Increasing occurrence of urological cancers in Slovakia

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Similarly as in other developed countries of the world cancers of the upper and lower urinary tract are increasing also in Slovakia. Of greater importance are urological cancers in men participating recently worldwide with 17% on all newly diagnosed cancers. In women only 3% of all incident cases occur in urological sites.

Data on incidence of urological cancers in the period 1968–1999 were derived from the National Cancer Registry, while those of mortality from the Statistical Office of the Slovak Republic. World standard population was used for the age-adjustment of both indicators. Temporal trends were evaluated using Poisson regression and computation of mean annual percent changes (MACP).

Substantial and nearly parallel increase of incidence and of mortality has been observed for prostate cancer. Despite dramatic increase of testicular cancers incidence, corresponding mortality rates remained stable with the tendency to decrease recently. Incidence and mortality rates of urinary bladder cancer in men showed tendency to peaking while in women incidence increased and mortality showed tendency to stabilization. Incidence rates of kidney cancers increased in both sexes during the whole period, followed by slow increase of mortality at substantially lower levels. With the exception of mortality from testicular cancer all analyzed trends were statistically significant.

In conclusion, only in the case of testicular cancer important reduction of mortality has been obtained despite dramatic increase of incidence. Reduction of smoking and improvement of industrial hygiene may influence the development of bladder cancer incidence and mortality. Limited resources for establishment of a concise cancer control program in this country do not allow to slow down in the near future the increase of incidence and mortality of prostate and kidneys cancers in Slovakia.

Key words: urological cancers, Slovakia, incidence, mortality, trends, structure

During previous decades an increased interest for epidemiological research of urological cancers could be observed. This tendency may be explained with increasing proportion of urinary tract cancers, mainly of prostate gland and testis in men and in a lesser extent of kidney and bladder cancers in women. The prostate gland, testicular and relatively rare penil cancers are classified as cancers of male genital organs but are commonly included in several epidemiological studies among urological cancers because of their dominant position among all diseases diagnosed and treated in the departments of urology in hospitals worldwide [3].

In the most recent estimate covering the period around 1990, out of total 4,293 500 cancer cases, registered every year in the whole world in men there were 396,100 cases of prostate cancers (9.2%), 202,500 of urinary bladder cancers (4.7%), 91,500 of kidney cancers (2.1%) and 35,600 of testicular cancers (0.8%). Urological cancers represented thus nearly 17.0% of all incident cancer cases yearly in men and around 3.1% in women [12]. Preliminary estimates indicate further increase of prostate cancers to 543,000 new cases in the year 2000, and their third most common position in men worldwide [11]. The proportion of urological cancers on deaths from all cancers was estimated as 10.4% in men and 2.6% in women in the same period worldwide [14].

As in other developed countries also in Slovakia the proportion of urological cancers increased recently, mainly influenced by rapid increase of prostate cancers in men and in lesser extent by increase of cancers of other urological sites.

Material and methods

The absolute numbers of incident cases of urological cancers notified in the years 1968–1999 in this country were derived from the main file of the National Cancer Registry of Slovakia. The urological cancers were classified using codes of the 9th revision of the International Classification of Diseases (ICD-9): 185.9 for prostate and 186.x for testicular cancers, 188.x for urinary bladder and 189.x for kidney cancers. The availability of 4-digits codes for kidney cancers enabled us to show separately the incidence trends of renal parenchymal and pelvis cancers. The codes of the 10th revision of the International Classification of Diseases (ICD-10) introduced in this country in 1994 were converted to ICD-9 to establish regular time trends of both indicators. The corresponding numbers of deaths and the age-structure of the population were obtained from the Statistical Office of the Slovak Republic and from the Institute of Health Information and Statistics in Bratislava, Slovak Republic. Availability of the absolute numbers of cases and deaths in individual age-groups and years allowed the computation of age-standardized rates (ASR) by direct method using world standard population as common denominator [7]. Temporal trends in incidence and mortality rates were evaluated by using the Poisson regression [9, 21]. In this regression it is assumed that observed numbers of cases have the Poisson distribution. The relation of standardized rates (R) and calendar year (Y) is supposed in the following way:

$R = \exp(a+b(Y=1968))$.

