	30.2	26.4	28.3
D00-D09	0.8	0.4	0.6	57.7	41.7	49.7	33.5	28.3	30.9	12.2	16.2	14.2	30.2	23.5	26.9
C64-C68	–	0.8	0.4	2.3	3.4	2.9	40.4	40.0	40.2	122.2	129.6	125.9	24.3	25.7	25.0
C43-C44	0.8	–	0.4	4.0	2.0	3.0	27.1	37.1	32.1	114.8	154.6	134.7	21.0	27.0	24.0
C60-C63	0.4	0.4	0.4	4.9	6.9	5.9	14.1	21.4	17.8	115.4	178.2	146.8	18.1	27.5	22.8
C81-C96	3.3	3.3	3.3	7.2	6.3	6.8	23.0	28.7	25.8	87.1	85.7	86.4	18.8	19.8	19.3
D37-D48	5.7	4.5	5.1	9.2	8.6	8.9	26.2	21.0	23.6	41.2	35.8	38.5	16.0	13.5	14.7
C00-C14	–	–	–	4.0	0.6	2.3	34.7	30.3	32.5	35.8	40.5	38.1	14.0	12.2	13.1
C69-C72	4.9	2.9	3.9	4.9	4.6	4.7	17.0	14.5	15.7	25.0	23.6	24.3	10.1	8.7	9.4
C73-C75	0.4	–	0.2	6.6	8.9	7.8	13.3	14.1	13.7	12.2	7.4	9.8	7.1	7.5	7.3
C76-C80	0.8	–	0.4	2.6	0.9	1.7	11.3	8.5	9.9	41.2	32.4	36.8	8.5	6.0	7.2
C45-C49	1.2	0.4	0.8	0.6	1.1	0.9	4.4	2.8	3.6	12.2	12.2	12.2	3.0	2.6	2.8
C40-C41	0.8	1.2	1.0	0.6	1.4	1.0	4.0	1.6	2.8	6.1	4.1	5.1	2.1	1.7	1.9
C00-D48	20.4	15.1	17.8	152.5	124.7	138.6	671.0	633.9	652.4	1759.8	1782.7	1771.3	420.6	402.6	411.6

Years of data collection: I period – 2001–2003, II period – 2004–2006, T – period 2001–2006

Both the total and gender-based cancer mortality rate declined in all groups, except in males groups C30- C39 (from 112 to 112.8/100,000) and C60-C63 (from 28.9 to 31.8/100,000) which showed a rise in the mortality rate.

The patients with cancer in the OBC had 40.1% age-adjusted 5-year relative survival estimates for 2001–2006 (Table 5, Figure 4). The lowest survival rate (14.8%) was related to the patients with cancer C30-C39, followed by patients with C76-C80 (16.6%), and then by patients with C15-C26 (23.6%). The 5-year relative survival from cancer for males was 32.4% which was a significantly lower than the corresponding females rate (48.8%).

The age distribution at diagnosis and at deaths by cancer group is shown in Table 6. Out of all the cases, 52.6% of patients were aged 65+. That age was absolutely dominated by cancer groups C60-C63 (74.2%), C43-C44 (67.3%) and C15-C26 (65.9%). The only cancer site with more than half of new cases and deaths within the 45–64 age group was C00-C14 (55.3% and 55.5%, respectively). The morbidity in the 20–44 age group was above all contributed by cancer D00-D09 (65.8%).

Patients of both genders mostly died in the age 65+ (65.4%). At that age, the mortality rate was higher among females, although 2/3 or more of the total deaths from cancer (females 70.3% and males 62%) were registered at that age. The highest mortality in the oldest age group was connected with cancer groups C60-C63 (86.7%), D37-D48 (81%) and C43-C44 (76.8%).

Discussion

In the 2001–2006 period there were 1,589 newly diagnosed cancer patients a year on average in the OBC, among which there were slightly more males (50.3%). In the same period, a total of 968 patients died of cancer on a yearly basis on average and again, there were more males (58.9%) than females among them. The age-standardized incidence and mortality rates declined in both periods and for both genders. The incidence rate in males increased from 485/100,000 in the first period to 504/100,000 in the second period, which could be partly explained by the lack of sufficient motivation (Table 1, Figure 2). At the time of the generation of these data, there were no preventive programmes against cancer at the national level, but these kinds of information were available in all media and hence it was possible to undergo a routine examination. The situation with females was completely different. The cancer incidence rate in the OBC in this period was above the Croatia average (Croatian average for both genders was 365/100,000, for males 473/100,000, for females 296/100,000)[20]. In 2006, the cancer incidence rate in the OBC was higher than the equivalent rate in the EU and this count for both genders[3].

