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Special Article

Nationwide Cancer Incidence in Korea, 2003～2005

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Purpose
To estimate the current cancer burden in Korea, newly diagnosed cancer cases and cancer incidence rates were calculated for the years 2003～2005.

Materials and Methods
The cancer incidence cases and rates were calculated from the Korea National Cancer Incidence Database. Crude and age-standardized incidence rates were calculated by gender for specified cancer sites in 5-year age groups.

Results
From 2003 to 2005, 398,824 cases of cancer were newly diagnosed in Korea (218,856 in men and 179,968 in women). For all sites combined, the crude incidence rate (CR) was 300.0 and 248.2 for men and women and the age-standardized incidence rate (ASR) was 297.0 and 191.2 per 100,000, respectively. Among men, five leading cancers were stomach (CR 66.0, ASR 64.2), lung (CR 48.5, ASR 50.3), liver (CR 44.9, ASR 42.1), colon and rectum (CR 37.9, ASR 37.2), and prostate cancer (CR 12.7, ASR 13.8). Among women, five leading cancers were breast (CR 37.3, ASR 29.0), thyroid (CR 36.2, ASR 28.8), stomach (CR 34.1, ASR 25.4), colon and rectum (CR 28.0, ASR 21.1), and lung cancer (CR 17.9, ASR 12.8). In the 0～14-year-old group, leukemia was the most common in both sexes; in the 15～34 group, the most common cancer was stomach cancer for men and thyroid cancer for women; in the 35～64 group, stomach cancer for men and breast cancer for women; among those 65 and over, lung cancer for men and stomach cancer, for women, respectively.

Conclusion
The cancer incidence rates have increased in recent years, and more cancers are expected to develop as Korea is quickly becoming an aged society. The cancer incidence statistics in this report can be used as an important source to effectively plan and evaluate the cancer control program in Korea.

Key words
Cancer incidence, Nationwide cancer registry, Korea

Introduction

Cancer is the leading cause of death in Korea. To estimate the cancer burden, a cancer registry is an essential component for planning and monitoring any national cancer control program (1). Since the Korea National Cancer Incidence Database (KNCIDB) for the year 1999 was first constructed in 2003, the Korea Central Cancer Registry (KCCR) has reported the annual cancer incidence rates in collaboration with eight regional population-based cancer registries, site-specific cancer registries, and the National Health Insurance Corporation (NHIC) (2,3).

This report presents the national cancer incidence rates for 2003～2005 based on the KNCIDB.

Materials and Methods

The KCCR developed a standardized form to identify cancer cases using hospital discharge records. All malignant neoplasms and *in situ* cases are classified according to the International Classification of Diseases for Oncology, 3rd edition (4) and converted according to the International Classification of Diseases, 10th edition (5). To improve the completeness of the nationwide cancer registry data, several sources of data were combined: national death certification data from the Korea National Statistical Office (KNSO), medical claims data from the NHIC, and additional medical record reviews. The KNCIDB is described in detail elsewhere (2,3). The list of KCCR-registered cases and a list of cancer cases from claims made through the NHIC for each region were sent to the regional cancer registries to find missing cases. The data collection methods at the regional cancer registries were both passive and active. From 2002 to 2008, we conducted an *ad hoc*

Table 1. Total number of cancer cases and age-standardized cancer incidence rates by gender in Korea during 2003～2005