Parameters a, b in the model are estimated by the maximum likelihood method using Epicure software, modul Amfit [20]. Mean annual percent change (MAPC) is given by

$MAPC = 100(\exp(b) - 1)$ and $\exp(a)$ is rate expected by the model in 1968.

The time trends of incidence and mortality of urological cancers are shown in Figures. International position of incidence rates of urological cancer sites in Slovakia was assessed using data published in recent VIII. volume of the series "Cancer Incidence in Five Continents" [13] and other sources [4].

Because of very low and unchanged numbers of the incident cases and deaths from cancer of penis this site was not included in this report.

Results

In the Table 1 the development of age-adjusted incidence rates and proportions of individual urological cancers in men in Slovakia is presented for the period 1968–72 to 1993–97. Important increase of incidence rates of all urological cancers could be observed with the exception of urinary bladder cancer. The proportion of all urological cancers on all newly diagnosed cancers increased from 13.3% to more than 19% in men. In women the proportion of urological cancer sites (bladder and kidney) increased from 2.3 to 5% in the same period, caused mainly by rapid increase of kidney cancer. Urological cancers represented 14% contribution on all deaths from cancer in men and 4.5% in women in this country recently, in comparison with 10 and 2% in men and women respectively in the late 1960s.

Table 1. Development of age-adjusted incidence rates (ASR) and proportions (%) of urological cancer sites on all cancers in men in Slovakia

Time period	Prostate ASR	Prostate %	Kidney ASR	Kidney %	Bladder ASR	Bladder %	Testis ASR	Testis %	Whole proportion of urological cancers (%)
1968–72	14.0	5.9	5.1	2.1	11.1	4.7	1.5	0.6	13.3
1983–87	19.4	7.5	8.2	2.8	14.1	5.0	3.8	1.3	16.6
1993–97	24.6	8.6	13.4	4.2	14.6	4.8	5.2	1.6	19.2

The evolution of age-adjusted incidence and mortality rates of prostate gland cancer in Slovakia, during the period 1968–1999 in Slovakia is shown in the Figure 1. As could be seen, both indicators showed important and parallel increase and nearly doubled in the studied period. Prostate gland cancer is the fourth most frequent cancer in men, (after lung, colorectal and less important non-melanoma skin cancers) as well as the third most important cause of death from all cancers in men at present time in this country.

In Figure 2 the evolution of the same indicators for testicular cancer in Slovakia is shown. It is evident, that despite rapid increase of incidence the mortality rates remained stable and in addition showed tendency to decline recently.

Gradual increase but with tendency to the stabilization of incidence and mortality rates during the last years of the time period studied were observed for urinary bladder cancer in men (Fig. 3). On the other hand, rapidly increasing rates of incidence and slowly increasing rates of mortality – both indicators at the lower levels in comparison with men – were observed in women (Fig. 4).

The incidence rates of the cancers of kidney in men and women showed gradual increase during the whole period studied. The corresponding mortality rates showed less expressive but permanent increase in both sexes, which resulted in the gradually increasing differences between both rates (Fig. 5 and 6). The long-lasting increase of kidney cancer incidence was influenced in men and women predominantly by dramatic increase of cancers arising from renal parenchyma, while incidence of renal pelvis cancers remained low and stable during the whole period studied (Fig. 7). About 93% of kidney cancers were localized in