The median age at cancer diagnosis in the OBC was 62.7 years. The diagnosis of cancer in the second period shifted by 1.32 years into an older age (first period 62.1 years, and second 63.4 years of age). The cancer in females was diagnosed later 2.9 years (age 61.2 years) than in males (age 64.1 years, Table 2, Figure 1). A similar relationship between the genders in the context of the median age of cancer was revealed in some parts of the USA where the difference in median age was greater and the age at disease shifted by 3.3 years in an older age[21,22]. Malignant neoplasms of digestive organs (C15-C26), malignant neoplasms of respiratory and intrathoracic organs (C30-C39), malignant neoplasms of female genital organs (C51-C58) and malignant neoplasms of male genital organs (C60-C63) accounted for much more than half of all cancers and at the same time, the median age at diagnosis exceeded 60 year[23]. Cancer type C15-C26 affected patients at the latest age and that age was 67.8 years for

TABLE 4
THE AGE-STANDARDIZED MORTALITY RATES FOR ALL CANCERS IN TWO PERIODS (BY AGE GROUPS AND GENDERS) IN THE OBC PER 100,000 USING THE EU STANDARD POPULATION

	Age-standardized mortality rate														
	Females														
	0–19			20–44			45–64			65+			All ages		
ICD-10	I	II	T	I	II	T	I	II	T	I	II	T	I	II	T
C15-C26	–	–	–	4.6	2.9	3.8	66.5	60.2	63.3	379.3	342.3	360.8	60.0	53.7	56.8
C50	–	–	–	10.4	2.3	6.4	61.0	41.4	51.2	164.2	120.8	142.5	37.0	24.5	30.7
C51-C58	–	–	–	5.2	7.5	6.4	40.7	34.4	37.5	136.7	100.7	118.7	27.0	22.3	24.7
C30-C39	–	–	–	3.5	1.2	2.3	26.6	28.9	27.8	86.9	65.7	76.3	17.4	14.9	16.1
C81-C96	0.8	–	0.4	1.2	1.2	1.2	12.5	8.6	10.6	56.2	53.0	54.6	10.0	8.4	9.2
C64-C68	–	–	–	1.2	0.6	0.9	3.9	6.3	5.1	49.8	33.9	41.9	6.9	5.5	6.2
C43-C44	–	–	–	1.2	0.6	0.9	4.7	7.0	5.9	49.8	29.7	39.7	7.1	5.2	6.1
C69-C72	2.5	1.7	2.1	–	1.2	0.6	10.2	7.0	8.6	18.0	14.8	16.4	5.3	4.3	4.8
C76-C80	–	–	–	–	–	–	4.7	3.9	4.3	36.0	22.3	29.1	5.1	3.4	4.3
D37-D48	–	–	–	–	–	–	3.1	0.8	2.0	19.1	5.3	12.2	2.9	0.8	1.8
C45-C49	–	–	–	–	–	–	3.9	1.6	2.7	6.4	10.6	8.5	1.7	1.6	1.6
C00-C14	–	–	–	–	–	–	3.1	3.1	3.1	9.5	5.3	7.4	1.8	1.4	1.6
C73-C75	–	–	–	–	0.6	0.3	2.3	2.3	2.3	5.3	3.2	4.2	1.2	1.1	1.2
C40-C41	–	–	–	1.2	–	0.6	–	0.8	0.4	3.2	2.1	2.6	0.8	0.4	0.6
C00-D48	3.4	1.7	2.5	28.4	18.0	23.2	243.2	206.5	224.8	1020.4	809.5	915.0	184.0	147.4	165.7

Years of data collection: I – period 2001–2003, II – period 2004–2006, T – period 2001–2006

TABLE 4 (continued)
THE AGE-STANDARDIZED MORTALITY RATES FOR ALL CANCERS IN TWO PERIODS (BY AGE GROUPS AND GENDERS) IN THE OBC PER 100,000 USING THE EU STANDARD POPULATION

	Males														
	0–19			20–44			45–64			65+			All ages		
ICD-10	I	II	T	I	II	T	I	II	T	I	II	T	I	II	T
C15-C26	–	–	–	8.6	7.4	8.0	139.4	131.0	135.2	727.2	680.7	703.9	117.8	110.2	114.0
C30-C39	–	–	–	5.1	5.7	5.4	197.8	187.0	192.4	552.4	582.1	567.2	112.0	112.8	112.4
C60-C63	–	–	–	1.1	0.6	0.9	11.7	13.4	12.5	232.5	256.7	244.6	28.9	31.8	30.3
C64-C68	–	–	–	1.7	1.1	1.4	30.9	18.4	24.6	161.8	148.8	155.3	26.1	21.4	23.7
C00-C14	–	–	–	1.1	0.6	0.9	45.9	38.4	42.2	67.0	65.1	66.0	19.2	17.0	18.1
C81-C96	–	0.8	0.4	5.1	2.9	4.0	14.2	15.0	14.6	102.3	80.0	91.1	16.6	13.8	15.2
C43-C44	0.8	–	0.4	1.7	0.6	1.1	8.3	14.2	11.3	98.6	93.0	95.8	13.8	14.0	13.9
C76-C80	–	–	–	1.7	0.6	1.1	13.4	8.3	10.9	48.4	44.6	46.5	9.3	7.2	8.2
C69-C72	1.6	0.8	1.2	2.9	3.4	3.1	14.2	10.9	12.5	29.8	27.9	28.8	8.3	7.2	7.7
D37-D48	–	–	–	0.6	–	0.3	2.5	0.8	1.7	24.2	22.3	23.2	3.5	2.7	3.1
C45-C49	–	–	–	–	0.6	0.3	3.3	0.8	2.1	16.7	7.4	12.1	2.7	1.2	2.0
C40-C41	–	0.8	0.4	–	–	–	2.5	1.7	2.1	11.2	7.4	9.3	1.9	1.5	1.7
C73-C75	0.8	–	0.4	–	–	–	1.7	0.8	1.3	9.3	1.9	5.6	1.7	0.4	1.0
C50	–	–	–	–	–	–	–	0.8	0.4	5.6	3.7	4.6	0.6	0.6	0.6
C00-D48	3.2	2.4	2.8	29.6	23.4	26.5	485.8	441.5	463.7	2086.7	2021.6	2054.2	362.3	341.6	352.0