Site	ICD-10	Males					Females				
		Cases*	%†	CR†	ASR§	Cum risk‖	Cases*	%†	CR†	ASR§	Cum risk‖
Lip, mouth, and pharynx	C00～C14	4,625	2.1	6.3	6.1	0.7	1,629	0.9	2.2	1.8	0.2
Esophagus	C15	5,410	2.5	7.4	7.6	1.0	512	0.3	0.7	0.5	0.1
Stomach	C16	48,164	22.0	66.0	64.2	7.7	24,708	13.7	34.1	25.4	2.9
Colon and rectum	C18～C20	27,640	12.6	37.9	37.2	4.5	20,275	11.3	28.0	21.1	2.5
Liver	C22	32,730	15.0	44.9	42.1	4.9	10,686	5.9	14.7	11.2	1.3
Gallbladder, etc.¶	C23～C24	5,838	2.7	8.0	8.3	1.0	5,884	3.3	8.1	5.8	0.7
Pancreas	C25	5,774	2.6	7.9	8.0	1.0	4,556	2.5	6.3	4.5	0.5
Larynx	C32	3,023	1.4	4.1	4.2	0.5	264	0.1	0.4	0.3	0.0
Lung	C33～C34	35,412	16.2	48.5	50.3	6.1	12,958	7.2	17.9	12.8	1.4
Breast	C50	160	0.1	0.2	0.2	0.0	27,049	15.0	37.3	29.0	2.9
Cervix uteri	C53	–	–	–	–	–	12,104	6.7	16.7	12.8	1.4
Corpus uteri	C54	–	–	–	–	–	3,321	1.8	4.6	3.7	0.4
Ovary	C56	–	–	–	–	–	4,536	2.5	6.3	5.1	0.5
Prostate	C61	9,260	4.2	12.7	13.8	1.6	–	–	–	–	–
Testis	C62	452	0.2	0.6	0.6	0.0	–	–	–	–	–
Kidney	C64	4,242	1.9	5.8	5.5	0.6	2,004	1.1	2.8	2.2	0.3
Bladder	C67	6,775	3.1	9.3	9.5	1.1	1,709	0.9	2.4	1.7	0.2
Brain and CNS	C70～C72	2,395	1.1	3.3	3.3	0.3	2,127	1.2	2.9	2.6	0.2
Thyroid	C73	4,167	1.9	5.7	4.8	0.5	26,230	14.6	36.2	28.8	2.8
Hodgkin's disease	C81	357	0.2	0.5	0.5	0.0	153	0.1	0.2	0.2	0.0
Non-Hodgkin's lymphoma	C82～C85, C96	4,777	2.2	6.5	6.3	0.7	3,623	2.0	5.0	4.0	0.4
Multiple myeloma	C90	1,083	0.5	1.5	1.5	0.2	955	0.5	1.3	1.0	0.1
Leukemia	C91～C95	3,801	1.7	5.2	5.5	0.5	3,048	1.7	4.2	4.0	0.4
Others	Re.C00～C97	12,771	5.8	17.5	17.8	1.9	11,637	6.5	16.0	12.6	1.3
All Cancer	C00～C97	218,856	100.0	300.0	297.0	30.0	179,968	100.0	248.2	191.2	18.7

*the total number of cases by site, †percentage of all cancers, †crude rate per 100,000 person-years, §the world age-standardized rate per 100,000 person-years, ‖cumulative risk up to age 74 years, ¶gallbladder and other and unspecified parts of biliary tract.

Table 2. Number of cancer cases by gender, age, and primary site in Korea during 2003～2005

Site	ICD-10	All ages (years)	0–	5–	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85+
Males																				
Lip, mouth, and pharynx	C00～C14	4,625	2	4	6	19	38	64	81	134	278	425	508	585	778	761	492	262	133	55
Esophagus	C15	5,410	–	–	–	–	–	2	6	11	55	176	335	627	1,132	1,266	933	508	263	96
Stomach	C16	48,164	–	1	3	7	66	186	631	1,241	2,526	3,900	4,756	5,872	8,043	8,424	6,110	3,683	2,024	691
Colon and rectum	C18～C20	27,640	–	–	4	18	35	133	297	633	1,293	2,066	2,767	3,547	4,604	4,916	3,560	2,141	1,145	481
Liver	C22	32,730	26	9	8	13	41	104	302	857	2,373	4,066	4,630	5,030	5,132	4,325	2,884	1,734	879	317
Gallbladder, etc.*	C23～C24	5,838	–	–	–	–	–	8	18	43	131	250	428	600	894	1,111	928	724	500	203
Pancreas	C25	5,774	1	1	–	1	4	10	31	80	201	335	507	623	955	1,040	839	615	377	154
Larynx	C32	3,023	–	1	–	2	2	2	6	11	45	140	253	406	602	637	442	281	137	56
Lung	C33～C34	35,412	–	1	3	8	23	33	107	245	636	1,325	2,007	3,339	5,753	7,523	6,466	4,485	2,504	954
Breast	C50	160	–	–	–	–	–	1	7	6	9	19	19	12	26	14	25	10	8	4
Prostate	C61	9,260	–	–	–	2	3	2	–	4	30	63	213	597	1,446	2,094	1,957	1,496	922	431
Testis	C62	452	38	1	7	23	68	82	82	53	39	21	9	13	5	5	1	3	2	–
Kidney	C64	4,242	44	15	9	9	11	44	101	185	343	499	460	516	627	577	402	225	124	51
Bladder	C67	6,775	4	–	2	4	11	29	72	97	197	349	468	664	1,089	1,257	1,067	798	447	220
Brain and CNS	C70～C72	2,395	91	112	104	82	97	108	140	162	180	192	178	192	199	218	154	107	57	22
Thyroid	C73	4,167	–	3	6	33	99	218	383	492	654	589	444	390	326	256	155	69	32	18
Hodgkin's disease	C81	357	2	9	12	23	30	27	32	23	31	35	27	23	30	23	15	10	5	–
Non-Hodgkin's lymphoma	C82～C85, C96	4,777	59	73	91	103	107	118	195	258	372	446	431	489	586	559	412	267	151	60
Multiple myeloma	C90	1,083	–	–	–	1	2	2	9	27	51	91	101	122	171	209	147	88	35	27
Leukemia	C91～C95	3,801	285	202	183	156	153	159	213	238	241	292	232	237	325	329	260	175	91	30
Others	Re. C00～C97	12,771	271	88	169	197	188	217	334	448	594	873	1,006	1,157	1,668	1,815	1,628	1,103	665	350
All cancer	C00～C97	218,856	823	520	607	701	978	1,549	3,047	5,248	10,279	16,152	19,779	25,041	34,391	37,359	28,877	18,784	10,501	4,220