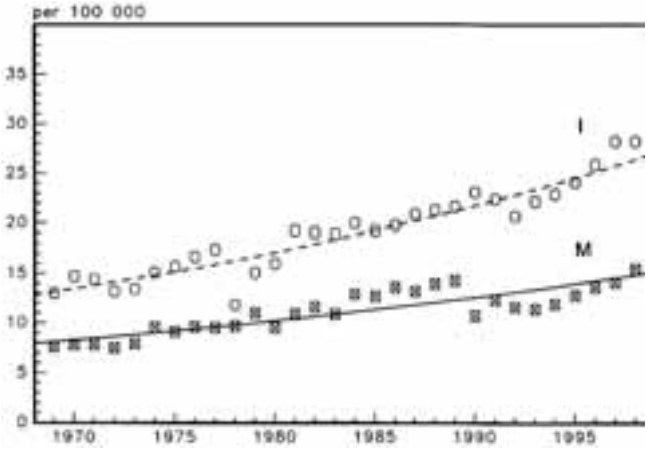

Figure 1. Trends in age-adjusted incidence (I) and mortality (M) rates of prostate gland cancer, Slovakia, 1968–1999.

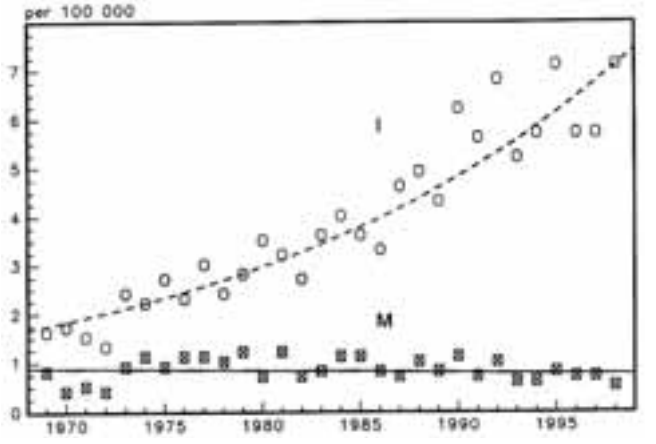

Figure 2. Trends in age-adjusted incidence (I) and mortality (M) rates of testicular cancer, Slovakia, 1968–1999.

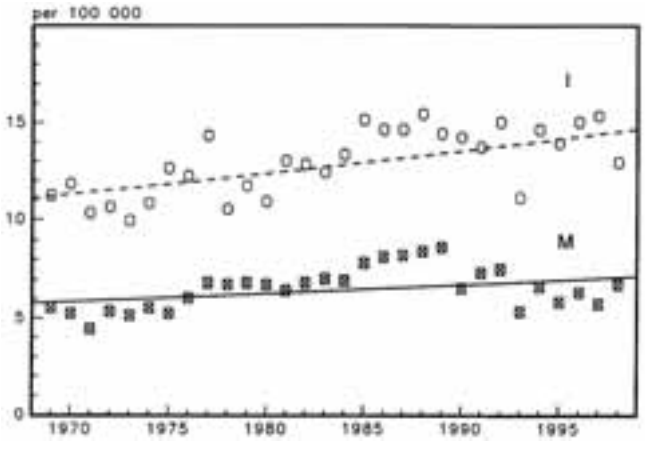

Figure 3. Trends in age-adjusted incidence (I) and mortality (M) rates of urinary bladder cancer of men, Slovakia, 1968–1999.

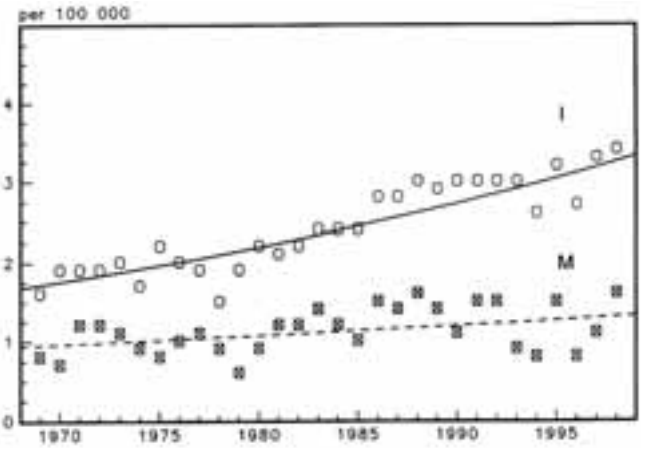

Figure 4. Trends in age-adjusted incidence (I) and mortality (M) rates of urinary bladder cancer in women, Slovakia, 1968–1999.