	Both genders														
	0–19			20–44			45–64			65+			All ages		
ICD-10	I	II	T	I	II	T	I	II	T	I	II	T	I	II	T
C15-C26	–	–	–	6.6	5.2	5.9	101.7	94.5	98.1	505.6	465.1	485.3	83.4	76.6	80.0
C30-C39	–	–	–	4.3	3.4	3.9	109.4	105.4	107.4	255.8	253.1	254.5	57.0	55.4	56.2
C50	–	–	–	5.2	1.1	3.2	31.5	21.8	26.6	106.7	78.3	92.5	21.4	14.5	17.9
C51-C58	–	–	–	2.6	3.7	3.2	21.0	17.8	19.4	87.1	64.1	75.6	15.7	12.8	14.3
C64-C68	–	–	–	1.4	0.9	1.1	17.0	12.1	14.5	90.5	75.6	83.0	14.7	11.6	13.2
C81-C96	0.4	0.4	0.4	3.2	2.0	2.6	13.3	11.7	12.5	72.9	62.8	67.8	12.6	10.7	11.6
C60-C63	–	–	–	0.6	0.3	0.4	5.7	6.5	6.1	84.4	93.2	88.8	10.9	12.0	11.4
C43-C44	0.4	–	0.2	1.4	0.6	1.0	6.5	10.5	8.5	67.5	52.7	60.1	9.7	8.6	9.1
C00-C14	–	–	–	0.6	0.3	0.4	23.8	20.2	22.0	30.4	27.0	28.7	9.5	8.1	8.8
C69-C72	2.0	1.2	1.6	1.4	2.3	1.9	12.1	8.9	10.5	22.3	19.6	20.9	6.6	5.5	6.1
C76-C80	–	–	–	0.9	0.3	0.6	8.9	6.1	7.5	40.5	30.4	35.4	7.0	5.0	6.0
D37-D48	–	–	–	0.3	–	0.1	2.8	0.8	1.8	20.9	11.5	16.2	3.1	1.5	2.3
C45-C49	–	–	–	–	0.3	0.1	3.6	1.2	2.4	10.1	9.5	9.8	2.0	1.4	1.7
C73-C75	0.4	–	0.2	–	0.3	0.1	2.0	1.6	1.8	6.8	2.7	4.7	1.4	0.8	1.1
C40-C41	–	0.4	0.2	0.6	–	0.3	1.2	1.2	1.2	6.1	4.1	5.1	1.2	0.9	1.0
C00-D48	3.3	2.0	2.7	29.0	20.7	24.8	360.5	320.2	340.4	1407.4	1249.5	1328.4	256.1	225.3	240.7

Years of data collection: I – period 2001–2003, II – period 2004–2006, T – period 2001–2006

both genders. Males usually developed that type of cancer 3.4 years earlier then females, at the age of 66.3 years while on average, females were diagnosed with that cancer at the age of 69.7 years. The average age at diagnoses of cancer C60-C63 in males was 67.8 years. Great differences in the age of disease for groups C40-C41 in males was consequence of a small number of patients.

The highest incidence and mortality rates in both genders were linked with cancer groups C15-C26 (101.1 and 80/100,000, respectively) and C30-C39 (63.6 and 56.2/100,000, respectively). These groups showed a declining tendency (Tables 3 and 4, Figure 2 and 3). In females, the next two places were taken by cancer types C50 (44.3 and 19.9/100,000, respectively) and C51-C58

TABLE 5
THE PERCENTAGE OF OVERALL AGE-STANDARDIZED 5-YEAR RELATIVE SURVIVAL RATES FOR ALL CANCERS (BOTH GENDERS) IN THE OBC IN THE 2001–2005 PERIOD