Table 2. Continued

Site	ICD-10	All ages (years)	0–	5–	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85+
Females																				
Lip, mouth, and pharynx	C00～C14	1,629	2	9	8	10	28	50	70	85	142	166	161	149	165	178	155	116	83	52
Esophagus	C15	512	–	–	–	1	–	1	1	4	14	19	28	34	54	63	81	89	77	46
Stomach	C16	24,708	–	1	1	11	96	284	778	1,161	1,710	1,861	1,797	2,142	2,946	3,379	3,360	2,697	1,640	844
Colon and rectum	C18～C20	20,275	1	–	2	10	51	85	253	481	951	1,408	1,706	2,139	2,767	3,067	2,927	2,263	1,427	737
Liver	C22	10,686	23	3	4	7	21	36	84	174	408	660	893	1,144	1,690	1,667	1,464	1,207	781	420
Gallbladder, etc.*	C23～C24	5,884	–	–	1	1	2	11	18	62	118	204	332	471	703	907	1,038	915	680	421
Pancreas	C25	4,556	1	–	5	5	8	13	19	50	88	188	215	338	513	745	863	706	526	273
Larynx	C32	264	–	–	–	1	1	1	2	6	7	9	10	16	26	41	51	51	28	14
Lung	C33～C34	12,958	3	1	1	8	17	31	100	208	359	653	762	959	1,484	1,836	2,069	1,998	1,545	924
Breast	C50	27,049	–	–	3	9	89	411	1,576	2,896	5,140	5,838	3,589	2,620	2,108	1,281	766	392	197	134
Cervix uteri	C53	12,104	–	–	–	–	47	255	696	1,175	1,874	1,662	1,285	1,141	1,118	1,062	802	543	296	147
Corpus uteri	C54	3,321	–	–	–	5	13	72	145	186	356	607	633	500	313	208	156	81	30	16
Ovary	C56	4,536	9	27	48	78	167	154	221	268	445	611	531	459	421	373	296	214	123	91
Kidney	C64	2,004	39	9	2	5	8	25	56	84	156	186	178	215	279	255	231	164	74	38
Bladder	C67	1,709	3	–	1	–	4	15	16	30	42	76	104	106	163	255	304	254	214	122
Brain and CNS	C70～C72	2,127	86	70	81	64	56	89	114	138	138	143	139	141	170	215	198	148	92	45
Thyroid	C73	26,230	–	4	31	214	730	1,361	2,362	3,017	4,106	4,360	3,218	2,459	1,924	1,303	616	324	133	68
Hodgkin's disease	C81	153	–	1	12	16	26	23	10	7	6	6	6	6	12	7	4	4	6	1
Non-Hodgkin's lymphoma	C82～C85, C96	3,623	30	31	33	46	96	125	160	206	266	302	292	357	413	408	372	276	133	77
Multiple myeloma	C90	955	1	–	1	–	1	–	4	10	30	49	100	89	147	179	170	112	48	14
Leukemia	C91～C95	3,048	216	123	135	108	102	121	143	161	249	219	190	177	279	264	220	190	95	56
Others	Re. C00～C97	11,637	215	69	115	102	143	240	321	398	551	698	791	846	1,232	1,412	1,482	1,327	1,023	672
All cancer	C00～C97	179,968	629	348	484	701	1,706	3,403	7,149	10,807	17,156	19,925	16,960	16,508	18,927	19,105	17,625	14,071	9,251	5,212

*gallbladder and other and unspecified parts of biliary tract.