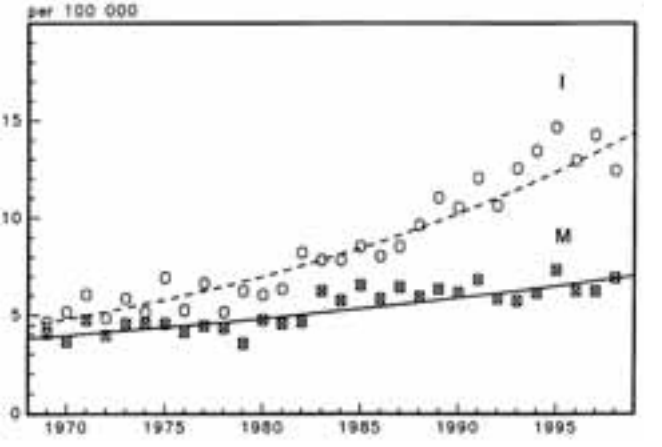

Figure 5. Trends in age-adjusted incidence (I) and mortality (M) rates of kidney cancer in men, Slovakia, 1968–1999.

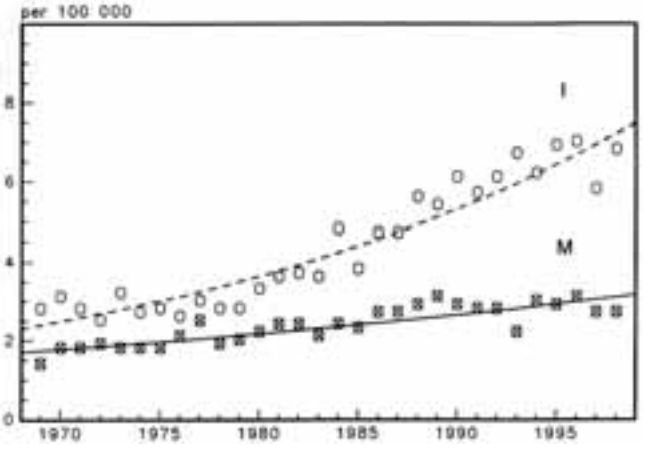

Figure 6. Trends in age-adjusted incidence (I) and mortality (M) rates of kidney cancer in women, Slovakia, 1968–1999.