	Females – % (number of survival cases)									
ICD-10	0–19		20–44		45–64		65+		All ages	
C00–C14	–	–	100.1	(3)	33.7	(3)	53.3	(9)	50.6	(15)
C15-C26	100.1	(1)	60.7	(20)	37.6	(80)	18.7	(113)	24.3	(214)
C30-C39	–	–	46.7	(7)	22.8	(16)	15.8	(20)	19.7	(43)
C40-C41	100.1	(2)	0.0	–	101.0	(4)	0.0	–	50.6	(6)
C43-C44	–	–	40.0	(2)	85.3	(49)	74.5	(116)	73.9	(167)
C45-C49	100.1	(1)	100.1	(2)	33.7	(3)	20.0	(3)	32.6	(9)
C50	–	–	76.8	(66)	76.4	(304)	49.9	(171)	64.2	(541)
C51-C58	100.1	(4)	80.6	(62)	67.2	(137)	37.1	(89)	54.5	(292)
C60-C63	–	–	–	–	–	–	–	–	–	–
C64-C68	–	–	71.5	(5)	80.4	(35)	36.7	(32)	50.6	(72)
C69-C72	64.3	(9)	84.7	(11)	42.9	(14)	33.3	(10)	48.4	(44)
C73-C75	–	–	100.1	(31)	92.9	(46)	66.6	(10)	90.8	(87)
C76-C80	100.1	(1)	75.1	(3)	47.5	(8)	8.5	(4)	22.5	(16)
C81-C96	75.1	(3)	69.3	(9)	45.4	(22)	27.7	(27)	36.3	(61)
D37-D48	100.1	(13)	100.1	(34)	94.4	(57)	75.6	(39)	88.9	(143)
C00-D48	85.1	(34)	78.6	(255)	64.0	(778)	35.1	(643)	48.8	(1710)
	Males – % (number of survival cases)									
ICD-10	0–19		20–44		45–64		65+		All ages	
C00–C14	100.1	(1)	76.6	(13)	35.6	(43)	26.3	(18)	35.7	(75)
C15-C26	100.1	(1)	38.5	(15)	35.0	(146)	15.6	(102)	23.1	(264)
C30-C39	100.1	(1)	30.8	(12)	17.1	(79)	9.8	(48)	13.7	(140)
C40-C41	50.0	(1)	66.7	(2)	50.5	(3)	0.0	–	30.4	(6)
C43-C44	50.0	(1)	66.7	(10)	70.3	(48)	62.2	(91)	62.8	(150)
C45-C49	100.1	(2)	100.1	(3)	44.9	(4)	24.6	(3)	45.0	(12)
C50	–	–	–	–	101.0	(2)	21.3	(1)	43.4	(3)
C51-C58	–	–	–	–	–	–	–	–	–	–
C60-C63	100.1	(2)	97.4	(36)	67.0	(59)	47.2	(155)	53.4	(252)
C64-C68	100.1	(1)	58.4	(7)	62.0	(81)	44.8	(79)	51.1	(168)
C69-C72	60.0	(3)	43.8	(7)	38.2	(14)	7.6	(2)	30.6	(26)
C73-C75	100.1	(1)	100.1	(9)	50.5	(3)	45.7	(3)	70.5	(16)
C76-C80	100.1	(1)	50.1	(5)	8.8	(2)	2.3	(1)	11.3	(9)
C81-C96	91.0	(10)	59.3	(16)	53.7	(34)	18.1	(17)	38.6	(77)
D37-D48	100.1	(10)	95.6	(21)	88.0	(27)	60.1	(22)	79.4	(80)
C00-D48	87.6	(35)	62.7	(156)	37.2	(545)	25.9	(542)	32.3	(1278)
	Both genders – % (number of survival cases)									
ICD-10	0–19		20–44		45–64		65+		All ages	
C00-C14	100.1	(1)	80.1	(16)	35.5	(46)	31.6	(27)	37.5	(90)
C15-C26	100.1	(2)	48.7	(35)	35.9	(226)	17.1	(215)	23.6	(478)
C30-C39	100.1	(1)	35.2	(19)	17.8	(95)	11.0	(68)	14.8	(183)
C40-C41	75.1	(3)	40.0	(2)	70.7	(7)	0.0	–	38.0	(12)
C43-C44	50.0	(1)	60.1	(12)	77.2	(97)	68.5	(207)	68.2	(317)
C45-C49	100.1	(3)	100.1	(5)	39.3	(7)	22.1	(6)	38.7	(21)
C50	–	–	76.8	(66)	76.5	(306)	49.6	(172)	64.1	(544)
C51-C58	100.1	(4)	80.6	(62)	67.2	(137)	37.1	(89)	54.5	(292)
C60-C63	100.1	(2)	97.4	(36)	67.0	(59)	47.2	(155)	53.4	(252)
C64-C68	100.1	(1)	63.2	(12)	66.6	(116)	42.1	(111)	51.0	(240)
C69-C72	63.2	(12)	62.1	(18)	40.4	(28)	21.3	(12)	39.8	(70)
C73-C75	100.1	(1)	100.1	(40)	88.4	(49)	60.3	(13)	86.9	(103)
C76-C80	100.1	(2)	57.2	(8)	25.3	(10)	5.5	(5)	16.6	(25)
C81-C96	86.7	(13)	62.6	(25)	50.1	(56)	23.0	(44)	37.6	(138)
D37-D48	100.1	(23)	98.3	(55)	92.2	(84)	69.2	(61)	85.2	(223)
C00-D48	86.3	(69)	71.7	(411)	49.4	(1323)	30.2	(1185)	40.1	(2988)

– »–« – no cases, 0.0 – no survival cases

TABLE 6
THE AGE DISTRIBUTION OF CANCER PACIENTS AT DIAGNOSIS AND AT DEATH BY ICD-10 GROUPS
(PERIOD 2001–2006, BOTH GENDERS)