Table 3. Age-specific cancer incidence rates per 100,000 population by gender and primary site in Korea during 2003～2005

Site	ICD-10	0–	5–	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85+
Males																			
Lip, mouth, and pharynx	C00～C14	0.0	0.1	0.1	0.4	0.6	1.1	1.2	2.0	4.1	7.4	12.6	18.3	27.3	35.5	38.6	37.0	35.3	32.5
Esophagus	C15	–	–	–	–	–	0.0	0.1	0.2	0.8	3.1	8.3	19.6	39.8	59.0	73.2	71.7	69.8	56.7
Stomach	C16	–	0.0	0.1	0.1	1.1	3.1	9.1	18.7	37.5	67.8	118.1	183.9	282.7	392.8	479.1	519.9	537.0	407.8
Colon and rectum	C18～C20	–	–	0.1	0.4	0.6	2.2	4.3	9.5	19.2	35.9	68.7	111.1	161.8	229.2	279.1	302.3	303.8	283.9
Liver	C22	0.6	0.2	0.1	0.3	0.7	1.7	4.4	12.9	35.3	70.7	115.0	157.6	180.4	201.7	226.1	244.8	233.2	187.1
Gallbladder, etc.*	C23～C24	–	–	–	–	–	0.1	0.3	0.6	1.9	4.3	10.6	18.8	31.4	51.8	72.8	102.2	132.7	119.8
Pancreas	C25	0.0	0.0	–	0.0	0.1	0.2	0.4	1.2	3.0	5.8	12.6	19.5	33.6	48.5	65.8	86.8	100.0	90.9
Larynx	C32	–	0.0	–	0.0	0.0	0.0	0.1	0.2	0.7	2.4	6.3	12.7	21.2	29.7	34.7	39.7	36.4	33.1
Lung	C33～C34	–	0.0	0.1	0.2	0.4	0.5	1.5	3.7	9.5	23.0	49.8	104.6	202.2	350.8	507.0	633.2	664.4	563.1
Breast	C50	–	–	–	–	–	0.0	0.1	0.1	0.1	0.3	0.5	0.4	0.9	0.7	2.0	1.4	2.1	2.4
Prostate	C61	–	–	–	0.0	0.0	0.0	–	0.1	0.4	1.1	5.3	18.7	50.8	97.6	153.4	211.2	244.6	254.4
Testis	C62	0.9	0.0	0.1	0.5	1.1	1.4	1.2	0.8	0.6	0.4	0.2	0.4	0.2	0.2	0.1	0.4	0.5	–
Kidney	C64	1.0	0.3	0.2	0.2	0.2	0.7	1.5	2.8	5.1	8.7	11.4	16.2	22.0	26.9	31.5	31.8	32.9	30.1
Bladder	C67	0.1	–	0.0	0.1	0.2	0.5	1.0	1.5	2.9	6.1	11.6	20.8	38.3	58.6	83.7	112.7	118.6	129.8
Brain and CNS	C70～C72	2.2	2.1	1.9	1.6	1.6	1.8	2.0	2.4	2.7	3.3	4.4	6.0	7.0	10.2	12.1	15.1	15.1	13.0
Thyroid	C73	–	0.1	0.1	0.7	1.6	3.6	5.5	7.4	9.7	10.2	11.0	12.2	11.5	11.9	12.2	9.7	8.5	10.6
Hodgkin's disease	C81	0.0	0.2	0.2	0.5	0.5	0.4	0.5	0.3	0.5	0.6	0.7	0.7	1.1	1.1	1.2	1.4	1.3	–
Non-Hodgkin's lymphoma	C82～C85, C96	1.4	1.4	1.7	2.1	1.8	2.0	2.8	3.9	5.5	7.8	10.7	15.3	20.6	26.1	32.3	37.7	40.1	35.4
Multiple myeloma	C90	–	–	–	0.0	0.0	0.0	0.1	0.4	0.8	1.6	2.5	3.8	6.0	9.7	11.5	12.4	9.3	15.9
Leukemia	C91～C95	6.8	3.8	3.3	3.1	2.5	2.6	3.1	3.6	3.6	5.1	5.8	7.4	11.4	15.3	20.4	24.7	24.1	17.7
Others	Re. C00～C97	6.4	1.6	3.1	4.0	3.1	3.6	4.8	6.7	8.8	15.2	25.0	36.2	58.6	84.6	127.6	155.7	176.4	206.6
All cancer	C00～C97	19.5	9.7	11.0	14.1	16.1	25.7	43.9	79.0	152.7	280.7	491.2	784.4	1,208.9	1,741.9	2,264.2	2,651.8	2,786.3	2,490.7