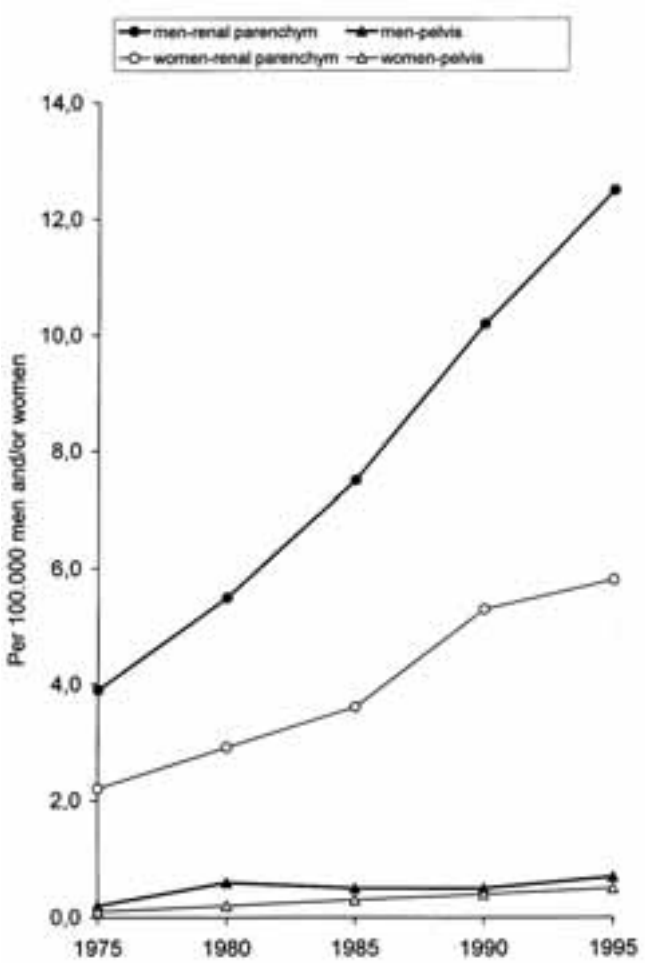

Figure 7. Trends in age-adjusted incidence rates of renal parenchymal and pelvis cancers in men and women in Slovakia, 1975–1995.

renal parenchym and only 5.5 in renal pelvis and 1.5% in ureters.

Estimated parameters (a, b) of the Poisson regression together with the mean annual percent change (MAPC) for incidence and mortality rates on the studied period are presented in Table 2.

In Table 3 the age-adjusted incidence rates and proportions of urological cancers in men in Slovakia are compared with corresponding values recorded in selected countries of the world [13]. From this comparison it is evident, that the proportions of urological cancers on all incident cancers in men are influenced mainly by the rates of prostate gland cancer showing nearly 200 fold differences among countries, regions or ethnical groups. The highest rates were recorded in some regions of USA in black men, where prostate gland cancers present nearly 40% of all urological cancers and these 45% of all incident cancer cases in men. Despite the lower rates of prostate cancer the high proportion of urological cancers in some highly developed European countries is influenced also by high incidence of

Table 2. Estimated parameters (a, b) of the Poisson regression and the MAPC with 95% CI for incidence (I) and mortality (M) rates in the period 1968–1999

Cancer site	a	b	MAPC	95% CI
Prostate gland				
I	2.552	0.024	2.4	2.3–2.6
M	2.069	0.021	2.1	1.9–2.3
Testis				
I	0.510	0.048	5.0	4.5–5.4
M	-.118	-.005	-.5	-1.3–0.3
Urinary bladder men				
I	2.408	0.009	0.9	0.7–1.1
M	1.753	0.007	0.7	0.4–1.0
Urinary bladder women				
I	0.520	0.022	2.3	1.8–2.7
M	-.060	0.011	1.1	0.6–1.7
Kidney men				
I	1.490	0.038	3.9	3.6–4.1
M	1.332	0.020	2.0	1.7–2.4
Kidney women				
I	0.835	0.038	3.8	3.5–4.2
M	0.532	0.020	2.0	1.6–2.4

MAPC – mean annual percent change, 95% CI – 95% confidence interval.

bladder and kidney and rapidly increasing rates of testicular cancers. Incidence rates and proportion of urological cancers in men in Slovakia have a medium position in Europe in connection with low rates of prostate gland cancers influenced with by relatively short life expectancy in comparison with the countries of Western and Northern Europe. On the other hand, the incidence rates of testicular cancers are relatively high, while bladder and kidney cancers have an intermediate position in comparison with other countries of Europe in men and women [4].