	Age distribution (%) at death												Frequency (number of cases)			Frequency (%)		
	Females				Males				Both genders									
ICD-10	0–19	20–44	45–65	65+	0–19	20–44	45–65	65+	0–19	20–44	45–65	65+	F	M	T	F	M	T
C15-C26	–	1.6	20.0	78.4	–	2.9	31.4	65.7	–	2.3	26.4	71.2	856	1109	1965	35.8	32.4	33.8
C30-C39	–	4.0	33.2	62.8	–	2.8	44.6	52.6	–	3.0	42.7	54.3	223	1090	1313	9.3	31.9	22.6
C50	–	6.4	33.2	60.4	–	–	16.7	83.3	–	6.3	32.9	60.7	422	6	428	17.7	0.2	7.4
C51-C58	–	7.3	30.1	62.6	–	–	–	–	–	7.3	30.1	62.6	342	–	342	14.3	–	5.9
C64-C68	–	3.2	13.7	83.2	–	2.2	29.0	68.8	–	2.5	24.5	73.0	95	231	326	4.0	6.8	5.6
C60-C63	–	–	–	–	–	1.0	12.2	86.8	–	1.0	12.2	86.8	–	296	296	–	8.7	5.1
C81-C96	0.7	3.0	23.7	72.6	0.7	9.5	25.7	64.2	0.7	6.4	24.7	68.2	135	148	283	5.7	4.3	4.9
C43-C44	–	3.2	16.1	80.6	0.7	3.7	21.5	74.1	0.4	3.5	19.3	76.8	93	135	228	3.9	3.9	3.9
C00-C14	–	–	36.4	63.6	–	2.9	57.7	39.4	–	2.5	55.3	42.1	22	175	197	0.9	5.1	3.4
C76-C80	–	1.5	19.7	78.8	–	6.3	33.8	60.0	–	4.1	27.4	68.5	66	80	146	2.8	2.3	2.5
C69-C72	8.3	3.3	38.3	50.0	4.0	14.7	40.0	41.3	5.9	9.6	39.3	45.2	60	75	135	2.5	2.2	2.3
D37-D48	–	–	21.4	78.6	–	3.3	13.3	83.3	–	1.7	17.2	81.0	28	30	58	1.2	0.9	1.0
C45-C49	–	–	30.4	69.6	–	5.3	31.6	63.2	–	2.4	31.0	66.7	23	19	42	1.0	0.6	0.7
C73-C75	–	6.7	40.0	53.3	10.0	–	30.0	60.0	4.0	4.0	36.0	56.0	15	10	25	0.6	0.3	0.4
C40-C41	–	25.0	12.5	62.5	6.3	6.3	25.0	62.5	4.2	12.5	20.8	62.5	8	16	24	0.3	0.5	0.4
C00-D48	0.3	3.8	25.6	70.3	0.2	3.3	34.5	62.0	0.2	3.5	30.9	65.4	2388	3420	5808	41.1	58.9	100.0

(28.3 and 14.3/100,000, respectively). If cancer C50 and cancer of female genital organs (C51-C58) are observed jointly, then these two cancer groups together occupied the second position (C50 in males is diagnosed only in a few cases). The same two cancer groups together had significantly lower mortality rates than that in group C30-C29 (the second place pursuant to the mortality rate), which represents a big difference from their ratio according to the incidence rate.

The leading cancer groups in females were C50 and C15-C26, which showed a downward trend in the two periods (Table 3, Figure 2). The trend was perhaps the result of female's greater concern for their health but also of the progress of medicine in the field of diagnostics and treatment of leading female's cancers. Public prevention programmes at the Croatian level were first initiated in 2006. The first one was the breast cancer prevention programme. The second one was the colorectal cancer programme which was initiated in 2007. Compared with the data of the Croatian Cancer Registry, the incidence rate of cancer C50 in the OBC was lower than the respective rate at the national level while the mortality rate is slightly higher than the Croatian average. These data can lead to the conclusion that the level of concern about the cancer in females in the OBC is somewhat lower than the appertaining level in Croatia as a whole, and one needs to find an explanation for this assumption[20]. The cancer incidence rate on several Croatian islands was significantly lower in males compared to males in the OBC, and slightly higher in females compared to females in the OBC[24]. In relation to the mortality rate from C50 in the EU, females in the OBC were in a less favourable position than females in Croatia in general[25,26].

The cancer incidence rate in young people aged 20–44 was significantly higher in females than in males (203.8 and 74.4/100,000, respectively) considering cancer groups C50 and *in situ* neoplasms (D00-D09). These groups represented the most common types of cancer at that age. However, there was slight difference in the mortality rate at this age (23.2/100,000 in females and 24.8/100,000 in males). The data were similar to those originating from other European countries[27]. The incidence and mortality rate in the population 65+ of age were more than twice higher in males (2,614.9 and 2,054.2/100,000, respectively) than in females (1,290.6 and 915/100,000, respectively). The reason for this discrepancy can be found in cancers that dominated the male population at that age (cancer of the digestive system, respiratory system and males genital organs). Other reasons also encompass a late diagnosis, less successful treatment compared to the leading groups of cancer in females and possible absence of optimal health care for themselves. Preventive programmes against smoking and alcohol consumption, early detection and good nutrition can have only the long-term impact on the cancer incidence and mortality in males[4].

References rarely include data on the relative survival rate for particular ICD-10 cancer groups. Authors mostly describe single and most common cancer sites.