Table 3. Continued

Site	ICD-10	0–	5–	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85+
Females																			
Lip, mouth, and pharynx	C00～C14	0.1	0.2	0.2	0.2	0.5	0.9	1.1	1.3	2.2	3.0	4.0	4.6	5.2	6.6	7.8	8.6	10.2	10.0
Esophagus	C15	–	–	–	0.0	–	0.0	0.0	0.1	0.2	0.3	0.7	1.0	1.7	2.3	4.1	6.6	9.5	8.9
Stomach	C16	–	0.0	0.0	0.2	1.7	4.9	11.7	18.2	26.5	33.3	45.1	65.4	92.2	125.2	168.1	200.6	201.4	162.8
Colon and rectum	C18～C20	0.0	–	0.0	0.2	0.9	1.5	3.8	7.5	14.7	25.2	42.8	65.4	86.6	113.7	146.5	168.3	175.2	142.2
Liver	C22	0.6	0.1	0.1	0.2	0.4	0.6	1.3	2.7	6.3	11.8	22.4	35.0	52.9	61.8	73.3	89.8	95.9	81.0
Gallbladder, etc.*	C23～C24	–	–	0.0	0.0	0.0	0.2	0.3	1.0	1.8	3.7	8.3	14.4	22.0	33.6	51.9	68.0	83.5	81.2
Pancreas	C25	0.0	–	0.1	0.1	0.1	0.2	0.3	0.8	1.4	3.4	5.4	10.3	16.1	27.6	43.2	52.5	64.6	52.7
Larynx	C32	–	–	–	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.8	1.5	2.6	3.8	3.4	2.7
Lung	C33～C34	0.1	0.0	0.0	0.2	0.3	0.5	1.5	3.3	5.6	11.7	19.1	29.3	46.5	68.1	103.5	148.6	189.7	178.3
Breast	C50	–	–	0.1	0.2	1.5	7.1	23.7	45.3	79.7	104.6	90.1	80.0	66.0	47.5	38.3	29.2	24.2	25.9
Cervix uteri	C53	–	–	–	–	0.8	4.4	10.4	18.4	29.1	29.8	32.3	34.9	35.0	39.4	40.1	40.4	36.3	28.4
Corpus uteri	C54	–	–	–	0.1	0.2	1.2	2.2	2.9	5.5	10.9	15.9	15.3	9.8	7.7	7.8	6.0	3.7	3.1
Ovary	C56	0.2	0.6	1.0	1.7	2.9	2.7	3.3	4.2	6.9	10.9	13.3	14.0	13.2	13.8	14.8	15.9	15.1	17.6
Kidney	C64	1.0	0.2	0.0	0.1	0.1	0.4	0.8	1.3	2.4	3.3	4.5	6.6	8.7	9.5	11.6	12.2	9.1	7.3
Bladder	C67	0.1	–	0.0	–	0.1	0.3	0.2	0.5	0.7	1.4	2.6	3.2	5.1	9.5	15.2	18.9	26.3	23.5
Brain and CNS	C70～C72	2.2	1.5	1.7	1.4	1.0	1.5	1.7	2.2	2.1	2.6	3.5	4.3	5.3	8.0	9.9	11.0	11.3	8.7
Thyroid	C73	–	0.1	0.6	4.7	12.7	23.6	35.5	47.2	63.7	78.1	80.8	75.1	60.2	48.3	30.8	24.1	16.3	13.1
Hodgkin's disease	C81	–	0.0	0.2	0.4	0.5	0.4	0.2	0.1	0.1	0.1	0.2	0.2	0.4	0.3	0.2	0.3	0.7	0.2
Non-Hodgkin's lymphoma	C82～C85, C96	0.8	0.6	0.7	1.0	1.7	2.2	2.4	3.2	4.1	5.4	7.3	10.9	12.9	15.1	18.6	20.5	16.3	14.9
Multiple myeloma	C90	0.0	–	0.0	–	0.0	–	0.1	0.2	0.5	0.9	2.5	2.7	4.6	6.6	8.5	8.3	5.9	2.7
Leukemia	C91～C95	5.6	2.6	2.8	2.4	1.8	2.1	2.1	2.5	3.9	3.9	4.8	5.4	8.7	9.8	11.0	14.1	11.7	10.8
Others	Re. C00～C97	5.6	1.4	2.4	2.2	2.5	4.2	4.8	6.2	8.5	12.5	19.9	25.8	38.6	52.3	74.2	98.7	125.6	129.6
All cancer	C00～C97	16.3	7.2	10.0	15.4	29.7	59.0	107.3	169.2	266.0	357.0	425.9	504.4	592.7	708.1	881.9	1,046.5	1,136.0	1,005.5

*gallbladder and other and unspecified parts of biliary tract.