Discussion

As could be seen, this study is mainly based on and oriented to analysis of various aspects of incidence of urological cancer sites. The data on incidence were derived from the population based cancer registry, which are generaly accepted as more reliable than moratlity rates. This problem, the important underreporting of urological cancer as a underlying cause of death in death certificate was clearly demonstrated recently in analysis of the Surveillance, Epidemiology, and End Results (SEER) data in USA. Important proportion of deaths of urological cancer cases was attributed to non-cancer causes, from 48%, of bladder to 28% of renal pelvis and this misclassification increased in advancing clinical stage and the age of patients

Table 3. Age adjusted incidence rates (ASR) and proportions (%) of various sites of urological cancers in men in selected countries or regions, 1993–1997

Country-region	Prostate		Kidney		Bladder		Testis		Proportion (%)
	ASR	%	ASR	%	ASR	%	ASR	%	on all canc.
USA, Michigan Detroit-blacks	202.2	39.4	14.5	2.7	12.3	2.5	1.4	0.2	44.8
Australia Capital Territ.	112.3	30.3	8.5	2.6	11.3	3.0	6.1	2.2	38.1
Canada, Prince Eduard Island	108.5	31.3	13.5	3.6	17.5	5.3	2.9	0.7	40.9
Austria, Tirol	100.1	29.4	11.7	3.3	30.8	9.0	7.5	2.0	43.7
Switzerland, Zurich	77.5	26.6	9.5	2.9	24.8	8.1	10.1	2.5	40.1
Czech Republic	32.0	10.6	21.1	6.5	18.7	5.8	6.2	1.6	24.5
Slovak Republic	24.6	8.6	13.4	4.2	14.6	4.8	5.2	1.6	19.2
China, Shangai	3.0	1.9	3.0	1.5	6.2	3.5	0.7	0.3	7.2

[5]. This evidence may perhaps indicate the lower reliability of mortality rates from urological cancer also in Slovakia.

Generally it could be said that the urological cancers showed rapid increase in recent 3 decades also in this country. As could be seen from the presented results the main problem and the most important influence on the whole number of incident cases of cancer in men have malignancies of prostate gland. Prostate gland cancer burden in 1968 consisted only in 349 cases, contributed with 5.2% and occupied 6th place after lung, colon, rectal, stomach and non-melanoma skin cancer among all incident cancer cases in men. The number of prostate cancer is increasing quickly despite short and nearly unchanged life expectancy of men in this country. Prostate gland cancer contributed with 7.6% on deaths from all cancers in men in Slovakia recently. Rapidly increasing trends of incidence and mortality were observed in all developed countries of the world in recent decades [3, 13, 22]. Analysis of the international and inter-regional position in Europe indicated rather lower rates of incidence and mortality from prostate cancer in Slovakia as well as in all countries of Eastern and Southern Europe [4]. Relative 5-years (age standardized) survival rates of prostate cancer in Slovakia in the period 1985–89 studied in the EUROCARE project were higher than in other European countries where the whole population was covered with population based cancer registries [19].

More or less expressed upward trend in the incidence of testicular cancer can be seen in all developed countries of the world during recent 3 to 5 decades [8]. On the other hand, despite rapid increase of testicular cancers incidence, mortality rates in this country show not only long-term stabilization but also beginning of decline, recently. This favorable evolution of mortality (seen not only in Slovakia) could be attributed to the centralization of these patients from 1982 in the Department of Urology in the School of Medicine in Bratislava [17]. Further progress has been obtained by establishment of better cooperation of local medical institutions, out-patient clinics and hospitals with specialized centers in the departments of urology in university hospitals involved in the treatment of non-seminoma testicular cancers [16]. Recent comparison of testicular cancer occurrence in selected countries or regions of Europe showed that Slovakia could be assigned among countries with high incidence rates, not only in Eastern Europe. On the other hand, the same evaluation is valid also for relatively high mortality rates, exceeding those observed particularly in Scandinavian countries [4]. Moreover 5-year survival rates for the period 1978–1989 collected and analyzed in the frame of EUROCARE study were in Slovakia lower than those observed in the countries of Western, Northern and Southern Europe [1]. This analysis emphasizes the need and possibility of further improvement of structure of clinical stages and treatment of testicular cancers in this country.