In the OBC 40.1% of cancer patients in the observed period survived for five years in the period from 2001 to 2005 (Table 5, Figure 4). In the USA, 66% of cancer pa-

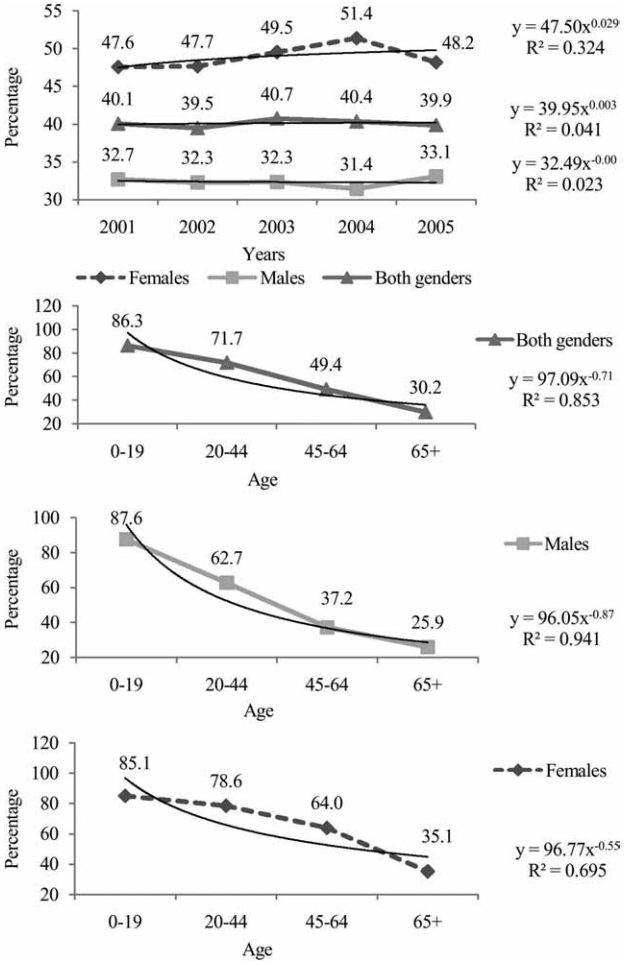

Fig. 4. The age-standardized 5-year relative survival rate for all cancers (both genders) combined by age in the OBC in the 2001-2005 period. The rising trendline in females suggest that a moderate relationship exists between 5-years relative survival rate and years, R^2=0.324 (R^2>0.16<0.49) and no evidence that would suggest that a relationship exists in males (R^2 =0023, (R^2>0.00<0.03)).

tients survived for five years after the cancer diagnosis in the period from 1996 to 2004. This (USA data) counts only for certain (selected) cancer sites. It should be noted that the health care system in Croatia provides every citizen with the highest possible level of healthcare available in Croatia. In the USA, the above data refer only to those people who had adequate medical insurance, so these data and their representativeness can be questioned. In the OBC, an apparent significant difference in the 5-year relative survival rate between males (32.4%) and females (48.8%) was detected. Compared to the OBC, in Germany was significant longer 5-year relative survival rate and smaller difference between the cancer patients by gender, where the ratio of survival was similar in favour of females, but with a significantly smaller difference between males and females[28]. The 5-year relative survival rate in females in the EU was slightly higher than in the OBC (51,2% and 48.8%, respectively), while the situation with males was adverse (39,8% and 32.4%, respectively)[29].

The age distribution of cancer patients by gender in the OBC was not significantly different from the age distribution of cancer patients in the USA[30,31]. Patients below 20 years of age on the OBC represented 1% of all patients, and their mortality was five times lower (0,2%). Greater differences from the average mortality rate for that age group were found with cancer group of malignant neoplasms of eye, brain and other parts of central nervous system (C69-C72, 5.9%), malignant neoplasms of thyroid and other endocrine glands (C73-C75, 4.2%) and malignant neoplasms of mesothelial and soft tissue (C45-C49, 4%). The differences resulted from a small number of patients belonging to that age group. Cancer patients aged 65+ made up 52.6% of all cancer patients and constituted more than 2/3 of deaths (65.4%).

On the basis of these data, it could be concluded that the concern about cancer patients in the OBC has not reached the Croatian level yet, and is far below the European one despite the human and technical capacity available in the OBC. This assertion is mostly supported by the data on 5-year relative survival.

Limitations

Patients who were treated outside the public hospital in the OBC are not registered in IPHO. Despite the efforts to obtain this information (they exist at the national level) in their original form, the authors were unable to obtain that data for unknown reasons. Therefore, the data of cancer in the OBC may differ from data of cancer for the OBC at the state level.