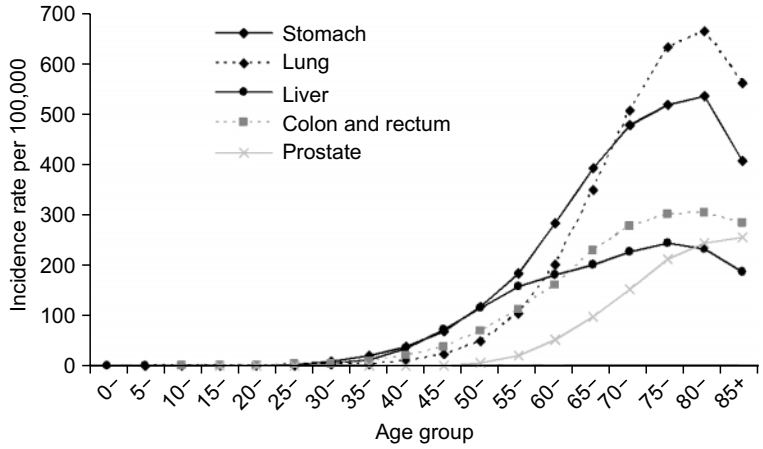

Fig. 1. Age-specific incidence rates of the five major cancers in males.

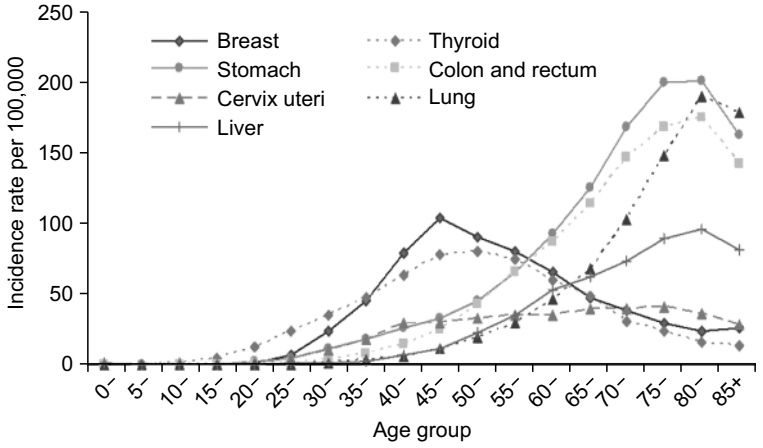

Fig. 2. Age-specific incidence rates of the seven major cancers in females.

nationwide medical record review survey of patients who were newly diagnosed during 1999～2006, and who were not registered in either registration system (hospital-based cancer registration and regional population-based cancer registration).

The KNCIDB was further refined by confirming multiple primary cancers according to the rules of the International Agency for Research on Cancer (6). Other duplicated cases were removed with the help of experts from a variety of fields, such as clinicians, pathologists, and medical records administrators.

All cancer cases newly diagnosed during 2003～2005 were included in this study. Approximately 84.4% (336,470 of 398,824 cases) were registered through the KCCR program, while 15.6% of the cases were collected through the population-based regional cancer registries, site-specific cancer registries, and other *ad hoc* medical records review surveys.

The crude incidence rate (CR) per 100,000 by gender was calculated for 18 age groups (*i.e.*, 0～4 years, 5～9 years, and groups of 5-year categories up to 85 years and over) and standardized to the WHO world standard population (7).

The population used as the denominator to calculate cancer incidence rates was the midyear population (the population on July 1) in a given year, which was estimated by taking the average of available population data from the KNSO on December 31 for 2 consecutive years (8). Detailed population was listed in appendix 1.