Bladder cancer is predominantly the disease of men, but the male: female ratio varied from 3:1 to more than 5:1 being highest in Europe (3:1 in Slovakia). Incidence rates of urinary bladder cancers showed continuous increase in all economically advanced countries of the world in the mid 1980s [10]. Recently published data covering the period of 1993–1997 years indicate further increase of incidence in men and in women [13]. Mortality rates were rising more or less moderately in developed countries (with the exception of some regions in USA) simultaneously with the rise of male: female ratio [10]. In Slovakia moderate upward trend of incidence but tendency to peaking has been observed in men during recent few years which could be attributed to the decrease of profesional exposition caused by rapidly falling industrial production or, with some delay, as an ansver to the decreasing prevalence of smoking in men – the stabilization of incidence and mortality from lung cancer in men in Slovakia began in the late 1980s [18]. Comparison of age-adjusted incidence and mortality rates in European countries revealed that both rates in men and women in Slovakia have a midle position [4]. Relative, age adjusted 5-year survival of patients with bladder cancer in Slovakia, obtained in the frame of EUROCARE study indicated survival rates comparable to those seen in developed countries of Europe covered with population based cancer registries [2].

Gradually increasing incidence and mortality rates from kidney, renal pelvis and ureter cancers in both sexes permits to assign Slovakia among the countries with high rates of this cancer sites in Europe [4]. There is no tendency to the peaking or stabilization of this cancer recently. Moreover, cancer incidence rates of kidney and related urinary organs

are increasing everywhere and mortality rates parallel incidence rates in men and women could be attributed to the increasing consumption of tobacco particularly in women in developed countries of Western Europe and Northern America [10]. Proportion of adult men and women surviving 5 years after the diagnosis is in Slovakia higher or similar as in other countries of Western and Northern Europe covered completely with the population based cancer registries [6]. On the other hand the 5-year survival rates of children with Wilm's tumours are in Slovakia rather low [15].

The detailed evaluation of incidence rates of kidney cancers indicates as mentioned above all that their increase is caused by prevailing proportion of cancers arising from renal parenchyma, while cancers of renal pelvis and of ureter are very rare. The proportion of cancers arising from renal parenchym and of those situated in renal pelvis varies largely among countries of Europe and the whole world. In a great majority of populations cancer of renal parenchyma is much more common than cancer of renal pelvis and also more frequent in males. Recently only New South Wales (Australia) reported higher incidence rates of renal pelvis cancers in women than in men [13]. It was not possible to analyze separately the mortality rates of renal parenchymal and renal pelvis cancers because of the use of 3-digit code for cancer mortality in ICD-9 in the past years and underestimated numbers of deaths from renal pelvis and ureter cancers after introduction of ICD-10.

In conclusion it seems necessary to stress that the occurrence of urological cancers is growing also in this country. They need to be more deeply involved in the concise cancer control program. Reduction of the smoking prevalence and improvements in industrial hygiene as well as of diagnostics and treatment may surely improve the incidence and mortality of bladder cancer, while continuous improving of health education of the population as well as better collaboration of local medical services and hospitals with specialized centers led in recent decades to positive evolution of mortality from testicular cancers despite their gradual increase. On the other hand, positive evolution of incidence and mortality from renal parenchymal cancer which is set to become slowly one of the major cancers in highly developed countries is difficult to await unless its etiology will be known [10]. The most important problem will be the reduction of deaths from major urological cancer – of prostate gland – where only the large introduction of available methods for effective screening together with improvement of diagnostics and treatement may led to more positive evolution of mortality. For the understanding and prevention of upward trends in incidence of prostate cancer the new knowledge of its etiology is necessary [22]. Limited resources for the establishment of the concise cancer control program does not allow to await dramatic changes in the further evolution of the growing occurrence of urological cancer in Slovakia.

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