REFERENCES

1. BOYLE P, D'ONOFRIO A, MAISONNEUVE P, SEVERI G, ROBERTSON C, TUBIANA M, VERONESI U, Ann Oncol, 14 (2003) 1312. DOI: 10.1093/annonc/mdg353. — 2. MALVEZZI M, BERTUCCIO P, LEVI F, LA VECCHIA C, NEGRI E, Ann Oncol 23 (2012) 1044. DOI: 10.1093/annonc/mds024. — 3. FERLAY J, AUTIER P, BONIOL M, HEANUE M, COLOMBET M, BOYLE P, Ann Oncol, 18 (2007) 581. DOI: 10.1093/annonc/mdl498. — 4. LA VECCHIA C, BOSETTI C, LUCCHINI F, BERTUCCIO P, NEGRI E, BOYLE P, LEVI F, Ann Oncol, 21 (2010) 1323. DOI: 10.1093/annonc/mdp530. — 5. VERDECCHIA A, GUZZINATI S, FRANCISCI S, DE ANGELIS R, BRAY F, ALLEMANI C, TAVILLA A, SANTAQUILANI M, SANT M; EUROCARE WORKING GROUP, 45 (2009) 1042. DOI: 10.1016/j.ejca.2008.11.029. — 6. QUINN MJ, D'ONOFRIO A, MILLER B, BLACK R, MARTINEZ-GARCIA C, MULLER H, RAHU M, ROBERTSON C, SCHOUTEN LJ, LA VECCHIA C, BOYLE P, Ann Oncol, 14 (2003) 1148. DOI: 10.1093/annonc/mdg307. — 7. CABANES A, VIDAL E, ARAGONÉS N, PÉREZ-GÓMEZ B, POLLÁN M, LOPE V, LÓPEZ-ABENTE G, Ann Oncol, 21 (2010) iii14. DOI: 10.1093/annonc/mdq089. — 8. AMERICAN CANCER SOCIETY, Cancer facts and figures 2008, American Cancer Society, Atlanta, accessed 01.04.2013. Available from: URL: http://www.cancer.org/acs/groups/content/Žnho/documents/document/2008cafffinalsecuredpdf.pdf. — 9. VERDECCHIA A, SANTAQUILANI M, SANT M, Ann Ist Super Sanita, 45 (2009) 315. DOI: 10.3322/caac.20006. — 10. JEMAL A, SIEGEL R, WARD E, HAO Y, XU J, THUN MJ, CA Cancer J Clin, 59 (2009) 225. DOI: 10.3322/caac.20006. — 11. YABROFF KR, BRADLEY CJ, MARIOTTO AB, BROWN ML, FEUER EJ, J Natl Cancer Inst, 100 (2008) 1755. DOI: 10.1093/jnci/

djn383. — 12. TRTICA LM, STRNAD M, GMAJNIĆ R, EBLING B, EBLING Z, MARKOVIĆ I, SAMIJA M, Coll Antropol, 32 (2008) 709, accessed 01.04.2013. Available from: URL: http://hrcak.srce.hr/file/42822. — 13. ROSSO M, KRALJIK N, MIHALJEVIĆ I, SIRIĆ L, SOS D, VRANJES Z, Coll Antropol, 36 (2012) 107, accessed 01.04.2013. Available from: URL: http://hrcak.srce.hr/file/141995. — 14. EBLING B, KOVACIĆ L, EBLING Z, VLAHUSIĆ A, TOKALIĆ M, GLAVINA K, SERIĆ V, STRNAD M, BILIĆ A, SANTO T, SAMIJA M, JURCIĆ D, Coll Antropol, 29 (2005) 169, accessed 01.04.2013. Available from: URL: http://hrcak.srce.hr/file/8011. — 15. KRALJIK N, GMAJNIĆ R, PRIBIĆ S, MILOSTIĆ-SRB A, RUDAN S, Coll Antropol, 35 (2011) 235-9, accesssed 01.04.2013. Available from: http://hrcak.srce.hr/file/107570. — 16. BRACKLEY ME, PENNING MJ, LESPERANCE ML, Int J Equity Health, 6 (2006) 12. DOI: 10.1186/1475-9276-5-12. — 17. YOUNG JL, The hospital-based cancer registry. In: JENSEN OM, PARKIN DM, MACLENNAN R, MUIR CS, SKEET RG (Eds) Cancer registration principles and methods (Lyon, France, 1991), accessed 01.04.2013. Available from: URL: http://www.iarc.fr/en/publications/pdfs-online/epi/sp95/sp95-chap13.pdf. — 18. AHMAD O, BOSCHI-PINTO C, LOPEZ A, MURRAY C, LOZANO R, INOUE M, Age standardization of rates: a new WHO standard, World Health Organization, 2000, accessed 01.04.2013. Available from: URL: http://www.who.int/healthinfo/paper31.pdf. — 19. HEIDELBERG, GERMANY: SAS INTERNATIONAL. SAS Statistic software version 9.1. http://www.sas.com. — 20. CROATIAN NATIONAL CANCER REGISTRY, Cancer Incidence in Croatia (Croatian National Institute of Public Health, Zagreb, 2006). — 21. HOWLADER N, NOONE AM, KRAPCHO M, NEYMAN N, AMINOU R, ALTEKRUSE SF, KOSARY CL, RUHL J, TATALOVICH Z, CHO H, MARIOTTO A, EISNER MP, LEWIS DR, CHEN HS, FEUER EJ, CRONIN KA, SEER Cancer Statistics Review, 1975-2009 (Vintage 2009 Populations, National Cancer Institute, Bethesda, 2009), accessed 01.04.2013. Available from: URL: http://seer.cancer.gov/csr/1975_2009_pops09/results_merged/topic_med_age.pdf. — 22. XIAOLING NIU X, BURGER SS, PAWLISH K, GRAFF JJ, CANCER EPIDEMIOLOGY SERVICES, PUBLIC HEALTH SERVICES BRANCH, NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES, Cancer Incidence and Mortality in New Jersey (Cancer Epidemiology Services, New Jersey Department of Health and Senior Services, 2012), accessed 01.04.2013. Available from: URL: http://www.state.nj.us/health/ces/documents/report05-09.pdf. — 23. NATIONAL CANCER REGISTRI IRELAND. Cancer in Ireland 2011 (Annual report of the National Cancer Registry, 2011), accessed 01.04.2013. Available from: URL: http://www.ncri.ie/pubs/pubfiles/AnnualReport2011.pdf. — 24. RUDAN I, CAMPBELL H, RANZANI GN, STRNAD M, VORKO-JOVIĆ A, JOHN V, KERN J, IVANKOVIĆ D, STEVANOVIĆ R, VUCKOV S, VULETIĆ S, RUDAN P, Coll Antropol, 23 (1999) 547. DOI: 616-006-036.2(497.5). — 25. LEVI F, LUCCHINI F, NEGRI E, LA VECCHIA C, Ann Oncol, 18 (2007) 593. DOI: 10.1093/annonc/mdl437. — 26. LEVI F, LUCCHINI F, NEGRI E, LA VECCHIA C, Cancer, 101 (2004) 2843. DOI: 10.1002/cncr.20666. — 27. VRDOLJAK E, WOJTUKIEWICZ MZ, PIENKOWSKI T, BODOKY G, BERZINEC P, FINEK J, TODOROVIĆ V, BOROJEVIĆ N, CROITORU A; SOUTH EASTERN EUROPEAN RESEARCH ONCOLOGY GROUP, Croat Med J, 52 (2011) 478. DOI: 10.3325/cmj.2011.52.478. — 28. HABERLAND J, BERTZ J, WOLF U, ZIESE T, KURTH BM, BMC Cancer, 22 (2010) 10. DOI:10.1186/1471-2407-10-52. — 29. COLEMAN MP, GATTA G, VERDECCHIA A, ESTEVE J, SANT M, STORM H, ALLEMANI C, CICCOLALLO L, SANTAQUILANI M, BERRINO F, EUROCARE WORKING GROUP, Ann Oncol, 14 (2003) 128. DOI: 10.1093/annonc/mdg756. — 30. GLOECKLER RIES LA, REICHMAN ME, LEWIS DR, HANKEY BF, EDWARDS BK, Oncologist, 8 (2003) 541, accessed 01.04.2013. Available from: URL: http://theoncologist.alphamedpress.org/content/8/6/541.full.pdf. — 31. HOWLADER N, NOONE AM, KRAPCHO M, NEYMAN N, AMINOU R, WALDRON W, ALTEKRUSE SF, KOSARY CL, RUHL J, TATALOVICH Z, CHO H, MARIOTTO A, EISNER MP, LEWIS DR, CHEN HS, FEUER EJ, CRONIN KA, SEER Cancer Statistics Review, 1975-2009 (Vintage 2009 Populations) (National Cancer Institute. Bethesda, 2009, accessed 01.04.2013. Available from: URL: http://seer.cancer.gov/csr/1975_2009_pops09/, based on November 2011 SEER data submission, posted to the SEER web site, April 2012, accessed 01.04.2013. Available from: URL: http://seer.cancer.gov/csr/1975_2009_pops09/results_merged/topic_age_dist.pdf.