We calculated several indices to measure the quality of the Korean cancer registry data: the mortality/incidence (M/I) ratio and the percentages of microscopic verification (MV%), death certificate only (DCO%), primary site unknown (PSU%), and age unknown (Age UNK%) (9). For the M/I ratio, an indicator of data completeness, the mortality data on cancer by gender, age group, and site for the same period as the registered cases from the KNSO were compared to the incidence data from the registry, which are presented as percentages. The MV%, an indicator of the validity of the diagnostic information, is the percentage of cases for which the diagnosis was based on morphological verification of a tissue specimen. The DCO%, the percentage of cases registered based on death certificates only, is an index of diagnostic validity. PSU% and Age UNK% are the percentages of cases registered with unknown primary sites or unknown age, respectively. The cumulative risk for developing cancer during a specified time period was computed as the proportion of initially susceptible individuals in a population who become incident cases during a given time period, in the

Table 4. Indices of data quality by gender (Units: %)

Site	ICD-10	Males				Females			
		Cases*	MV†	DCO†	M/I§	Cases*	MV†	DCO†	M/I§
Lip, mouth, and pharynx	C00～C14	4,625	92.2	2.5	45.4	1,629	91.1	3.6	34.6
Esophagus	C15	5,410	89.8	4.5	75.1	512	69.7	13.7	77.1
Stomach	C16	48,164	92.7	3.2	46.0	24,708	89.9	4.8	48.2
Colon and rectum	C18～C20	27,640	92.7	2.3	34.4	20,275	90.2	3.2	38.6
Liver	C22	32,730	24.6	6.7	75.8	10,686	23.4	9.1	76.2
Gallbladder, etc.¶	C23～C24	5,838	55.3	7.7	82.8	5,884	51.6	8.2	80.4
Pancreas	C25	5,774	44.0	8.4	91.7	4,556	37.7	9.3	91.2
Larynx	C32	3,023	88.4	4.4	56.5	264	70.5	17.8	81.1
Lung	C33～C34	35,412	78.7	7.8	83.1	12,958	68.2	12.3	80.9
Breast	C50	160	86.9	9.4	33.1	27,049	97.5	0.9	16.7
Cervix uteri	C53	–	–	–	–	12,104	95.4	1.3	26.9
Corpus uteri	C54	–	–	–	–	3,321	98.0	0.4	12.8
Ovary	C56	–	–	–	–	4,536	87.1	4.5	44.8
Prostate	C61	9,260	91.2	2.5	28.3	–	–	–	–
Testis	C62	452	97.6	0.0	10.4	–	–	–	–
Kidney	C64	4,242	83.7	1.9	31.0	2,004	80.4	3.2	29.1
Bladder	C67	6,775	92.1	2.0	30.1	1,709	83.7	5.1	40.7
Brain and CNS	C70～C72	2,395	65.8	10.3	76.4	2,127	59.3	12.1	76.0
Thyroid	C73	4,167	98.4	0.6	7.2	26,230	98.7	0.3	2.7
Hodgkin's disease	C81	357	99.2	0.8	26.1	153	99.3	0.7	26.8
Non-Hodgkin's lymphoma	C82～C85, C96	4,777	93.9	3.4	45.2	3,623	93.5	3.4	39.3
Multiple myeloma	C90	1,083	88.7	5.8	74.2	955	84.4	5.4	70.1
Leukemia	C91～C95	3,801	89.5	5.0	64.5	3,048	88.9	5.4	63.5
Others	Re. C00～C97	12,771	83.4	4.9	43.6	11,637	81.6	6.7	40.1
All cancer	C00～C97	218,856	76.8	4.7	56.3	179,968	83.6	4.3	39.4

*the total number of cases by site, †microscopically verified, ‡death certificate only, §mortality/Incidence ratio, ‖gallbladder and other and unspecified parts of biliary tract.

absence of other competing causes of death. Cumulative risk was derived from the cumulative rate, which is the sum of each age-specific rate over each year of age from birth to a defined upper age limit. In this report, we used 74 years old as the upper age limit.

Results

Between 2003 and 2005, 398,824 cancer cases were newly diagnosed in Korea (218,856 in men and 179,968 in women). For all sites of cancer, the CRs were 300.0 and 248.2, and the age-standardized incidence rates (ASRs) were 297.0 and 191.2 per 100,000 for men and women, respectively. The overall cumulative risk for developing a cancer before the age of 74 was 30.0% for males and 18.7% for females (Table 1). In males, the five leading primary cancer sites were the stomach (CR 66.0, ASR 64.2), lung (CR 48.5, ASR 50.3), liver (CR 44.9, ASR 42.1), colon and rectum (CR 37.9, ASR 37.2), and prostate (CR 12.7, ASR 13.8). In females, the most common primary cancer sites were the breast (CR 37.3, ASR 29.0), followed by the thyroid (CR 36.2, ASR 28.8), stomach (CR 34.1, ASR 25.4), colon and rectum (CR 28.0, ASR 21.1), and lung (CR 17.9, ASR 12.8).