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RAK (C00-C48) U OSJEČKO-BARANJSKOJ ŽUPANIJI, HRVATSKA

S A Ž E T A K

Zavod za javno zdravstvo Osječko-Baranjske županije (OBC) je obradio podatke o oboljelima od raka koji su prikupljeni iz obvezatnih statističkih prijava zdravstvenih ustanova županije, županijskog statističkog ureda i županijske matice umrlih. Korištena je Međunarodna klasifikacija bolesti – 10-ta revizija (ICD-10) za definiranje skupina raka, neoplazme (C00-C97), karcinomi *in situ* (D00-D09) i novotvorine nesigurne ili nepoznate prirode (D37-D48). Cilj članka je prikazati veličinu problema raka u OBC koristeći se grupama raka iz ICD-10. Incidencija i mortalitet su izračunati za sve skupine raka za vremensko razdoblje 2001–2006 godine prema spolu i dobnim skupinama 0–19, 20–44, 45–64, 65+ u trenutku prvog postavljanja dijagnoze raka. Prosječna dob u trenutku prvog postavljanja dijagnoze raka je 62,7 godina, u žena 61,2 godine, a u muškaraca 64.1 godina. Prosječno godišnje oboli 411,6/100,000 (EU dobno standardizirana stopa), a umre 240,7/100,000 stanovnika OBC. Incidencija je u oba spola najviša za grupe raka probavnog sustava (C15-C26), dišne i intratorakalne organe (C30-C39) i dojku (C50) (101,1, 63,6 i 44,3/100,000). Prve dvije grupe raka u oba spola su i vodeće grupe u muškaraca (141.6 i 124,9/100,000), a na trećem je mjestu rak muških spolnih organa (C60-C63) (58/100,000). U žena je vodeća grupa raka C50 (79,3/100,000), a zatim slijede C15-C26 (73,2/100,000) i karcinom *in situ* (D00-D09) (51,4/100,000). Smjer i izgled stope smrtnosti u cijelosti prati stopu incidencije, ali na nižoj razini. Izuzetak je stopa smrtnosti u žena gdje je vodeća grupa raka C15-C26 (56,8/100,000). Prosječno 5-godišnje preživljavanje za vremensko razdoblje 2001–2005 godine je 40,1% za sva sijela u oba spola, u žena 48,8 i 32,4% u muškaraca. 52,6% oboljelih od raka obole u dobi 65+ godina, a 65,4% umiru u istoj dobi. Ovi osnovni parametri ukazuju da se u OBC moraju uložiti napori u kreiranju dugoročne strategije prevencije raka i ranijoj dijagnostici s ciljem produljenja životnog vijeka i podizanja kvalitete života oboljelih od raka te podići udio 5-godišnjeg preživljavanja.