In the 0～14-year age group, leukemia was the most common cancer in both genders. For males, stomach cancer was the common in the 15～64-year age group, while lung cancer was more frequent in the over 65-year age group. For females, the most common forms of cancer for each age group were as follows: 15～34 years, thyroid cancer; 35～64 years, breast cancer; and stomach cancer for age 65 years and older (Tables 2, 3). Fig. 1 and 2 plot the age-specific incidence of the five and seven major cancers in men and women, respectively. In men, the incidence of the five major cancers increased gradually with age, while in women, the incidence of breast and thyroid cancers increased with age until the late 40 s and early 50 s and then subsequently decreased.

In terms of the quality indices, the KNCIDB showed acceptable values for the cancer incidence data for 2003～2005 (Table 4). In particular, the MV% of the diagnosis was 76.8% for men and 83.6% for women. The DCO% was 4.7% for men and 4.3% for women. The M/I ratio was 56.3% and 39.4% for men and women, respectively. The PSU% was 1.4% and 1.5% for the respective sexes. The Age UNK% was 0% for both men and women.

Discussion

This report presents the nationwide cancer incidence statistics for Korea during 2003～2005. Compared to cancer statistics for 1999～2002 reported in the Cancer Incidence in Five Continents, Volume IX (10), the crude cancer incidence rates during 2003～2005 increased by 21.6% (17.9% in men and 26.5% in women). While these increases might have resulted from improved completeness and the aging population in Korea during recent years, these increases in cancer incidence could be real, as the age-standardized incidence rates have also increased. A possible explanation for these increases is the change to a Westernized lifestyle, such as the high consumption of fat and less physical activity, together with early detection.

In Korean men, stomach, lung, liver, colorectal, and prostate cancers are the five most common cancers, accounting for two-thirds of the cancer burden. In Korean women, breast, thyroid, stomach, colorectal, and lung cancer account for two-thirds of the cancer burden. In particular, increases in colorectal, thyroid, prostate, and female breast cancer have been observed. The rapid increase in thyroid cancer incidence in women might be attributable to improved diagnostic techniques, leading to the detection of disease that would have gone undetected previously, rather than a true increase in the incidence of thyroid cancer, as in the United States (11).

Assessing the quality of the data for completeness and validity is essential. In particular, completeness is a critically important component (12). Various methods have been proposed to measure the completeness of registration. Using the Ajiki method (13), the completeness of incidence for 2003～2005 in Korea is 94.6%. We also evaluated the completeness and validity of the incidence data for 2003～2005 using the indices MV%, DCO%, M/I ratio, PSU%, and Age UNK%. All of the values for these indices satisfied the evaluation criteria published in the Cancer Incidence in Five Continents, Volume IX (14). Here, DCO% was 4.7% for men and 4.3% for women (improved from 6.1% for men and 5.8% for women during 1999～2002). The PSU% of the KNCIDB (1.4% for men and 1.5% for women) is relatively low compared to those of most countries (14). For Age UNK%, which rarely exceeds 1% in developed countries, only one case with an unknown age occurred in our data.

Cancer certainly has become a very important public health concern in Korea, and as Korea becomes an aged society, the cancer burden will continue to increase. The cancer incidence rates in this report can be used as an important source to plan and evaluate the cancer control program in Korea more effectively.

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Appendix 1. Total population* of Korea during 2003～2005 and the world standard population

Age group (years)	Males	Females	World†
0～4	4,220,902	3,868,110	12,000
5～9	5,338,078	4,809,133	10,000
10～14	5,506,384	4,858,316	9,000
15～19	4,984,741	4,551,485	9,000
20～24	6,088,538	5,752,891	8,000
25～29	6,016,597	5,771,690	8,000
30～34	6,939,159	6,660,742	6,000
35～39	6,644,702	6,388,685	6,000
40～44	6,730,105	6,449,713	6,000
45～49	5,753,694	5,581,927	6,000
50～54	4,026,381	3,982,377	5,000
55～59	3,192,517	3,272,964	4,000
60～64	2,844,844	3,193,546	4,000
65～69	2,144,762	2,697,956	3,000
70～74	1,275,400	1,998,495	2,000
75～79	708,340	1,344,640	1,000
80～84	376,880	814,313	500
85～	169,430	518,329	500
Total	72,961,454	72,515,312	100,000

*for a given year, the midyear population size was estimated using the average of the population on december 31 for 2 consecutive years. total population was the sum of midyear population during a given period, †the world standard population is a theoretical proportion of the world population used for standardization.

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